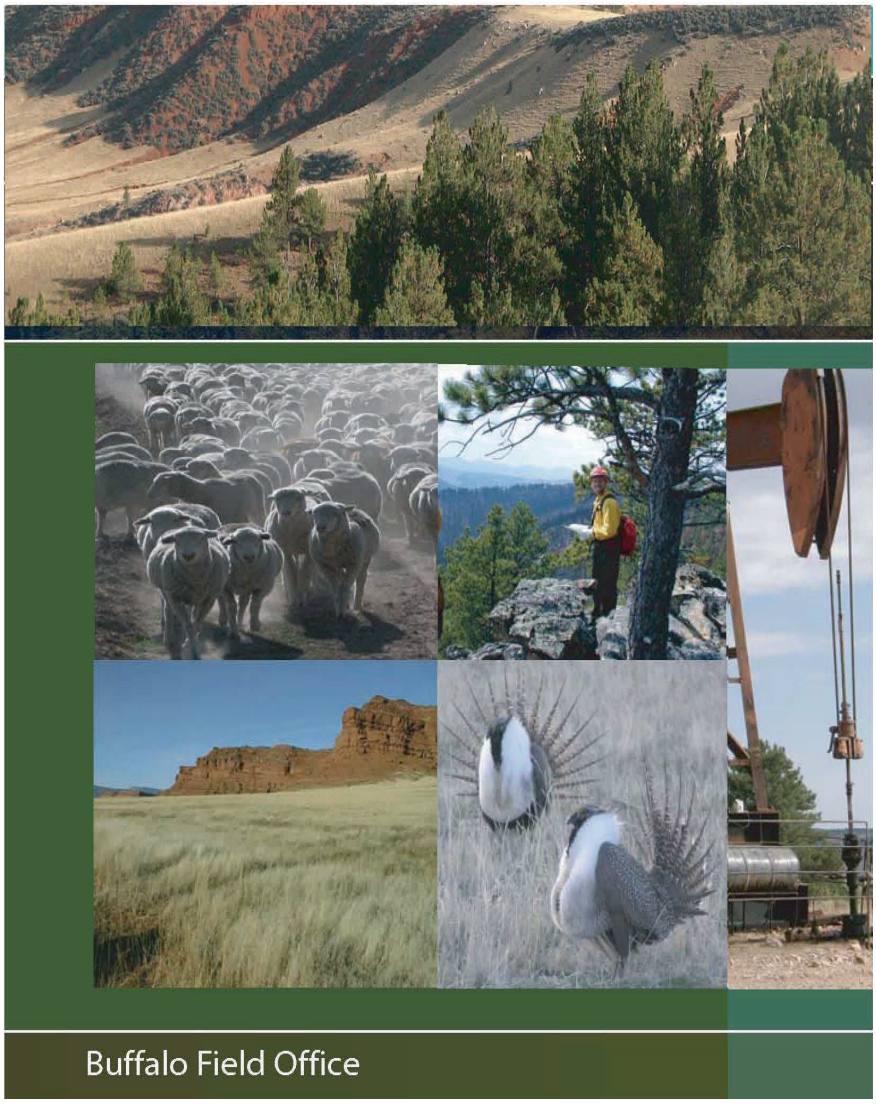
BLM

Draft Resource Management Plan and Environmental Impact Statement for the Buffalo Field Office Planning Area



Volume 3 of 3

Chapters 5 - 6, Glossary, Appendices, and Maps

June 2013

Buffalo Field Office

The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

BLM/WY/PL-13/020+1610

Volume 3 of 3

Draft Resource Management Plan and Environmental Impact Statement

for the

Buffalo Field Office Planning Area

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U.S. Department of the Interior
Bureau of Land Management
Buffalo Field Office, Wyoming

June 2013

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Chapter 6. List of Preparers

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Table 6.1. List of Preparers

Name	Project Role
Bureau of Land Management	
Thomas Bills	Project Manager/Inspector and Team Leader
Buck Damone	Technical Coordinator; Cultural Resources; Areas of Critical Environmental Concern
Christopher Carlton	State Office Lead
Duane Spencer	Buffalo Field Office Manager
Stephanie Connelly	High Plains District Office
Diane Adams	GIS Coordinator
Kerry Aggen	Geologic Resources; Mineral Resources – Other Solid Leasables, Locatable, Salable
Cindy Allen	Forests and Woodlands, Forest Products
Roy Allen	Social Conditions/ Economic Conditions/ Environmental Justice
Allison Barnes	Visual Resources; Travel and Transportation Management; Recreation; Lands with Wilderness Characteristics; Areas of Critical Environmental Concern; Back Country Byways; Wild and Scenic Rivers; Wilderness Study Areas
Brent Breithaupt	
Kristi Bulock	Fire and Fuels Management – Planned Fire (Prescribed Fire)
Jude Carino	Lands with Wilderness Characteristics; Wild and Scenic Rivers; Wilderness Study Areas
Lesley Collins	Public Affairs
Ronald Cross	ePlanning
Al Elser	Mineral Resources – Oil and Gas
Jay Esperance	Fire and Fuels Management – Unplanned/Wildland Fire
Janelle Gonzales	Stabilization and Rehabilitation; Grassland and Shrubland Communities; Riparian and Wetland Resources, Invasive Species; Livestock Grazing
Dale Hanson	Paleontological Resources; Areas of Critical Environmental Concern
Amber Haverlock	Lands and Realty, Rights-of-Way and ROW Corridor
Ken Henke	Health and Safety
Melissa Hovey	Air Quality
Melanie Hunter	Mineral Resources – Oil and Gas
Arnie Irwin	Soil
Mike Karbs	Mineral Resources – Coal
Travis Kern	
Seth Lambert	Cave and Karst Resources
Brent Lingnell	Air Resources
Jenny Morton	Fish and Wildlife; Special Status Species
Bill Ostheimer	Fish; Special Status Fish
Jerry Queen	Geologic Resources; Mineral Resources – Other Solid Leasables, Locatable, Salable
Christine Sadler	Lands and Realty; Renewable Energy; Rights-of-Way and Corridors
Lesly Smith	Travel and Transportation Management; Recreation; Areas of Critical Environmental Concern; Back Country Byways
Brent Sobotka	
Jennifer Spegon	
Dean Stilwell	Mineral Resources – Oil and Gas
Cheris Tuers	Air Quality
Jennifer Walker	Fire and Fuels Management – Unplanned Fire (Wildfire), Planned Fire (Prescribed), Emergency Stabilization and Rehabilitation
Matthew Warren	Mineral Resources – Oil and Gas
Chris Williams	Water
Mike Worden	Mineral Resources – Oil and Gas

Name	Project Role
Victor Xuan	Mineral Resources – Oil and Gas
John Zachariassen	Air Quality
Consultant	
ICF International	Interdisciplinary Team
Science Applications International Corporation (SAIC)	Interdisciplinary Team

Glossary

Access:
The opportunity to approach, enter, or cross public lands.

Accessible:
A term used to describe a site, building, facility, or trail that complies with the Architectural Barriers Act Accessibility Standards and can be approached, entered, and used by people with disabilities.

Active Nest:
A nest that could reasonably be expected to be occupied in the future; the period of time that a nest can be unoccupied but still classified as active varies and is dependent on the characteristics of the species most likely to use the nest in the future.

ADA Compliant:
The subject (facility, website, trail, etc.) meets the standards of the Americans with Disabilities Act of 1990 (ADA). For example; new facility construction or alterations that meet the ADA standards published in the Title II (28 Code of Federal Regulations [CFR] part 35) and Title III regulations (28 CFR Part 36) issued by the Department of Justice (Revised September 15, 2010).

Administrative Access:
A term used to describe access for resource management and administrative purposes such as fire suppression, law enforcement and military in the performance of their official duty, or other access needed to manage BLM-administered lands.

Administratively Unavailable:
BLM H-1601-1 – Land Use Planning, Appendix C.4 uses the term areas closed to oil and gas leasing. Areas administratively unavailable or closed to oil and gas leasing are areas where it has been determined that other land uses or resource values cannot be adequately protected with even the most restrictive oil and gas leasing stipulations; appropriate protection can be ensured only by making the areas administratively unavailable to oil and gas leasing for the life of the plan. Lands currently under lease would remain leased for the life of the leases. After expiration of these leases, no lands would be available for lease.

Allotment:
An area of land where one or more livestock operators graze their livestock. Allotments are Bureau of Land Management (BLM) lands, but may also include other federally managed, state-owned, and private lands. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Allotment Categorization:
All allotments in the Buffalo Field Office have been categorized as Improve (I), Maintain (M), or Custodial (C), based on resource values and opportunities for improvement. Allotment category refers to BLM's level of management for a given grazing allotment and is used to establish priorities for distributing available funds and personnel during plan implementation to achieve cost-effective improvement of rangeland resources. Categorization is also used to organize allotments into similar groups for purposes of developing multiple use prescriptions, analyzing site-specific and cumulative impacts, and determining trade-offs. Allotments in Category I are managed more intensively and are monitored more frequently. Allotments in

Category M are usually at a desired condition and are managed to maintain or improve that condition. Allotments in Category C are usually isolated parcels with few resource concerns that are fenced in with larger parcels of deeded land, are managed in conjunction with the permittee/lessee's normal livestock operation, and are monitored less frequently. Additional information on the categories follows:

- **I (Improve):** The category for allotments where (1) present range condition is unsatisfactory and where range condition is expected to decline further; (2) present grazing management is not adequate; (3) the allotment has potential for medium to high vegetative production but production is low to moderate; (4) resource conflicts/controversy with livestock grazing are evident; (5) there is potential for positive economic return on public investment.
- **M (Maintain):** The category for allotments where (1) the present range condition an management are satisfactory with good to excellent condition and will be maintained under present management, or fair condition and improving with improvement expected to continue under present management or opportunities for BLM management are limited because percentage of public land is low or acreage of public lands is small; (2) the allotment has a potential for moderate or high vegetative production is producing at or near this potential; (3) there are no significant land-use resource conflicts with livestock grazing; (4) land ownership status may or may not limit management opportunities; (5) opportunities for positive economic return from public investment may exist.
- **C (Custodial):** The category for allotments where (1) present range condition is not in a downward trend; (2) the allotment has a low vegetative production potential and is producing near this level; (3) there may or may not be limited conflicts between livestock grazing and other resources; (4) present management is satisfactory or is the only logical management under existing conditions; and (5) opportunities for a positive economic return on public investments do not exist.

Allotment Management Plan:
A written program of livestock grazing management, including supportive measures if required, designed to attain specific management goals in a grazing allotment.

Analysis Area:
Any lands, regardless of jurisdiction, for which the BLM synthesizes, analyzes, and interprets data for information that relates to planning for BLM-administered lands.

Animal Unit Month (AUM):
A standardized measurement of the amount of forage necessary for the sustenance of one cow unit or its equivalent for one month (approximately 800 pounds of forage).

Annual Brome:
A term which commonly refers to non-native annual brome grasses invading western rangelands. Annual brome species include, among others, cheatgrass (*Bromus tectorum*) and Japanese brome (*B. japonicas*).

Archeological Monitor:
A professional archeologist contracted to observe firsthand surface-disturbing activity occurring in areas of known or predicted cultural sensitivity and to make recommendations to protect cultural resources that may be impacted. A Monitor must meet the Secretary of the Interior's Professional Qualifications Standards (36 CFR Part 61) for an archeologist.

Archeological site:
A place which holds evidence of past human activity.

Archeology:
A method of the discovery, study and reconstruction of past human cultures from material remains such as artifacts and sites.

Area of Critical Environmental Concern (ACEC):
An area within the public lands designated for special management attention to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. According to 43 CFR 1601.0-5a, "The identification of...[an] ACEC shall not, of itself, change or prevent change of the management or use of public lands."

Areas Administratively Unavailable to Leasing:
BLM H-1601-1 - Land Use Planning, Appendix C.4 uses the term areas closed to oil and gas leasing. Areas administratively unavailable or closed to oil and gas leasing are areas where it has been determined that other land uses or resource values cannot be adequately protected with even the most restrictive oil and gas leasing stipulations; appropriate protection can be ensured only by making the areas administratively unavailable to oil and gas leasing for the life of the plan. Lands currently under lease would remain leased for the life of the leases. After expiration of these leases, no lands would be available for lease.

Artifact:
Any object made, modified or used by humans, usually but not necessarily portable.

Avoid:
A term used to address mitigation of some activity (i.e., resource use). Paraphrasing the Council on Environmental Quality (CEQ) Regulations (40 CFR 1508.20), avoidance means to circumvent, or bypass, an impact altogether by not taking a certain action, or parts of an action. Therefore, the term "avoid" does not necessarily prohibit a proposed activity, but it may require the relocation of an action, or the total redesign of an action to eliminate any potential impacts resulting from it.

Avoidance Areas:
Areas with sensitive resource values where rights-of-way (ROW) and Section 302 permits, leases, and easements would be strongly discouraged. Authorizations made in avoidance areas would have to be compatible with the purpose for which the area was designated and not be otherwise feasible on lands outside the avoidance area.

Back Country Byway:

- **Back Country Byway Type I:** Byways that are either paved or have an all-weather surface. Normal passenger cars can easily negotiate the roads. They are usually narrow, slow-speed, secondary roads. None of the byways follow the main highways.
- **Back Country Byway Type II:** Roads that require high-clearance trucks or four-wheel-drive vehicles, although passenger cars may be able to negotiate them under good conditions. These roads are not paved but often have an improved gravel surface. They often cross dry, rocky arroyos, have rough rutted sections, and have occasional steep grades and sharp curves.
- **Back Country Byway Type III:** Byways requiring four-wheel-drive vehicles and others such as dirt bikes and all-terrain vehicles (ATVs). These roads are often unimproved dirt

tracks. Expect steep grades, rocky and muddy sections, and possible route-finding. Do not attempt these byways in a two-wheel-drive vehicle, the consequences could be serious for operator/passenger and car.

- **Back Country Byway Type IV:** Trails that are managed for snowmobile, dirt bike, mountain bike, or ATV use.

Basin:

hydrologic basin: An extent of land where water from rain or snow melt drains downhill into a body of water, such as a river, lake, reservoir, estuary, wetland, sea or ocean. The basin includes both the streams and rivers that convey the water as well as the land surfaces from which water drains into those channels, and is separated from adjacent basins by a drainage divide.

geologic basin: A geographic depression in the earth's surface in which sediments accumulate over time.

Big Game Crucial Winter Range:

Winter habitat on which a wildlife species depends for survival. Because of severe weather conditions or other limiting factors, no alternative habitat would be available.

Biological Buffer Zone:

A combination of distance and screening (visual and/or audio) that reduces adverse impacts to a biological resource to an acceptable level.

BLM-administered land:

Land or interest in land owned by the United States and administered by the Secretary of the Interior through the BLM, except lands located on the Outer Continental Shelf, and land held for the benefit of Indians, Aleuts, and Eskimos.

Borrow Material:

A term typically used in conjunction with construction. The term refers to excavated material transported for use as fill at another location.

Camping:

Erecting a tent or shelter or arranging bedding, or both, or parking a vehicle for the purpose of remaining overnight on land.

Carbon Dioxide (CO_2):

A colorless, odorless, nontoxic gas that is a normal component of earth's atmosphere. One of a number of "greenhouse gases."

Carbon Dioxide (CO_2) Flood:

A CO_2 flood is an enhanced oil recovery technique that injects fluid into the reservoir. When CO_2 is injected, it mixes with the oil and the two compounds dissolve into one another. The injected CO_2 acts as a solvent to overcome forces that trap oil in tiny rock pores and helps sweep the immobile oil left behind after the effectiveness of water injection decreases, resulting in increased oil production.

Carbon Dioxide (CO_2) Sequestration, also called Carbon Capture and Storage (CCS):

A number of technologies used or proposed for capturing CO_2 and sequestering (isolating) it, to keep it from entering the atmosphere. These technologies include scrubbing (removing) the CO_2 gas from the stream of exhaust gases emitted from various industrial operations

(including coal burning at electrical generation plants), as well as liquefying the CO_2 gas and injecting it into underground reservoirs.

Casual Use:
Activities ordinarily resulting in no or negligible disturbance of the public lands, resources, or improvements (43 CFR 2801.5, 2881.5, 3150.0-5, 3200.1, 3400.0-5, 3482.1, and 3809.5).

Cave:
Any naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the earth or within a cliff or ledge, including any cave resource therein, and which is large enough to permit a person to enter, whether the entrance is excavated or naturally formed. Such term shall include any natural pit, sinkhole, or other feature that is an extension of a cave entrance or which is an integral part of the cave.

Cave Significance Criteria:
Under the Federal Cave Resources Protection Act, a cave is considered significant if it meets one or more of the following criteria (per 43 CFR 37.11(c)).

- **Biota:** The cave provides seasonal or yearlong habitat for organisms or animals, or contains species or subspecies of flora or fauna that are native to caves, or are sensitive to disturbance, or are found on state or federal sensitive, Threatened, or Endangered species lists.
- **Cultural:** The cave contains historic properties or archeological resources or other features that are included in or eligible for inclusion in the National Register of Historic Places because of their research importance for history or prehistory, historical associations, or other historical or traditional significance.
- **Geologic/Mineralogic/Paleontologic:** The cave possesses one or more of the following features: (i) Geologic or mineralogic features that are fragile, or that exhibit interesting formation processes, or that are otherwise useful for study. (ii) Deposits of sediments or features useful for evaluating past events. (iii) Paleontologic resources with potential to contribute useful educational and scientific information.
- **Hydrologic:** The cave is a part of a hydrologic system or contains water that is important to humans, biota, or development of cave resources.
- **Recreational:** The cave provides or could provide recreational opportunities or scenic values.
- **Educational or Scientific:** The cave offers opportunities for educational or scientific use; or, the cave is virtually in a pristine state, lacking evidence of contemporary human disturbance or impact; or, the length, volume, total depth, pit depth, height, or similar measurements are notable (43 CFR 37.11(c)).

Cheatgrass:
Cheatgrass is an annual grass that forms tufts up to 2 feet tall. The leaves and sheaths are covered in short, soft hairs. The flowers occur as drooping, open, terminal clusters that can have a greenish, red, or purple hue. Flowering occurs in the early summer. These annual plants will germinate in fall or spring (fall is more common), and senescence usually occurs in summer. Cheatgrass invades rangelands, pastures, prairies, and other open areas. Cheatgrass has the potential to completely alter the ecosystems it invades. It can completely replace native vegetation and change fire regimes and is most problematic in areas of the western United States with lower precipitation levels.

Class II Wells:

Injection wells

1. That are brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production, and may be commingled with wastewaters from gas plants, which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection.
2. For enhanced recovery of oil or natural gas.
3. For storage of hydrocarbons that are liquid at standard temperature and pressure.

Class I Wells:

Injection wells that are

1. Wells used by generators of hazardous waste or owners or operators of hazardous waste management facilities to inject hazardous waste beneath the lowermost formation containing, within 0.25 mile of the wellbore, an underground source of drinking water.
2. Other industrial and municipal disposal wells that inject fluid beneath the lowermost formation containing, within 0.25 mile of the wellbore, an underground source of drinking water.
3. Radioactive waste disposal wells that inject fluid below the lowermost formation containing an underground source of drinking water within 0.25 mile of the wellbore.

Climax Forest:

A relatively stable forest community that represents the final stage of ecological succession for its locality; the natural potential of a forest community. The climax community perpetuates itself indefinitely unless disturbed by outside forces.

Clinker:

A reddish, brownish, to black rock common in certain areas of the Powder River Basin, especially near and above coal outcrops. Formed when the heat produced from a coal seam fire baked and/or melted the rocks, sediments, and soils on top of the coal seam. Ranges from friable (easily broken) to very durable and hard to break. Can have a bubbly-looking appearance, which gave rise to its local name of "scoria" (a bubbly-looking volcanic rock).

Closed:

Generally denotes that an area is not available for a particular use or uses; refer to specific definitions found in law, regulations, or policy guidance for application to individual programs.

Commercial use:

Commercial use is defined as recreational use of public lands and related waters for business or financial gain. Financial gain includes gratuities, donations, gifts, bartering, etc.

Commodity:

An economic good, such as a product of agriculture or mining.

Communication Site Management Plan:

A plan that provides for effective administration of a communications site. The site plan defines the principles and technical standards adopted in the site designation. The site plan provides direction for the day-to-day operations of the site in connection with the lease. The site plan shall delineate the types of uses that are appropriate at this site and the technical and administrative requirements for management of the site. The site plan should reflect the complexity of the current situation and the anticipated demand for the site.

Community Wildfire Protection Plan (CWPP):
A plan for at risk communities that identifies and prioritizes areas for hazardous fuel reduction treatments, recommends the types and methods of treatment on federal and non-federal land that will protect one or more at-risk communities and essential infrastructure, and recommends measures to reduce structural ignitability throughout the at-risk community. A CWPP is a collaborative product involving interested parties, local government, local firefighting agencies, the state agency which oversees forest management, and federal land management agencies.

Comprehensive Weed Management Plan:
A plan for controlling invasive plant species that incorporates integrated weed management techniques and accounts for pertinent considerations, such as management actions and allocations affecting weeds.

Consumptive Use:
The use of a resource that reduces the supply. For example, removing water from a source like a river, lake or aquifer without returning an equal amount of water, reduces the supply.

Contrast:
Opposition or unlikeness of different forms, lines, colors, or texture in a landscape.

Controlled Surface Use (CSU):
Surface occupancy or use will be restricted or prohibited unless the operator and surface managing agency arrive at an acceptable plan for mitigation of anticipated impacts. Identified resource values require special operational constraints that may modify the lease rights. CSU is used for operating guidance, not as a substitute for the no surface occupancy or timing limitation stipulations.

Cultivate:
To raise crops; to water, loosen the soil, and weed around growing plants.

Cultivation:
The process of preparing the land and caring for growing crops.

Cultural Resource Inventory Levels:
A three-tiered process for discovering, recording, and evaluating cultural resources.

- **Class I** - A review of existing literature and oral informant data combined with an analysis of a specific geographic region (e.g., an area of potential effect, drainage basin, resource area, etc.).
- **Class II** - A sampling survey usually aimed at developing and testing a predictive model of cultural resource distribution.
- **Class III** - An on-the-ground survey to discover, record, and evaluate cultural resources within a specific geographic area (e.g., usually an area of potential effect for a proposed undertaking).

Culture:
The customs, beliefs, and ways of life of a group of people.

Day-use:
Visitor use during the period of one-half hour before sunrise until one-half hour after sunset. Alternatively, a day use site may post hours for a defined time (i.e., 6 a.m. until 10 p.m.).

dB (decibel):
A unit of measurement of the loudness or strength of a signal. One decibel is considered the smallest difference in sound level that the human ear can discern. Decibels are a relative measurement derived from two signal levels: a reference input level and an observed output level. A decibel is the logarithm of the ratio of the two levels. One Bel is when the output signal is 10 times that of the input and one decibel is 1/10th of a Bel.

Defer:
Postpone for the life of the plan.

Defer (Minerals):
To set-aside, or postpone, a particular resource use(s) or activity(ies) on the public lands to a later time. Generally when this term is used the period of the deferral is specified. Deferments sometimes follow the sequence timeframe of associated serial actions (e.g., action B will be deferred until action A is completed, etc.).

Deferment (Livestock Grazing):
Delay of livestock grazing on an area for an adequate period of time to provide for plant reproduction, establishment of new plants, or restoration of vigor of existing plants.

Designated Roads and Trails:
Specific roads and trails on which some type of motorized vehicle use is allowed either seasonally or year-long. Use can be defined as open to the general public or for administrative use only.

Desired Future Condition:
Landscape conditions and management scenarios that should exist for a specific land area and for a specific resource (e.g., livestock grazing or wildlife) that meet the managing agency's vision statement and objectives for ecological, economic and social considerations.

Desired Future Condition (DFC) for Riparian and Wetlands (after 20-40 years of management):

- Manage for proper functioning conditions (PFCs) on all riparian and wetland habitats.
- Riparian and wetland vegetation supports PFC of biologic, hydrologic, and physical components of streams and wetlands.
- Systems are vertically stable (no downcutting).
- Floodplain connectivity.
- Herbaceous plant communities are composed of functional and structural plant groups that are dominated by deep-rooted native species that support stream bank and shoreline stability, floodplain development, water quality, and nutrient cycling. Also includes woody species and cottonwoods within the site's potential.
- Management of invasive, noxious, and undesirable species.
- Provide 'Yellow, Red and Blue Ribbon' streams on those systems with fish habitat potential.

Desired Plant Community (DPC):
Of the several plant communities that may occupy a site, the DPC is the community that has been identified through a management plan to best meet the plan's objectives for the site. At a minimum, it must protect the site.

Developed Recreation Site:
Any designated site or location built or improved for recreation and visitor services on BLM-administered land such as a trailhead, scenic vista, interpretive site, parking area, boat launch, picnic area, potable water source, restroom or campground.

Diet:
What people and living organisms eat is their diet. A diet is a combination of foods and liquids that provide the necessary nutrients for the body.

Dispersed Recreation:
Recreation that occurs on BLM-administered lands outside of a developed recreation site or designated trail.

Disposal:
Federally owned mineral materials are disposed of through federally-approved actions, including sales and free use. Sales generate a set royalty to the federal government, typically by the ton or cubic yard, while royalty-free use is granted to municipal governments for uses in public works projects and to qualified non-profit organizations.

Disruptive Activity:
Those Public Land resource uses/activities that are likely to alter the behavior, displace, or cause excessive stress to existing animal or human populations occurring at a specific location and/or time. In this context, disruptive activity(ies) refers to those actions that alter behavior or cause the displacement of individuals such that reproductive success is adversely affected, or an individual's physiological ability to cope with environmental stress is compromised. This term does not apply to the physical disturbance of the land surface, vegetation, or features. Examples of disruptive activities may include noise, human foot or vehicle traffic, domestic livestock roundups, or other human presence regardless of the activity. When administered as a land use restriction (e.g., No Disruptive Activities), this term may prohibit or limit the physical presence of sound above ambient levels, light beyond background levels, and/or the nearness of people and their activities. The term is commonly used in conjunction with protecting wildlife during crucial life stages (e.g., breeding, nesting, birthing, etc.), although it could apply to any resource value on the Public Lands. The use of this land use restriction is not intended to prohibit all activity or authorized uses. (IB WY-2007- 029)

Disturbance Free Buffer Zone:
An area from which surface-disturbing and disruptive activities are prohibited for the protection of a resource. This is synonymous with ‘minimal human activity levels’ as described in the Greater Yellowstone Bald Eagle Management Plan (Greater Yellowstone Bald Eagle Working Group 1996). Essentially no disruptive activity with the following exceptions: (1) existing patterns of land use activities, (2) monitoring or research activities by experienced personnel, and (3) traffic that maintains a constant velocity (no stopping) and at an acceptable frequency.

Domestication:
The process of taming or making usable for humans.

Ecological Site:
A kind of land with a specific potential natural community and specific physical site characteristics, differing from other kinds of land in that the site has the ability to produce distinctive kinds and amounts of vegetation and to respond to management. Ecological sites

are defined and described with information about soil, species composition, and annual production.

Endangered Species:
Any species that is in danger of extinction throughout all or a significant portion of its range.

Enhancement:
A management action designed to improve visual quality.

Environment:
The conditions around an area that affect it. These include geography, soil, climate, plants, and animals.

Ephemeral Stream:
A stream that flows only in direct response to precipitation, and whose channel is at all times above the water table. Confusion over the distinction between intermittent and ephemeral streams may be minimized by applying Meinzer's suggestion that the term "ephemeral" be arbitrarily restricted to streams that do not flow continuously for at least 30 days (Prichard et al. 1998). Ephemeral streams support riparian areas when streamside vegetation reflects the presence of permanent subsurface water.

Epidemic:
An outbreak of a pest or disease in a high proportion of the individuals of a population in a geographic area. For example, outbreaks of bark beetles causing mortality in a large portion of pine trees in a forest.

Erosion:
The general term used for any of a group of processes whereby earth materials (rocks, soil, and sediments) are worn away, removed, and/or moved to another site. Erosion includes mechanical processes (such as physical wearing away by water and wind, and movement due to gravity), chemical processes (such as dissolution by water and the constituents in water), and biological processes (such as breaking down by plants into soil, and consumption of rocks by lichen).

Evidence:
Data which are used to prove a point, or which clearly indicate a situation.

Excavation (cultural resources):
Carefully removing layers of dirt or sediment to find objects or features made by people from long ago.

Exceedance:
An event in which measurements of ambient air quality are above the national ambient air quality standard (NAAQS) or Wyoming Department of Environmental Quality (DEQ) standard set for a particular pollutant. For example, an annual average nitrogen dioxide value of 110 $\mu g/m^3$ (microgram per cubic meter) is an exceedance of both the NAAQS and Wyoming DEQ annual average standard for nitrogen dioxide of 100 $\mu g/m^3$.

Exclusion Areas:
Areas with sensitive resource values where ROWs and 302 permits, leases, and easements would not be authorized.

Extensive Recreation Management Areas (ERMA):
See *Recreation Management Areas*.

Extinct:
No longer existing or active; died out.

Extinction:
Bring to an end, wiping out, or destruction.

Federal Mineral Estate:
Lands where all or some minerals (such as coal or oil and gas) underlying the surface are owned by the federal government.

Federal Undertaking:
A project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including:

a. those carried out by or on behalf of the agency;
b. those carried out with federal financial assistance;
c. those requiring a federal permit license, or approval; and
d. those subject to State or local regulation administered pursuant to a delegation or approval by a federal agency (16 United States Code [U.S.C.] 470w).

Fire-adapted:
An organism or plant community with the ability to survive or regenerate in an area that is vulnerable to wildland fire.

Firearm:
A loaded or unloaded pistol, rifle, shotgun, airgun or other weapon that is designed to, or may be readily converted to, expel a bullet pellets, or other projectiles by the ignition of a propellant.

Fire Management Plan:
Identifies appropriate strategies to achieve resource objectives. Identifies fire policy, objectives, and prescribed actions; may include maps, charts, tables, and statistical data.

Fire Regime Condition Class:
A classification of the amount of departure from the natural fire regime. The departure results in changes to one or more of the following ecological components: vegetation characteristics (e.g., species composition, structural stages, stand age, canopy closure, and mosaic pattern), fuel composition, fire frequency, severity, and pattern, and other associated disturbance (e.g., insect and disease mortality, grazing, and drought). The three condition classes are listed below:

Condition Class 1

- The historic disturbance regime is largely intact and functioning (e.g., has not missed a fire return interval)
- Potential intensity and severity of fire within historic range
- Effects of disease and insects within historic range
- Hydrologic functions within normal historic range
- Vegetation composition and structure resilient to disturbances
- Non-native species currently not present or to a limited extent

- Low risk of loss for key ecosystem components

Condition Class 2

- Moderate alterations to historic disturbance regime evident (e.g., missed one or more fire return intervals)
- Effects of disease and insects pose an increased risk of loss of key community components
- Riparian areas and associated hydrologic function show measurable signs of adverse departure from historic conditions
- Vegetation composition and structure shifted toward conditions less resilient to disturbances
- Populations of non-native species may have increased, increasing the risk of further increases following disturbance

Condition Class 3

- Historic disturbance regime significantly altered; historic disturbance processes and impacts may be precluded (e.g., missed several fire return intervals)
- Effects of disturbance (fire, insects, and disease) may cause significantly or complete loss of key community components
- Hydrologic functions may be adversely altered; high potential for increased sedimentation and reduced streamflows
- Invasive species may be common and in some cases the dominant species on the landscape; disturbance will likely increase both the dominance and geographic extent of these invasive species
- Highly altered vegetation composition and structure predisposes community to disturbance events outside the range of historic availability; disturbance may have effects not observed or measured before

Fire Return Interval:
The number of years between two successive fire events at a specific site or area.

Flaring/Venting:
The controlled burning (flare) or release (vent) of natural gas that cannot be processed for sale or use because of technical or economic reasons.

Floodplain Connectivity:
Maintenance of lateral, longitudinal, and vertical pathways for biological and hydrological processes in the floodplain. Examples of failures to maintain connectivity could include culverts or levees that restrict flow in the floodplain and that focus overbank flow into the channel.

Flushing Livestock:
Flushing livestock is the holding of livestock in an invasive plant species seed-free area where they are fed an invasive species seed-free ration for 72 hours, thus flushing invasive species seed from the animals' digestive systems.

Foothill:
A low hill near the base of a mountain or range of mountains.

Foreground-Middle Ground Zone:
An area that can be seen from a travel route for a distance of 3 miles (foreground) to 5 miles (middle ground) where management activities might be viewed. A distance from 5 to 15 miles is called the Background Zone and the area beyond 15 miles is called the Seldom-Seen Zone.

Fossil:
The remains or traces of an organism preserved by natural processes in the earth's crust. This would include plants and animals, their tracks, burrows, and other imprints. Fossils are considered a nonrenewable resource. The definition does not include minerals derived from fossils such as coal or oil and gas.

Geologic Resources:
Resources associated with the earth, including its composition, structure, and physical properties. Geologic resources commonly include the structure of the earth, rocks and minerals; landforms; and the processes that produce them.

Geothermal Energy:
Heat energy that occurs naturally in the earth, and that can be extracted and used. Can be either moist (containing water as steam) or dry.

Glacier:
A large mass of ice that moves slowly down a slope or valley.

Goal:
A broad statement of a desired outcome. Goals are usually not quantifiable and may not have established timeframes for achievement.

Greenhouse Gas:
A gas that absorbs and retains heat radiation. These gases include CO_2, water vapor, and methane (CH_4).

Guzzler:
A water development for wildlife.

Hazardous Fuel:
Excessive live or dead wildland fuel accumulations that increase the potential for uncharacteristically intense wildland fire and decrease the capability to protect life, property, and natural resources.

Hazardous Substance:
As defined by comprehensive environmental response, compensation, and liability act (CERCLA) 42 U.S.C. 9601(14), the term "hazardous substance" means (A) any substance designated pursuant to section 311(b)(2)(A) of the Federal Water Pollution Control Act [33 U.S.C. 1321(b)(2)(A)], (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title, (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act [42 U.S.C. 6921] (but not including any waste the regulation of which under the Solid Waste Disposal Act [42 U.S.C. 6901 et seq.] has been suspended by Act of Congress), (D) any toxic pollutant listed under section 307(a) of the Federal Water Pollution Control Act [33 U.S.C. 1317(a)], (E) any hazardous air pollutant listed under section 112 of the Clean Air Act [42 U.S.C. 7412], and (F) any imminently hazardous chemical substance or mixture

with respect to which the Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act [15 U.S.C. 2606]. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

Heavy Equipment Use:
This phrase is used in fire management and is relative to limiting fire suppression tactics. In this context it refers to not using dozers, skidders, or graders in areas where important resource values are in need of protection. Fire engines and water tenders used during suppression activities would be allowed.

Held by Production:
Leases that become productive and do not terminate until all wells on the lease have ceased production.

Highly Erosive Soil:
There are two primary erosion mechanisms, water and wind. Highly erosive soils have severe potential for erosion from one or both of these mechanisms.

Water Erosion – Water erosion is a function of soil erodibility and percent slope. Soil erodibility factor (Kw) quantifies soil detachment by runoff and raindrop impact. Factor Kw applies to the whole soil, which includes rock fragments. Kw is based primarily on percentage of silt, sand, and organic matter, soil structure, saturated hydraulic conductivity, and rock fragments. Values of Kw range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water (NRCS 2010b).

Slope gradient is the difference in elevation between two points, expressed as a percentage of the difference between those points. Representative Value Slope indicates the expected slope value for a given SMU (NRCS 2010b).

Water Erosion Hazard = Kw factor x Representative Value Slope. A water erosion hazard greater than 7 is rated severe.

Wind Erosion – The soil wind erosion hazard is estimated by the using the soil Wind Erosion Index. Wind Erosion Index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion (NRCS 2010b). A wind erosion index of (134, 160, 180, 220, 250, 310) is rated severe.

Historic:
Referring to the time after written records or after the Europeans first came and wrote about the people and events in America.

Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER):

The Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) is an integral component of the federal government's commitment to historic preservation. The program documents important architectural, engineering and industrial sites throughout the United States and its territories. A complete set of HABS/HAER documentation, consisting of measured drawings, large-format photographs, and written history plays a key role in accomplishing the mission of creating an archive of American architecture and engineering and in better understanding what historic resources tell us about America's diverse ethnic and cultural heritage. To insure that such evidence is not lost to future generations, the HABS/HAER Collections are archived at the Library of Congress, where they are made available to the public.

Historic property:

Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places maintained by the Secretary of the Interior. They include artifacts, records, and material remains related to such a property or resource (16 U.S.C. 470w).

History:

The study of past events and times through use of written and recorded sources. In some cases, oral sources may also be available.

House Pit:

A small dwelling that had a shallow excavated floor and a roof of poles covered with branches or hides.

Hunter-gatherers:

People who depend on wild animals and plants for food to survive.

Hydrogen Sulfide (H_2S):

The chemical formula for hydrogen sulfide (H_2S). This colorless, toxic and flammable gas often results from the break down of sulfites within nonorganic matter in the absence of oxygen. H_2S can occur in natural gas, swamps, volcanic gases, and well water.

Impact Analysis for Planning (IMPLAN 2000) Model:

IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the "ripple effect" (also called the "multiplier effect") of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly affected) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

Indicator:

An indicator is a component of a system whose characteristics (for example, presence, absence, quantity, and distribution) can be observed, measured, or monitored based on sound scientific principles. An indicator can be evaluated at a site- or species-specific level. Monitoring of an indicator must be able to show change within timeframes acceptable to

management and be capable of showing how the health of the ecosystem is changing in response to specific management actions. Selection of the appropriate indicators to be observed, measured, or monitored in a particular allotment is a critical aspect of early communication among the interests involved on-the-ground. The most useful indicators are those for which change or trend can be easily quantified and for which agreement as to the significance of the indicator is broad based.

Infestation:
The inhabitation of a host by large numbers of pests, such as bark beetles on pine trees.

***In Situ* Leaching or *In Situ* Recovery:**
A mining method whereby the valuable mineral(s) of a mineral deposit are removed without requiring physical extraction of the rock(s) containing the mineral(s). Also called "solution mining." Using In Situ Leaching or In Situ Recovery methods eliminates much of the tailings and waste that would be created during traditional mining methods (underground or surface mining).

Integrated Pest Management (IPM):
A pest control strategy that uses a variety of complementary strategies including: mechanical devices, physical devices, genetic, biological, cultural management, and chemical management. These methods are done in three stages: prevention, observation, and intervention. It is an ecological approach with a main goal of significantly reducing or eliminating the use of pesticides while at the same time managing pest populations at an acceptable level.

Intermittent Stream:
A stream that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas. Confusion over the distinction between intermittent and ephemeral streams may be minimized by applying Meinzer's suggestion that the term "intermittent" be arbitrarily restricted to streams that flow continuously for periods of at least 30 days (Prichard et al. 1998).

Invasive Species:
A non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order [EO] 13112).

Karst Region:
Karst topography is a landscape shaped by the dissolution of a layer or layers of soluble bedrock, usually carbonate rock such as limestone or dolomite. Due to subterranean drainage, there may be very limited surface water, even to the absence of all rivers and lakes. Many karst regions display distinctive surface features, with sinkholes or dolines being the most common. However, distinctive karst surface features may be completely absent where the soluble rock is mantled, such as by glacial debris, or confined by a superimposed non-soluble rock strata. Some karst regions include thousands of caves, even though evidence of caves that are big enough for human exploration is not a required characteristic of karst.

Key Features:
Areas or types of resource features that should guide land use allocation decisions.

Landscape character:
The arrangement of a particular landscape as formed by the variety and intensity of the landscape features and the four basic elements of form, line, color, and texture. These factors give the area a distinctive quality which distinguishes it from its immediate surroundings.

Land Tenure:
To improve the manageability of BLM-administered lands and improve their usefulness to the public, the BLM has numerous authorities for "repositioning" lands into a more consolidated pattern, disposing of lands, and entering into cooperative management agreements. These land-pattern improvements are completed primarily through the use of land exchanges, but also through land sales, jurisdictional transfers to other agencies, and through the use of cooperative management agreements and leases. These ownership or jurisdictional changes are referred as "Land Tenure Adjustments."

Leasable Minerals:
Those minerals or materials subject to lease by the federal government under the Mineral Leasing Act of 1920, the Mineral Leasing Act for Acquired Lands of 1947, and their amendments. They include, but are not limited to coal, phosphate, asphalt, sulphur, potassium, and sodium minerals, oil and gas, as well as geothermal resources; and are administered pursuant to 43 CFR Parts 3100, 3200, 3400, 3500 and 3900.

Lease:
Any contract, profit-share arrangement, joint venture, or other agreement issued or approved by the United States under a mineral leasing law that authorizes exploration for, extraction of, or removal of minerals. Federally owned leasable minerals, such as coal, oil and gas, are obtained through a lease, in which the federal government receives a set royalty for each mineral being extracted.

Lease By Application (LBA):
An application for a for a federal coal lease under a competitive, sealed-bid process (see regulations under 43 CFR 3425). Not part of regional coal leasing (described under 43 CFR 3420), the LBA process pertains to leasing individual coal tracts which will continue or extend the life of an existing mine. If an LBA meets regulatory requirements, BLM application-processing steps include: notification of the Governor of LBA receipt, ensuring the LBA conforms with the applicable Resource Management Plan, preparing site-specific environmental analysis, holding a public hearing, consulting with surface-management agencies, the Governor, Attorney General and Indian Tribes, and holding a lease sale or rejecting the application. If a sale is held, bidding is open to any qualified bidder and is not limited to the applicant. A coal lease is issued to the highest bidder, if the BLM determines that the high bid meets or exceeds the fair market value of the coal as determined by BLM's economic evaluation, and if the U.S. Department of Justice determines that no antitrust violations would result from assigning the lease to the high bidder.

Lek:
A traditional courtship display area attended by male Greater Sage-Grouse in or adjacent to sagebrush dominated habitat. A lek is designated based on observations of two or more male Greater Sage-Grouse engaged in courtship displays. Before adding the suspected lek to the database, it must be confirmed by an additional observation made during the appropriate time of day, during the strutting season. Sign of strutting activity (tracks, droppings, feathers) can also be used to confirm a suspected lek. Sub-dominant males may display on itinerant

(temporary) strutting areas during population peaks. Such areas usually fail to become established leks. Therefore, a site where small numbers of males (less than 5) are observed strutting should be confirmed active for two years before adding the site to the lek database.

Lentic:
Standing water riparian-wetland areas such as lakes, ponds, seeps, bogs, and meadows.

Limited Activity Zone:
An area from which surface-disturbing activities are prohibited, temporally or permanently, for the protection of a resource. Disruptive activities are permissible synonymous with 'light human activity levels' as described in the Greater Yellowstone Bald Eagle Management Plan (Greater Yellowstone Bald Eagle Working Group 1996). Day use and low impact activities are allowed at low densities and frequencies. Extended use activities such as oil and gas development, heavy construction, timber harvest, and concentrated use are excluded.

Limited Area:
Means an area restricted, at certain times, in certain areas, and/or to certain vehicle use. These restrictions may be of any type, but can generally be accommodated within the following type of categories: Number of vehicles, type of vehicles, time of season of vehicle use, permitted or licensed use only, use on existing roads and trails, use on designated roads and trails, and other restrictions.

Limited Reclamation Potential:
Areas possessing unique landscape characteristics (e.g., sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock-outcrops, etc.) often make meeting reclamation requirements impractical and/or unrealistic due to physical, biological, and/or chemical challenges. When disturbed, these areas may require extraordinary and/or unconventional reclamation strategies to attain reclamation success.

Locatable Minerals:
Minerals subject to exploration, development, and disposal by staking lode or placer mining claims as provided for in the Mining Law of 1872, as amended and regulated pursuant to 43 CFR subparts 3802 or 3809 regulations. This includes deposits of metallic minerals containing gold, silver and uranium; nonmetallic minerals such as bentonite and gypsum; and uncommon variety minerals not subject to disposal under the 43 CFR Part 3600 regulations. There is no royalty to the federal government associated with the extraction of locatable minerals from public lands.

Lotic:
Running water riparian-wetland areas such as rivers, streams and springs.

Major Right-of-Way:
Pipelines 16 inches or greater pipelines or surface-disturbing activities greater than 50 feet.

Medicinal/Ceremonial Plants:
Plants in Native American culture that serve an important function in spiritual or social ritual or that are believed to provide therapeutic benefit.

Methanogenesis:
The production of CH_4 under anaerobic conditions by biological processes that are carried out by single celled microorganisms (methanogens).

Mineral Entry:
Areas "open to mineral entry" are areas that are open to the operation of the mining laws; locatable minerals may be explored and/or developed in these areas. Areas "closed to mineral entry" are those areas which are closed to the operation of the mining laws; locatable minerals may not be explored for or developed in these areas.

Mineral Leasing Deferral:
The postponement of the offering of a parcel in a mineral lease sale. Reasons for postponement may involve concerns about the impacts of mineral development on other resources and/or involve parcels on federal lands with land use plans that are currently being revised or amended.

Mineral Materials (Salable Minerals):
Materials such as common varieties of sand, stone, gravel, pumice, pumicite, and clay that are not obtainable under the mining or leasing laws, but can be acquired under the Mineral Materials Act of 1947, as amended.

Mineral Withdrawal:
A formal order that withholds federal lands and minerals from entry under the Mining Law of 1872, as amended, and closes the area to mineral location (i.e., staking of mining claims and sites) and exploration and development pursuant to the 43 CFR Subparts 3802 and 3809.

Mining Claims, and Location of Mining Claims:
A "mining claim" can be located on any area for which all mineral are reserved by the federal government, and which are not closed to mineral entry. A mining claim gives the claimant the royalty-free right to explore for and develop the locatable minerals contained on the claim, given the claimant follows all applicable state and federal laws and regulations (including those under 43 CFR 3800).

Mitigation:
Includes:

a. Avoiding the impact altogether by not taking a certain action or parts of an action.
b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
d. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
e. Compensating for the impact by replacing or providing substitute resources or environments.

Mitigation Measures:
Methods or procedures designed to reduce or lessen the adverse impacts caused by management activities.

Motor Vehicle or Motorized Vehicle:
Any device that is moved or propelled by an internal combustion engine or electrically powered motor. It shall include, but not be limited to automobiles, trucks, motorcycles, ATVs, motor bikes, motor-scooters and off-road vehicles, whether or not they can be licensed to operate on public roads. The term does not include vessels or personal mobility assistive devices, such as wheelchairs.

Multiple Use Reservoir:
A human-created lake or pond with a combination of balanced uses, including, but not limited to, recreation, livestock watering, watershed health, and wildlife and fish.

Native American:
The first people living in North and South America. Many groups of people today are Native Americans and have ancestors who lived on these continents for thousands of years before Columbus came. They are also called American Indian, First American, Alaska Native and Native People.

Native American Monitor:
An official representative of a Native American tribe who monitors projects that may impact cultural resources significant to their tribe. The Monitor participates and obtains firsthand knowledge of archeological excavations and surface-disturbing activities in areas that are known to have cultural sensitivity or have the potential for cultural sensitivity. The Native American Monitor should be knowledgeable about his or her culture and its traditions, and be familiar with archeological practices, as well as federal and state laws and regulations regarding Native American cultural concerns.

Native Species Status:
Native Species Status (NSS) refers to the population status of species native to the area in which their habitats occur. The NSSs are divided into the following categories:

NSS1 Native Species Status 1

- Populations are greatly restricted or declining, extirpation appears possible; or ongoing significant loss of habitat.

NSS2 Native Species Status 2

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

NSS3 Native Species Status 3

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

NSS4 Native Species Status 4

- Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted
  OR

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

Natural Fire Regime:
The general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993; Brown 1995).

Necessary Tasks (Clause):
Work requiring the use of motor vehicles. Examples include using motor vehicles to repair range improvements, manage livestock, perform geophysical exploration activities and other types of leasable mineral exploration activity (other than casual use), and performing mining claim functions resulting in less than five acres of surface disturbance as described in 43 CFR 3809.

Nonconsumptive Use:
The use of a resource that does not reduce the supply. For example, wildlife viewing does not reduce the supply of wildlife as opposed to big game hunting, which reduces the supply of big game.

No-net Gain:
The result of land tenure adjustments that result in no overall acreage gain in public land.

No Surface Occupancy:
A mineral lease stipulation where use or occupancy of the land surface for mineral exploration or development is prohibited to protect identified resource values.

Noxious Weed:
In Wyoming, a noxious weed is a legal designation of plants under the Wyoming Weed and Pest Control Act.

Objective:
A description of a desired condition for a resource. Objectives can be quantified and measured and, where possible, have established timeframes for achievement.

Occupied Lek:
A lek that has been active during at least one strutting season within the last 10 years.

Off-Highway Vehicle (OHV):
Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding (1) any nonamphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially

approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used in times of national defense emergencies.

Off-Highway Vehicle (OHV) Management Designations:
Used by federal agencies in the management of OHVs on public lands. Refers to the land use planning decisions that permit, establish conditions, or prohibit OHV activities on specific areas of public lands. All public lands are required to have OHV designations (43 CFR 8342.1). The CFR requires all BLM-administered public lands to be designated as "open", "limited", or "closed" to off-road vehicles, and provides guidelines for designation. The definitions of open, limited, and closed are provided in 43 CFR 8340.0-5 (f), (g), and (h), respectively.

Closed: Motorized vehicle travel is prohibited in the area. Access by means other than motorized vehicle, such as mechanized or non-motorized use, is permitted. Areas are designated closed if closure to all vehicular use is necessary to protect resources, promote visitor safety, or reduce use conflicts (see 43 CFR 8340.0-5).

Open: Motorized vehicle travel is permitted year-long anywhere within an area designated as "open" to OHV use. Open designations are used for intensive OHV use areas where there are no special restrictions or where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel (See 43 CFR 8340.0-5).

Limited:

a. Motorized vehicle travel within specified areas and/or on designated routes, roads, vehicle ways, or trails is subject to restrictions. The "limited" designation is used where OHV use must be restricted to meet specific resource management objectives. Examples of limitations include number or type of vehicles; time or season of use; permitted or licensed use only; use limited to designated roads and trails; or other limitations if restrictions are necessary to meet resource management objectives, including certain competitive or intensive use areas that have special limitations (see 43 CFR 8340.0-5).
b. Vehicle travel may be permitted only on roads and vehicle routes designated by the BLM. In areas where final designation has not been completed, vehicle travel is limited to existing roads and vehicle routes as described above. Designations would be posted as appropriate stating:
    1. Vehicle route is open to vehicular travel.
    2. Vehicle route is closed to vehicular travel.
c. Vehicle travel may be limited by number or type of vehicle. Designations would be posted as appropriate stating:
    1. Vehicle route limited to four-wheel drive vehicles only.
    2. Vehicle route limited to motorbikes only.
    3. Area is closed to over-snow vehicles.
    4. Vehicle travel is limited to licensed or permitted use.
    5. Vehicle travel is limited to time or season of use.
    6. Where specialized restrictions are necessary to meet resource management objectives, other limitations also may be developed.

The BLM may place other limitations, as necessary, to protect other resources, particularly in areas with intensive OHV use. Where off-road vehicles are causing or will cause considerable

adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, threatened or endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence.

Old Growth Forest:
Ecosystem distinguished by old trees and related structural features. Old growth encompasses the later stages of stand development that typically differs from earlier stages in several ways, including tree size; accumulation of large, dead woody material; number of canopy layers; species composition; and ecosystem function.

Open:
Generally denotes that an area is available for a particular use or uses. Refer to specific program definitions found in law, regulations, or policy guidance for application to individual programs.

Organized Event:
A structured, ordered, consolidated, or scheduled event or occupation of public lands or related waters for recreation use that is not commercial or competitive, and that the BLM has determined needs a special recreation permit based on planning decisions, resource concerns, potential user conflicts, and/or public health and safety. The threshold for requiring a permit is determined for relevant management areas (for example, 10 people in a sensitive riparian area may constitute an organized group, but a less sensitive upland area may be able to handle 200 people without the need for special management).

Outbreak:
The infestation of a relatively small and contained grouping of trees by bark beetles.

Overgrazing:
Continued heavy grazing that exceeds the recovery capacity of the forage plants and creates deterioration of the grazing lands (Valentine 1990).

Paleontological Locality:
A geographic point or area where a fossil or associated fossils are found in a related geological context. A paleontological locality is confined to a discrete stratigraphic layer, structural feature, or physiographic area.

Paleontology:
The study of ancient plants and animals now known only from fossil remains.

Perennial Stream:
A stream that flows continuously. Perennial streams generally are associated with a water table in the localities through which they flow (Prichard et al. 1998).

Pest:
With the exception of vascular plants classified as invasive plant species, a pest can be any biological life form that poses a threat to human or ecological health and welfare. For the purposes of this planning effort, an "animal pest" is any vertebrate or invertebrate animal subject to control by Animal and Plant Health Inspection Service (APHIS). APHIS is

currently BLM's authorized agent for controlling "animal pests." For this reason, "animal pests" will be considered a subset of Pest.

Petroglyph:
Pictures created on rock faces by removing a portion of the rock by pecking, abrading, incising, or scratching.

Pictograph:
Picture created on a rock face by applying pigment or charcoal.

Planning Area:
A geographic area for which land use and resource management plans are developed and maintained.

Potential Fossil Yield Classification:
Geologic units are classified according to the Potential Fossil Yield Classification system, usually at the formation or member level, based on the relative abundance of significant fossils and their sensitivity to adverse impacts. The classification uses a ranking of 1 through 5, with Class 5 assigned to units with a very high potential for fossils. The classifications are described below.

Class 1 – Very Low: Igneous or metamorphic geologic units, or other units not likely to contain recognizable fossil remains. Management concern is negligible for Class 1 units and mitigation requirements are rarely necessary.

Class 2 – Low: Sedimentary geologic units that are not likely to contain vertebrate fossils or significant nonvertebrate fossils. Management concern is low for Class 2 units and mitigation requirements are not likely.

Class 3 – Moderate or Unknown: Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential. Management concern may extend across the entire range of management. Ground-disturbing activities require sufficient assessment to determine whether significant resources occur in the area of the proposed action, and whether the action could affect the paleontological resources. Predisturbance surveys, monitoring, or avoidance procedures may be necessary.

Class 4 – High: Geologic units containing known occurrences of significant fossils, but these occurrences may vary in local abundance and predictability. Management concern is moderate to high, depending on the potential impacts of the proposed action and local geologic conditions. Predisturbance field surveys are often needed, and avoidance or onsite monitoring may often be necessary during project activities.

Class 5 – Very High: Highly fossiliferous geologic units that consistently and predictably produce significant fossils, and that are at risk of human-caused adverse impacts or natural degradation. Class 5 areas merit a high level of management focus. Mitigation of ground-disturbing activities, including Predisturbance surveys, onsite monitoring, or avoidance procedures, are nearly always necessary. These units are often the focus of illegal collecting activities. Special management designations may be appropriate for protection or interpretation.

Potential Natural Community:
The biotic community that would become established if all successional sequences were completed without interference by humans under the present environmental conditions. Natural disturbances are inherent in development. Potential Natural Communities can include naturalized non-native species.

Prairie Dog "Complex":
Defined as a cluster of two or more prairie dog towns within 3 kilometers of each other (Clark and Stromberg 1987), and bounded by either natural or artificial barriers (Whicker and Detling 1988) which effectively isolate one cluster of colonies from interacting/interchanging with another. Prairie dogs may commonly move among colonies of a cluster, and thereby foster reproductive/genetic viability, but exhibit little emigration/immigration between clusters. A cluster may include some currently unoccupied, through physically suitable (i.e., vegetation, soils, topography, etc.), land immediately adjacent to occupied colonies that support other prairie dog-associated (ecosystem function), obligate or facultative species (e.g., swift fox, mountain plover, burrowing owl).

Prehistory/Prehistoric:
Information about past events prior to the recording of events in writing. The period of prehistory differs around the world depending upon when written records became common in a region.

Prescribed Burning:
Application of fire to wildland fuels in either their natural or modified state under specified environmental conditions that allow the fire to be confined to a predetermined area and at the same time to produce the fire intensity and rate of spread required to attain planned resource management objectives.

Prescribed Fire:
A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which the National Environmental Policy Act requirements (where applicable) have been met prior to ignition.

Primitive and Unconfined Recreation:
Nonmotorized, nonmechanized (except as provided by law), and undeveloped types of recreational activities. Bicycles are considered to constitute mechanized transport.

Priority Fish Species:
Priority fish species are species considered to be sport fish and native species.

Produced Water:
Groundwater removed to facilitate the extraction of minerals, such as coal, oil, or gas.

Proper Functioning Condition:
See *Riparian/Wetland Functionality Classification*.

Proper Grazing:
Proper grazing is the practice of managing forage use by grazing animals at a sustainable level that maintains rangeland health. Proper grazing will maintain or increase plant cover, including residue, which acts to slow down or reduce runoff, increase water infiltration, and

keep erosion and sedimentation at or above acceptable levels within the potential of ecological sites within a given geographic area (e.g., watershed, grazing allotment).

Range Improvement Project:
A structural improvement requiring placement or construction to facilitate management or control distribution and movement of grazing or browsing animals. Such improvements may include, but are not limited to, fences, wells, troughs, reservoirs, water catchments, pipelines, and cattleguards. The project also may include a practice or treatment which improves rangeland condition and or resource production for multiple use. Nonstructural types of projects may include, but are not limited to, seeding and plant control through chemical, mechanical, and biological means or prescribed burning.

Rangeland:
Land on which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing. This includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangelands include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

Rangeland Health:
The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained.

Raptor:
Bird of prey with sharp talons and a strongly curved beak, such as hawks, falcons, owls, vultures, and eagles.

Raptor Species of High Federal Interest or Conservation Concern:
Bird of prey species that the U.S. Fish and Wildlife Service (USFWS) and the BLM have identified as high interest species. Species selection is based on national importance or public value, the potential for regional decline, regional jeopardy, or long-term impact, and status as an indicator species.

Reclamation:
Taking measures following disturbance of public lands caused by operations to meet applicable performance standards and achieve conditions required by the BLM at the conclusion of operations. Components of reclamation include, where applicable: (1) Isolation, control, or removal, of acid-forming, toxic, or deleterious substances; (2) Regrading and reshaping to conform with adjacent landforms, facilitate revegetation, control damage, and minimize erosion; (3) Rehabilitation of fisheries or wildlife habitat; (4) Placement of growth medium and establishment of self-sustaining revegetation; (5) Removal or stabilization of buildings, structures, or other support facilities; (6) Plugging of drill holes and closure of underground workings; and (7) Providing for post-mining monitoring, maintenance, or treatment. (43 CFR 3809.5)

Initial Reclamation: Occurs as soon as possible after the surface is disturbed.

Interim Reclamation: Occurs on all disturbed areas not needed for active support of to minimize the environmental impacts of development on other resources and uses.

Final Reclamation: Occurs at the end of the project and the character and productivity of the land and water are restored.

Reclamation Suitability:
The inherent ability of the soil to recover from impacts; often referred to as soil resilience.

Recreation Management Areas:
Recreation management areas are units within a planning area guiding recreation management on public lands having similar recreation related issues and concerns. There are two types of recreation management areas: extensive and special.

Extensive Recreation Management Areas (ERMA): an administrative unit that requires specific management consideration in order to address recreation use, demand, or recreation and visitor services program investments. ERMAs are managed within the recreation program to support and sustain the principal recreation activities and the associated qualities and conditions of the ERMA, commensurate with the management of other resources and resource uses. Management actions within ERMAs focus on access to the public lands, conflict resolution, resource protection and visitor health and safety.

Special Recreation Management Areas (SRMA): an administrative unit where the existing or proposed recreation opportunities and recreation setting characteristics are recognized for their unique value, importance and/or distinctiveness, especially as compared to other areas used for recreation. SRMAs are areas where recreation is recognized as the predominant LUP focus, where specific recreation opportunities and recreation setting characteristics are managed and protected on a long-term basis.

Rehabilitation:
Altering or reclaiming a degraded habitat in order to improve ecological function.

Resource Reserve Allotment:
A unit of public land that will not have term grazing permits issued. Such an allotment would only be grazed on a temporary, nonrenewable basis to provide temporary grazing to rest other areas following wildfire, habitat treatments, or to allow for more rapid attainment of rangeland health. The allotment must be of sufficient size to be managed as a discrete unit. Resource reserve allotments should be distributed throughout the planning area.

Rest (livestock grazing):
Leaving an area ungrazed, thereby foregoing grazing of one forage crop. Normally rest implies absence of grazing for a full growing season or during a critical portion of plant development; i.e., seed production.

Restricted Disposal:
Parcels identified for restricted disposal may be disposed of under the Recreation and Public Purposes Act, by exchange, may limit the disposal to a particular type of entity capable of preserving the resource values, or may include the use of covenants in the deed or land sale patent to ensure the resource values are protected.

Right-of-Way (ROW):
A ROW grant is an authorization to use a specific piece of public land for a specific project, such as roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time.

Riparian:

A form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Included are ephemeral streams that have vegetation dependent upon free water in the soil. All other ephemeral streams are excluded.

Riparian/Wetland Functionality Classification:

Functional-at-Risk: Riparian/wetland areas that are in functional condition, but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

Proper Functioning Condition (PFC): A riparian or wetland area is considered to be in PFC when adequate vegetation, landform, or large woody debris is present to do the following:

- Dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality
- Filter sediment, capture bedload, and aid floodplain development
- Improve floodwater retention and groundwater recharge
- Develop root masses that stabilize stream banks against cutting action
- Develop diverse ponding and channel characteristics to provide the habitats and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses
- Support greater biodiversity

Nonfunctional: Riparian or wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, and so on, as listed above. The absence of certain physical attributes, such as a floodplain where one should be, are indicators of nonfunctioning conditions.

Unknown: Riparian or wetland areas that the BLM lacks sufficient information on to make any form of determination.

Rock Shelter:

A shallow, cave-like opening at the base of a bluff or cliff.

ROW Avoidance Areas:

Areas where adverse routing factors exist. ROWs either will not be granted in these areas, or – if granted – will be subject to stringent terms and conditions. In other words, ROWs would be restricted (but not necessarily prohibited) in these avoidance areas.

Salable Minerals:

Common variety mineral materials, such as sand and gravel, which occur on public lands and are used mainly for construction purposes. Salable minerals are disposed of by sales to the public for a set royalty by the ton or cubic yard, or through free-use permits to government agencies or qualified nonprofit organizations.

Saturated Soil:

A condition in which all voids between soil particles are temporarily or permanently filled with water.

Scenic Area:
An area whose landscape character exhibits a high degree of variety and harmony among the basic elements which results in a pleasant landscape to view.

Scenic Quality:
The relative worth of a landscape from a visual perception point of view. Scenic quality is rated as Class A (high), Class B (medium), or Class C (low).

Scoria:
Local term used in the Powder River Basin for "clinker."

Seasonal Ranges:
The Wyoming Game and Fish Department has identified various ranges for big game species. These ranges are defined as follows:

Summer or Spring-Summer-Fall: A population or portion of a population of animals uses the documented habitats within this range annually from the end of previous winter to the onset of persistent winter conditions.

Severe Winter Relief: A documented survival range, which may or may not be considered a crucial range area as defined above. It is used to a great extent, but only in extremely severe winters. It may lack habitat characteristics that would make it attractive or capable of supporting major portions of the population during normal years, but is used by and allows at least a significant portion of the population to survive the occasional extremely severe winter.

Winter: A population or portion of a population of animals annually uses the documented suitable habitat sites within this range in substantial numbers during the winter period only.

Winter/Year-long: A population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges.

Year-long: A population or substantial portion of a population of animals makes general use of the suitable documented habitat sites within the range on a year-round basis. On occasion, animals may leave the area under severe conditions.

Calving Areas (Parturition): Documented birthing areas commonly used by females. They include calving areas, fawning areas, and lambing grounds. These areas may be used as nurseries by some big game species.

Section 106 of National Historic Preservation Act:
"The head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking in any state and the head of any federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking" (16 U.S.C. 47 df).

Security Habitat:
The area to which wildlife retreat when disturbance in their usual range is intensified. Each species tends to be most comfortable or secure within habitat blocks larger than a minimum area. The Fortification Creek Resource Management Plan amendment defined elk security habitat as contiguous habitat of 250 acres or greater that is more than 0.5 mile or not visible from an open road.

Sensitive Sites or Resources:
Sensitive sites or resources refer to significant cultural resources that are or may be eligible for nomination to the National Register of Historic Places.

Sensitive Species:
Species designated as sensitive by the BLM State Director include species that are under status review, have small or declining populations, live in unique habitats, or require special management. BLM Manual 6840 provides policy and guidance for special status species management. The BLM Wyoming Sensitive Species Policy and List are provided in a memorandum updated annually. Primary goals of the BLM Wyoming policy include maintaining vulnerable species and habitat components in functional BLM ecosystems and preventing a need for species listing under the Endangered Species Act.

Seral Stage:
One of a series of plant communities that follows another in time on a specific ecological site.

Setting:
Setting is the physical environment of a historic property and how the property evokes a sense of feeling and association with past events. Accordingly, setting referees to the character of the place in which the property played its historic role. It involves how, not just where, the property is situated and its relationship to surrounding features and open space. These features and their relationships should be considered not only within the exact boundaries of the property, but also between the property and its surroundings.

Significant Paleontological Resource (also Significant Fossil Resource):
Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value.

Silviculture:
The art of producing and tending a forest; the application of knowledge of silvics in the treatment of a forest; the theory and practice of controlling forest establishment, composition, structure, and growth.

Site:
A location, place. Is a term used by archeologists for places that prehistoric and historic people lived in or used. Sites are places where humans left things behind.

Special Recreation Management Areas (SRMA):
See *Recreation Management Areas.*

Special Recreation Permit (SRP):
An authorization that allows specified recreational uses of the public lands and related watersas required by 43 CFR 2932.11a(1). Special recreation permits are issued as a means to manage visitor use and to protect natural and cultural resources and as a mechanism to authorize commercial, competitive, and vending use; organized group activities and events; and individual or group use of special areas. Commercial SRPs are also issued as a means to provide a fair return for the commercial recreational use of public lands.

Special Status Species:
Special status species are species proposed for listing, officially listed as Threatened, Endangered, proposed, or are candidates for listing as Threatened or Endangered under the provisions of the Endangered Species Act; those listed by a state in a category implying potential endangerment or extinction; and those designated by the State Director as sensitive (BLM 2008c).

Species of Greatest Conservation Need (SGCN):
Low and declining populations that are indicative of the diversity and health of Wyoming's wildlife.

Split Estate:
Surface land and mineral estate of a given area under different ownerships. Frequently, the surface will be privately owned and the minerals federally owned.

Stakeholder:
Entities whose interests may be affected as a result of project execution or project completion.

State-listed Species:
Species proposed for listing or listed by a state in a category implying, but not limited to, potential endangerment or extinction. Listing is either by legislation or regulation.

Stratigraphy:
The science of studying layers of materials, as in rock layers in the Earth or deposits in archeological sites. Cultural remains and dirt become buried over time and, usually, the layer on the bottom is the oldest, the layer on the top is the youngest. Dirt of different layers is often colored differently.

Subsoil:
Technically, the subsoil includes the B horizon. This is roughly the part of the solum below the organic topsoil and above the rocky parent material of the C horizon. When suitable, the subsoil may be salvaged to supplement the topsoil for plant establishment.

Surface-disturbing Activities (or Surface Disturbance):
An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other Public Land values. Examples of surface-disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and powerlines; and the conduct of several types of vegetation treatments (e.g., prescribed fire, etc.). Surface-disturbing activities may be either authorized or prohibited.

Surface Water Classes and Uses:

The following water classes are a hierarchical categorization of waters according to existing and designated uses. Except for Class 1 waters, each classification is protected for its specified uses plus all the uses contained in each lower classification. Class 1 designations are based on value determinations rather than use support and are protected for all uses in existence at the time of or after designation. There are four major classes of surface water in Wyoming with various subcategories within each class (see "Wyoming Surface Water Classification List" for current listing).

Class 1, Outstanding Waters: Class 1 waters are those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. Nonpoint sources of pollution shall be controlled through implementation of appropriate best management practices. Pursuant to Section 7 of these regulations, the water quality and physical and biological integrity that existed on the water at the time of designation will be maintained and protected. In designating Class 1 waters, the Environmental Quality Council shall consider water quality, aesthetic, scenic, recreational, ecological, agricultural, botanical, zoological, municipal, industrial, historical, geological, cultural, archeological, fish and wildlife, the presence of substantial quantities of developable water, and other values of present and future benefit to the people.

Class 2, Fisheries and Drinking Water: Class 2 waters are waters, other than those designated as Class 1 that are known to support fish or drinking water supplies or where those uses are attainable. Class 2 waters may be perennial, intermittent, or ephemeral and are protected for the uses indicated in each subcategory listed below. Five subcategories of Class 2 waters exist.

Class 3, Aquatic Life Other than Fish: Class 3 waters are waters other than those designated as Class 1 that are intermittent, ephemeral, or isolated waters, and because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning or certain perennial waters that lack the natural water quality to support fish (e.g., geothermal areas). Class 3 waters provide support for invertebrates, amphibians, or other flora and fauna that inhabit waters of the state at some stage of their life-cycles. Uses designated on Class 3 waters include aquatic life other than fish, recreation, wildlife, industry, agriculture, and scenic value. Generally, waters suitable for this classification have wetland characteristics; and such characteristics will be a primary indicator used in identifying Class 3 waters. There are four subcategories of Class 3 waters.

Class 4, Agriculture, Industry, Recreation, and Wildlife: Class 4 waters are waters other than those designated as Class 1 where it has been determined that aquatic life uses are not attainable pursuant to the provisions of Section 33 of these regulations. Uses designated on Class 4 waters include recreation, wildlife, industry, agriculture and scenic value (Wyoming DEQ 2002).

Threatened Species:

Any species that is likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.

Topsoil:

The biologically active, upper part of the soil profile, being the most favorable material for plant growth. The topsoil includes the O and A horizons.

Traditional Cultural Property:
A cultural property eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property is derived from the role the property plays in a community's historically rooted beliefs, customs, and practices.

Undetermined Lek:
Any lek that has not been documented as being active in the last 10 years, but does not have sufficient documentation to be designated unoccupied. Management protection will be afforded to undetermined leks until their status has been documented as unoccupied.

Vegetative Diversity:
The variety of vegetative types in an area, including species, the genetic differences among species and populations, the communities and ecosystems in which vegetation types occur, and the structure and seral stage of these communities. Vegetative diversity includes rare as well as common vegetative types, and typically supports a diverse array of animal species and communities.

Viewshed:
Viewshed is used in Visual Resource Management to describe "…landscape that can be seen under favorable atmospheric conditions from a viewpoint (key observation point) or along a transportation corridor" (BLM 1984).

Visual Resource Management (VRM) Classes:
The objectives of each VRM Class are as follows:

- **Class I:** To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention. It is applied to wilderness and wilderness study areas, some natural areas, wild portions of Wild and Scenic Rivers, and other similar situations in which management activities are to be restricted.
- **Class II:** To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Proposed alterations should be designed so as to retain the existing character of the landscape. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class III:** To partially retain the existing character of the landscape. Contrasts to the basic elements (form, line, color, and texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape; however, the changes should remain subordinate to the existing characteristic landscape. The level of change to the characteristic landscape should not exceed the moderate threshold.
- **Class IV:** To provide for management activities which require major modification of the existing character of the landscape. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, changes should repeat the basic elements (form, line, color, and texture) inherent in the characteristic landscape. The level of change to the characteristic landscape can be high.

Visual Resources:
The visible physical features of a landscape (topography, water, vegetation, animals, structures, and other features) that constitute the scenery of an area.

Watershed:
See *Basin*.

Wetlands:
Areas that are inundated or saturated by surface or groundwater often and long enough to support and under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. BLM Manual 1737, Riparian-Wetland Area Management (BLM 1992a), includes marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas as wetlands.

Wild and Scenic River:
A river or portion of a river that is part of a national system of congressionally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural and other similar values and are preserved in a free-flowing condition. The system consists of three types of streams:

1. Recreation – rivers or sections of rivers that are readily accessible by road or railroad and that may have some development along their shorelines and may have undergone some impoundments or diversion in the past;

2. Scenic – rivers or sections of rivers free of impoundments with shorelines or watersheds still largely undeveloped but accessible in places by roads; and

3. Wild – rivers or sections of rivers free of impoundments and generally inaccessible except by trails, with watersheds or shorelines essentially primitive and waters unpolluted.

Wilderness (area):
A unit designated by Congress for inclusion in the National Wilderness Preservation System.

Wilderness characteristics:
Wilderness characteristics are discussed in Section 2(c) of the Wilderness Act of 1964, and incorporated in Federal Land Policy Management Act, which states: "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Wilderness Study Area:
An area inventoried, found to have wilderness characteristics, and managed to preserve those characteristics under authority of the review of public lands required by Section 603 of the Federal Land Policy and Management Act of 1976. During the period of review or "study," Wilderness Study Areas are managed so as not to impair the suitability of such areas for preservation as wilderness.

Wildfire:
Unplanned ignition of a wildland fire, (such as a fire caused by lightning, volcano, unauthorized and accidental human caused fires), and escaped prescribed fires.

Wildland Fire:
A general term describing any non-structure fire that occurs in the wildland.

Wildland Industrial Interface:
The area where industrial development meets or intermingles with undeveloped wildland.

Wildland Urban Interface:
Healthy Forest Restoration Act 2003: defines wildland urban interface (section 101) as an area within or adjacent to an at risk community that has been identified by a community in its wildfire protection plan or, for areas that do not have such a plan, an area extending; (1) 0.5 mile from the boundary of an at risk community, or (2) 1.5 miles when other criteria are met. (e.g., a sustained steep slope or a geographic feature aiding in creating an effective fire break or is condition class III land, or (3) is adjacent to an evacuation route.

Wildlife-Disturbing Activity:
BLM-authorized activities other than routine maintenance that may cause displacement of or excessive stress to wildlife during critical life stages. Wildlife-disturbing activities include human presence, noise, and activities using motorized vehicles or equipment.

Wildlife Habitat Management Area:
Special management areas that are designed to protect or preserve habitat for wildlife. The environment in these areas is unique in some respects, and it is therefore desirable to apply different management prescriptions to these areas from those of the surrounding public lands. The integration of different land management goals, objectives, and actions will be implemented to ensure that the integrity of these areas will be maintained. (Record of Decision and Approved Rawlins Resource Management Plan, G-21, BLM)

Wildlife Monitoring and Protection Plan:
A plan that is developed with a goal of avoiding or minimizing impacts to wildlife by monitoring wildlife population trends and by developing appropriate mitigation actions. A Wildlife Monitoring and Protection Plan is often produced in conjunction with an Environmental Impact Statement. These plans are intended to help the BLM identify problems, design project plans, monitor decisions and make recommendations to adjust management actions as they relate to wildlife protection.

Withdrawal:
Removal or withholding of public lands, by statute or Secretarial order, from operation of some or all of the public land laws. A mineral withdrawal is the closing of an area to locatable mineral location and development activities.

Woodland:

Forest lands which are not included in the commercial forest land allowable cut base. These lands include both commercial and noncommercial forest lands. Also included are those lands formerly defined as noncommercial forest lands and those that cannot be reforested within 15 years (now Category I and II lands).

Yellowcake:

Yellowcake is the product of the uranium extraction (milling) process. Early production methods resulted in a bright yellow compound, hence the name yellowcake. The material is a mixture of uranium oxides that can vary in proportion and color from yellow to orange to dark green (blackish), depending at which temperature the material was dried (level of hydration and impurities). Higher drying temperatures produce a darker, less soluble material. Yellowcake is commonly referred to as U_3O_8 and is assayed as pounds U_3O_8 equivalent. This fine powder is packaged in drums and sent to a conversion plant that produces uranium hexafluoride as the next step in the manufacture of nuclear fuel.

Appendix A. Legislation and Policy Pertaining to Specific Resources

General Plans, Policies, and Regulations for All Resources
CEQ Final Guidance for Department and Agencies on the Appropriate Use of Mitigation and Monitoring (2011)
BLM Land Use Planning Handbook, H-1601-1, updated March 11, 2005
BLM National Environmental Policy Act Handbook H-1790-1 (2008)
BLM Planning Regulations 40 CFR 1600
Federal Land Policy and Management Act
National Environmental Policy Act
Physical Resources
Clean Air Act
Clean Water Act of 1977, as amended
Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming (1998)
Mineral Resources
2006 Oil and Gas Surface Operating Standards and Guidelines (Gold Book, 4th edition)
Energy Policy Act of 2005 (P.L. 109-58)
43 CFR Parts 3100 (oil and gas), 3150 (geophysical), 3200 (geothermal), 3400 (coal), 3500 (other leasable solids), 3600 (salable), and 3800 (locatable) 43 CFR
BLM National Notice-to-Lessees
BLM Onshore Oil and Gas Orders
U.S. Department of the Interior Manual 3031601, Mineral Materials Disposals (2002)
U.S. Department of the Interior Manual 3031, Energy and Mineral Resource Assessments (1985)
Federal Coal Leasing Amendments Act of 1976 (FCLAA). This act amended Section 2 of the Mineral Leasing Act of 1920 to require that all public lands available for coal leasing be offered competitively. Competitive leasing provides an opportunity for any qualified interested party to competitively bid for a federal coal lease.
Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA)
Federal Oil and Gas Royalty Simplification and Fairness Act of 1996 (FOGRS+FA)
Federal Onshore Oil and Gas Leasing and Reform Act of 1987 (FOOGLRA)
General Mining Law of 1872. This law allowed the location of placer and lode mining claims, as well as patents, declaring "all valuable mineral deposits in lands belonging to the United States … to be free and open to exploration and purchase."
Integration of Best Management Practices (BMPs) into applications for permit to drill approvals and associated rights-of-way (ROW; WO IM 2007-021)
IM WY 2005–14, Water Disposal and Land Application Disposal (LAD) in the Powder River Basin. U.S. Department of the Interior, Bureau of Land Management (2005)
Materials Act of 1947 (as amended by the Surface Resources Act of 1955). Under this act, certain mineral and vegetative materials may be disposed of either through a contract of sale or a free-use permit. These mineral materials include common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. This act also provides for free use of material by government agencies or municipalities, or non-profit organizations if not used for commercial purposes.
Surface Resources Act of July 23, 1955. This act removed sand, gravel, cinders, pumice, pumicite, and clay from locatable mineral classification, unless they have some type of uncommon characteristic.
Mineral Leasing Act for Acquired Lands of 1947, as amended. This act authorizes and governs mineral leasing on acquired lands. It provides that minerals on these lands are subject to the federal mineral leasing system, even though the commodity may be locatable or salable on other types of lands retained by the federal government.
Mineral Leasing Act of 1920, as amended. Under this law, the BLM issues leases for development of oil and gas, deposits of coal, phosphate, potash, sodium, sulfur and other leasable minerals on public domain lands and on lands having federally-reserved minerals.
Mining and Minerals Policy Act of 1970. This act identifies the continuing federal policy 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.

Petrified Wood Act of 1962. This act provides for free collection of limited amounts of petrified wood by the public, and for sale of larger quantities for commercial purposes.
Surface Mining Control and Reclamation Act of 1977 (SMCRA). This law requires reclamation of surface coal mining operations, imposes bonding requirements, and set up the US Office of Surface Mining (OSM), also called the US Office of Surface Mining, Reclamation, and Enforcement (OSMRE), to oversee reclamation.
Unitization Handbook H-3180-1 (Exploratory)
Unitization Manual 3180 (Exploratory)
Fire and Fuels Management
The Interagency Prescribed Fire Planning and Implementation Procedures Guide (July 2008), with BLM Supplement (February 2009)
Federal Wildland Fire Management Policy and Program Review (1995 and 2001) (DOI and USDA 1995), and Guidance for the Implementation of Federal Wildland Fire Management Policy (February 2009)
Healthy Forest Restoration Act of 2003, which aids or directs the implementation of the goals of the: ● National Fire Plan (2000) ● 10-Year Comprehensive Strategy Implementation Plan (2001) ● Community Wildfire Protection Plans (CWPPs)
BLM Manual M-9211 – Fire Planning Manual (September 2012)
BLM Handbook H-9211-1 – Fire Planning Handbook (September 2012)
Interagency Fire Management Plan Template (2009)
Interagency Standards for Fire and Aviation Operations (published annually) (2010)
National Fire Plan (2000)
Protecting People and Natural Resources: A Cohesive Fuels Treatment Strategy (2006)
U.S. Department of the Interior/U.S. Department of Agriculture Western Governors' Association, 2001; A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy and Implementation Plan (2001)
Washington Office Instruction Memorandum 2004-007, Land Use Plan and Implementation Plan Guidance for Wildland Fire Management Guidance (2004)
Biological Resources
Applicable Federal and state laws that make the federal government responsible for control of weeds on Federal lands and provide direction for their control.
BLM Manual 1737 – Riparian-Wetland Area Management (1992)
BLM Manual 1745 – Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants (1992)
BLM Manual 4180 – Land Health (2009)
BLM Manual 6500 – Wildlife and Fisheries Management (1988)
BLM Manual 6720 – Aquatic Resource Management (1991)
BLM Manual 6840 – Special Status Species Management (2008)
BLM Manual 7100 – Soil Classification
BLM regulations contained in 43 CFR 8200
Carlson-Foley Act (P.L. 90-583)
Cave Resources Protection Act (16 U.S.C. 4301 et seq.)
CFR, Title 50, Section 402 (50 CFR 402), Interagency Cooperation: Endangered Species Act (ESA)
Clean Water Act of 1977, as amended
Department of the Interior Manual 601, Mineral Materials Disposals (2007)
Emergency Wetlands Resources Act of 1986 (P.L. 99-645;100 Stat. 3582)
Endangered Species Act (ESA)
Executive Order 11987, Exotic Organisms
Executive Order 11988, Floodplain Management
Executive Order 11990, Protection of Wetlands
Executive Order 13112, Establishment of the Invasive Species Council
Executive Order 13186, Migratory Birds
Executive Order 12962, Recreational Fisheries (June 7, 1995)
Executive Order 13112, Invasive Species Control
Federal Noxious Weed Act of 1974 (P.L. 93-629) (as amended by section 15 Management of Undesirable Plants on Federal Lands, 1990) (superseded by Plant Protection Act of 2000; Secs. 2801 to 2813 repealed)

Final EIS: Vegetation Treatment on BLM Lands in the 13 Western States (1991)
Fish and Wildlife 2000 – National and state policies
Fish and Wildlife Conservation Act of 1980
Fish and Wildlife Management Act of 1956
Healthy Forests Act of 2003
Instructional Memorandum 2010–012, Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate
Instructional Memorandum 2010–022, Managing Structures for the Safety of Sage-Grouse, Sharp-tailed Grouse, and Lesser Prairie-chicken
Instructional Memorandum 2010–181, White-Nose Syndrome
Instructional Memorandum 2011–138, Sage-Grouse Conservation Related to Wildland Fire and Fuels Management
Instructional Memorandum 2012–019, Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands Including the Federal Mineral Estate
Instructional Memorandum 2012–044, BLM National Greater Sage-Grouse Land Use Planning Strategy
Neotropical Migratory Bird Conservation Act (P.L. 106-247)
North American Wetlands Conservation Act, as amended (P.L. 101-233; 16 U.S.C. 4401)
Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412)
Northwest Area Noxious Weed Control Program Environmental Impact Statement (1985)
Plant Protection Act of 2000 (P.L. 106-224) (supersedes Federal Noxious Weed Act of 1974 (7 U.S.C. 2801 et seq.) except for Sec. 2814)
Public Rangelands Improvement Act of 1978
Riparian Habitat, Interior Department Manual 520
Riparian-Wetlands Initiative for the 1990s, USDOI, BLM, January 22, 1992
Sikes Act of 1960, as amended
Soil and Water Resources Conservation Act of 1977 (16 U.S.C. 2001 et seq.)
Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming
Supplement to the Northwest Area Noxious Weed Control Program Final Environmental Impact Statement
Taylor Grazing Act of 1934 (43 United States Code [USC] 315)
The Bald and Golden Eagle Protection Act
The Migratory Bird Treaty Act (MBTA)
Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement, 2007 and Final Programmatic Environmental Report
Water Quality Act of 1987, as amended from the Federal Water Pollution Control Act of 1977 (Clean Water Act) as amended (33 U.S.C. 1251 et seq.)
Wyoming Executive Order 2008–2, Greater Sage-Grouse Core Area Protection
Wyoming Executive Order 2010–4, Greater Sage-Grouse Core Area Protection (replaces EO 2008–2)
Wyoming Executive Order 2011–5, Greater Sage-Grouse Core Area Protection (replaces EO 2010–4)
Wyoming Executive Order 2013–3, Greater Sage-Grouse Core Area – Grazing Adjustments
Heritage and Visual Resources
36 CFR Part 60: National Register of Historic Places – Identifies processes for the identification and evaluation of historic properties for the National Register, and specifies procedures for listing properties on the National Register
36 CFR Part 78: Waiver of Federal Agency Responsibilities under Section 110 of the National Historic Preservation Act – Identifies limited circumstances when Agencies may waive responsibilities under Section 110 and procedures to follow
36 CFR Part 800: Protection of Historic Properties – Identifies processes and procedures for federal agencies to follow to be in compliance with Section 106 and 110 of the National Historic Preservation Act
43 CFR 8400 – Visual Resource Management
43 CFR Part 10: Native American Graves Protection and Repatriation Regulations – Identifies processes and procedures for federal agencies to follow to comply with the Native American Graves Protection and Repatriation Act
43 CFR Part 7: Protection of Archaeological Resources – Identifies processes and procedures for federal agencies to follow to comply with the Archaeological Resources Protection Act
American Indian Religious Freedom Act of 1978 (P.L. 95-431; 92 Stat. 469; 42 U.S.C. 1996)
Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225; 16 U.S.C. 432, 433)

Archaeological Resources Protection Act of 1979 (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 47Oaa et seq.) as amended (P.L. 100-555; P.L. 100-588)
BLM Handbook 8410-1, Visual Resource Inventory
BLM Information Bulletin No. 2002-101, Cultural Resource Considerations in Resource Management Plans
BLM Information Bulletins 98-135, 98-164, and 2000-096
BLM Manuals:
8100: Cultural Resource Management
8120: Tribal Consultation under Cultural Resources
8130: Planning For Uses of Cultural Resources
8140: Protecting Cultural Resources
8150: Permitting Uses of Cultural Resources
8170: Interpreting Cultural Resources for the Public
Buffalo Resource Area: Resource Management Plan/Record of Decision
Executive Order 11593 – Protection and Enhancement of the Cultural Environment
Executive Order 13007 – Providing for American Indian and Alaska Native Religious Freedom and Sacred Land Protections
Executive Order 13084 – Consultation and Coordination with Indian Tribal Governments
Historic Sites Act of 1935 (P.L. 74-292; 49 Stat. 666; 16 U.S.C. 461)
Instructional Memorandum 2002–096, Use of Visual Resource Management Class I Designation in Wilderness Study Area (2002)
National Historic Preservation Act of 1966 as amended (P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470)
Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601; 104 Stat. 3048; 25 U.S.C. 3001)
Powder River Basin Oil and Gas Project Environmental Impact Statement and Proposed Plan Amendment
Programmatic Agreement Among BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in which BLM will meet its Responsibilities Under the National Historic Preservation Act (1997)
Reservoir Salvage Act of 1960, as amended by Archeological and Historic Preservation Act of 1974 (P.L. 86-523; 74 Stat. 220, 221; 16 U.S.C. 469; P.L. 93-291; 88 Stat. 174; 16 U.S.C. 469)
State Protocol Agreement Between the Wyoming BLM State Director and the Wyoming State Historic Preservation Officer (2006)
Update to Buffalo Resource Area: Resource Management Plan/Record of Decision (2001)
Land Resources
40 CFR 2740, 2912, 2911, and 2920, Land Use Authorizations
43 CFR 2091
43 CFR 2930, Permits for Recreation on Public Lands
BLM Manual 1626 — Travel and Transportation and Management (2011)
BLM Manual H-2101–4 — Preacquistion Environmental Site Assessment (2000)
BLM Manual 2200–1 — Land Exchange Handbook (2005)
BLM Manual 6301 — Wilderness Characteristics Inventory (2011)
BLM Manual 6302 — Consideration of Lands with Wilderness Characteristics in the Land Use Planning Process (2011)
BLM Manual 6303 — Consideration of Lands with Wilderness Characteristics for Project-Level Decisions in Areas not Analyzed in Accordance with Manual 6302 (2011)
BLM Manual 6310 — Conducting Wilderness Characteristics Inventory on BLM Lands (2012)
BLM Manual 6320 — Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process (2012)
BLM Manual 6330 — Management of Wilderness Study Area (2012)
BLM Manual 6400 — Wild and Scenic Rivers (2012)
BLM Manual 9113 — Roads Manual (1958)
BLM Manual 4180 – Rangeland Health Standards
BLM regulations contained in 43 CFR 4100 et seq.
BLM Wyoming Standards for Healthy Public Rangelands
Executive Order 12548 (1986): Establishment of annual fees for domestic livestock grazing on public rangelands
Federal Land Transfer Facilitation Act
FLPMA, Sections 102, 201, 202, 302, 304, 307, 309, 310, 401, 402, and 403

Hazardous Materials Transportation Act and Amendments
Instructional Memorandum 2006–173, Travel and Transportation Management, Off-Highway Vehicle Management, Property, Engineering, Land Use Planning, and Lands and Realty (2006)
Instructional Memorandum 2008–014, Land Use Planning, Engineering, and All Resource Programs (2008)
Instructional Memorandum 2009–007, Process for Evaluating Status of Land Health and Making Determinations of Causal Factors When Land Health Standards Are Not Achieved (2009)
Instructional Memorandum 2009–043, Right-Of-Way Management, Wind Energy (2009)
Instructional Memorandum 2010–101, Oil and Gas Leasing Reform — Land Use Planning and Lease Parcel Reviews (2010)
Instructional Memorandum 2012-169, Resource Management Plan Alternative Development for Livestock Grazing (2012)
Memorandum of Agreement WY-7 between BLM and the Wyoming Recreation Commission, Addresses land classifications and withdrawals to protect public lands generally, and specifically to protect historic trails.
Memorandum of Agreement WY-19 between BLM and the Wyoming Governor, addresses overall cooperation in public and state land management efforts
Memorandum of Agreement WY-20 between BLM and the Wyoming Game and Fish Commission, addresses a myriad of land and resource management issues, including classifications, land acquisition, disposal, and access
Memorandum of Agreement WY-21 between BLM and Region II and Region IV of the U.S. Forest Service, addresses overall coordination on a myriad of land and resource management issues
Memorandum of Agreement WY-63 between BLM, the U.S. Forest Service, Wyoming Department of Public Lands and the Wyoming Game and Fish Commission, addresses public land access and management of access problems
Memorandum of Agreement WY-65 between BLM and the ASCS, addresses overall coordination on a myriad of land and resource management issues
Memorandum of Agreement WY-77 between BLM, the ASCS, U.S. Forest Service, AES, and Wyoming State Conservation Commission, addresses overall coordination on conservation planning projects
Memorandum of Agreement WY-117 between BLM and the Wyoming Board of Land Commissioners, the Wyoming State Historic Preservation Office and the Advisory Council on Historic Preservation, addresses cultural resource protection in state exchanges
Memorandum of Agreement WY-118 between BLM and the Wyoming Board of Land Commissioners, addresses processing state exchanges
Memorandum of Agreement WY-119 between BLM and the ASCS, addresses management of agricultural trespass
Memorandum of Agreement WY-121 between BLM and the National Park Service, addresses management of the Oregon National Historic Trails
Memorandum of Agreement WY-122 between BLM and the U.S. Forest Service, Wyoming Department of Public Lands, Wyoming Game and Fish Commission, Wyoming Recreation Commission, Wyoming Department of Agriculture, and the Wyoming Sate Planning Coordinator's Office, addresses access to public land
Memorandum of Agreement WY-131 between BLM and the Wyoming Game and Fish Department, addresses overall coordination on land and resource management
Memorandum of Agreement WY930-91-06-38 between BLM and the Wyoming Board of Land Commissioners, addresses exchange pooling
Memorandum of Agreement WY930-91-06-39 between BLM and the Wyoming Board of Land Commissioners, addresses exchange of state land in holdings in wilderness areas
Memorandum of Understanding between BLM and the Bureau of Reclamation addresses interaction and management of reclamation withdrawn lands
Programmatic Agreement for historic preservation regarding how BLM will meet its responsibilities under the National Historic Preservation Act by Bob Bennett, BLM Wyoming State Director dated 03/08/2006
Public Rangelands Improvement Act of 1978 (P.L. 95-514)
Taylor Grazing Act of 1934
Transportation Safety Act of 1974
Special Designations
BLM Manual 1613, Areas of Critical Environmental Concern
Socioeconomic Resources
Additional Guidance on the Treatment of Socioeconomic Issues in Land Use Plans, BLM IM-2002-167
American Folklife Preservation Act of 1976 (20 U.S.C. 2101)
American Indian Religious Freedom Act of 1978 (P.L. 95-341; 42 U.S.C. 1996 and 1996a)
Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)

Civil Rights Act of 1964 (P.L. 88-352)
Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.)
Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (42 U.S.C. 9601 et seq.)
Council on Environmental Quality Environmental Justice Guidance under National Environmental Policy Act
Emergency Planning and Community Right-to-Know Act of 1986
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
Executive Order 13006, Locating Federal Facilities on Historic Properties in Our Nation's Central Cities
Executive Order 13007, which mandates the protection and preservation of Indian religious practices
Executive Order 13148, Greening of the Government Through Leadership in Environmental Management, 2000
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
Federal Facilities Compliance Act of 1992 (P.L. 102-386)
Guidance on Environmental Justice in Planning, IM-2002-164
Guidance on the Recommended Formats for Land Use Plans, Records of Decision, and Their Supporting Environmental Impact Statements, BLM IB-2002-056
Hazardous Materials Management, BLM Manual Section 1703
IM 2002–164, Guidance to Address Environmental Justice (EJ) in Land Use Plans and Related National Environmental Policy Act (NEPA) Document. (2002)
Indian General Allotment Act of 1887
Indian Mineral Development Act of 1982 (25 U.S.C. 2101 et seq.)
Indian Reorganization Act of 1934 (25 U.S.C. 461 et seq.)
Indian Self Determination and Education Assistance Act of 1975 (P.L. 93-658; 25 U.S.C. 450 et seq.)
Military Munitions and Explosives of Concern: A Handbook for Federal Land Managers with Emphasis on Unexploded Ordnance, Draft BLM Handbook H-1703-2
National Contingency Plan Regulations (40 CFR 300)
National Historic Preservation Act of 1966 (16 U.S.C. 470)
Native American Coordination and Consultation, BLM Manual 8160
Native American Graves Protection and Repatriation Act of 1990 (43 CFR 10)
Natural Resource Damage Assessment Regulations
Occupational Safety and Health Act of 1970 (29 U.S.C. 651 et seq.)
Oil Pollution Act of 1990 (33 U.S.C. 2715a)
Pre-acquisition Environmental Site Assessments, BLM Manual Handbook H-2101-4
Recreational and Public Purposes Act of 1926, as amended in 1988 (43 U.S.C. 869)
Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.)
Rules applicable only within the State of Wyoming that have been adopted under the Surface Mining Control and Reclamation Act of 1977 (30 CFR 950)
Safe Water Drinking Act of 1974, as amended (42 U.S.C. 300 et seq.)
Secretarial Order 3206 for Implementing the Endangered Species Act
Surface Mining Control and Reclamation Act, Section 409 (P.L. 95-87, Section 401-C.1)
Use of the Economic Profile System in Planning, BLM IM 2003-169

Appendix B. Implementation and Monitoring

B.1. Implementation

Implementation of the Buffalo Resource Management Plan (RMP) will require continued involvement of cooperating agencies, both in terms of funding and time, and continued public participation. This appendix describes the basic elements of implementing the Buffalo RMP.

B.1.1. Implementation Working Group

To ensure implementation coordination, the Bureau of Land Management (BLM) and the cooperating agencies should meet at least yearly to provide support for the implementation prioritization, review recommendations for changes to implementation strategies, and review monitoring evaluation results. This group is called the Implementation Working Group. Implementation Working Groups will serve in a recommending capacity as the BLM cannot relinquish its decision-making authority or responsibility. All Implementation Working Group meetings will be open to the public, and announced on the BLM website.

The Implementation Working Group will ensure implementation is orderly and without duplication or confusion. The Implementation Working Group will look at interdisciplinary and interagency implementation rather than resource-by-resource implementation to make recommendations regarding the best use of funding and personnel from both cooperating agencies and the BLM.

B.1.2. Implementation Tracking Database

A database has been developed for the Buffalo Field Office to track the budget, monitoring, and implementation actions. Once the database has been populated, it will require continual maintenance and updates to accurately track the implementation process. Information will be collected based on quarterly performance evaluation accomplishment reporting, and complete fiscal year reports will be published with analysis on the BLM website by December 31 of each calendar year.

B.1.3. Monitoring Working Group

To ensure that monitoring methods are in place, a Monitoring Working Group will be assembled to develop an overall monitoring plan, utilizing existing monitoring information from the various members of the Implementation Working Group. The team's guidance and direction will be provided through the Monitoring and Evaluation (p. 1576) section of this appendix. The BLM is responsible to apply monitoring procedures and protocols that are based on BLM policies, field office priorities and available funding. The field manager will make final decisions on the monitoring plans, monitoring priorities, and whether or not monitoring data collected by other agencies meets the specific needs of the BLM. The BLM Field Manager will assess the monitoring needs and consider additions or changes proposed by the Monitoring Working Group.

Since some monitoring data is being collected and provided by other federal and state agencies to the extent of their specific missions and expertise, a system will be established to regularly collect and coordinate this data. The team will also be responsible for collecting data to determine if the implemented actions are meeting stated goals and objectives or desired outcomes.

B.1.4. Activity Plan Working Groups

Activity Plan Working Groups consisting of local, state, and federal governments will be formed for new projects when circumstances dictate. Cooperating agencies in these Activity Plan Working Groups will assist the BLM in developing alternatives and preparing environmental analyses. Activity Plan Working Groups will serve in a recommending capacity as the BLM cannot relinquish its decision-making authority or responsibility. As an example, travel management plans would be developed with an Activity Plan Working Group.

The objectives of Activity Plan Working Groups include:

- Minimizing analysis and decision making controversy by being proactive rather than reactive to public land use and resource conflicts.
- Providing effective, cost-efficient, and collaboratively-based solutions to resource conflicts.
- Improving resource conditions by recommending practices appropriate to special situations.
- Streamlining public land authorizations, increasing implementation flexibility, and notifying public land users of required practices.
- All Activity Plan Working Group meetings where recommendations are made to the BLM will be open to the public, and will provide for specific and helpful public involvement. This includes providing web-based information to the public prior to any Activity Plan Working Group meetings; such that members of the public can provide input to the working session, both early and mid-way through the scheduled meetings.

B.1.5. Public Involvement

A website where the public can quickly and easily access data concerning implementation should be developed and kept current. Creating this website and maintaining it through the implementation cycle will be a vital part of implementation success. The public is welcome to provide implementation comments to the BLM any time during the cycle, but schedules for implementation planning decisions will be posted so the public can make timely comments. All Activity Plan Working Group meetings where recommendations are made to the BLM will be open to the public, and will provide for specific and helpful public involvement. This includes providing web-based information to the public prior to any Activity Plan Working Group meetings; such that members of the public can provide input to the working session, both early and mid-way through the scheduled meetings.

B.2. Monitoring and Evaluation

This section provides an overview of the Buffalo Monitoring and Evaluation protocol. Conditions may change over the life of the land use plan and these changes may require different management actions to protect resources and minimize resource conflicts. To address the changing conditions and provide management flexibility that incorporates best management practices, the BLM reviews effectiveness of management actions, assesses the current resource conditions and, if needed, alters management actions.

Due to staffing and funding levels monitoring will be prioritized consistent with the goals and objectives of the RMP in cooperation with local, state, and other federal agencies. A system, as identified in the Implementation (p. 1575) section of this appendix, will be established to regularly collect, coordinate and distribute monitoring data collected by other federal and state agencies. Changes to monitoring may result from developing technologies or a better understanding of information.

B.2.1. Data Collection

In cooperation with local, state and other federal agencies, the BLM will collect, analyze, and report monitoring data that allows for the determination of cause and effect, conditions, trends and predictive modeling of land use authorizations. Monitoring methods are implemented to collect data that establish current conditions and reveal any change in the indicators. Monitoring techniques consider when, where, and frequency. The data collected through monitoring provide a variety of information applicable to one or more resource uses. To increase effectiveness, efficiency and eliminate duplication, monitoring methods should be designed to address as many uses as possible. The BLM will rely upon cooperating agencies for the funding, facilities, and labor to assist in or perform this data collection.

B.2.2. Data Analysis

Data will be analyzed to determine the change that has occurred as a result of management actions. Data analysis will be conducted on a predetermined schedule that considers the data collection frequency for detecting change. Data will also be recorded and organized to facilitate analysis to be used in assessing management actions. Analyzed data will be assessed to determine whether the resource conditions are meeting the planned goals; whether a change has occurred, and if so, identify the cause; and what appropriate action should be taken to achieve the desired outcome if the objective is not being met. New technology and management methods will be reviewed to determine their applicability in modifying or replacing current management actions. The BLM will rely upon cooperating agencies for the funding, facilities, and labor to assist in or perform this data analysis.

B.2.3. Decision

When the assessment shows that the goals are still valid but the outcome is not being achieved, the cause of non-achievement will be documented and a change or modification in management actions would be warranted to address the causal factors. The assessment will develop recommendations to be considered by management for continuation, modification, or replacement of current management actions. Because adoption of a new management action may require changes in the monitoring plan, the assessment will also evaluate the effectiveness of the monitoring and data collection methods and recommend continued use, modification, or elimination of those methods.

B.2.4. Establishment of Monitoring Protocols

Establishing monitoring protocols will follow BLM program specific policy and, where appropriate, in accordance with the following seven principles:

1. Specify monitoring goals and objectives.

2. Characterize anthropogenic stressors that may affect receptors and parameters of interest.
3. Develop regional questions and conceptual models to describe the process and pathways anthropogenic stressors may affect receptors.
4. Suggest indicators to measure the effects of anthropogenic stressors, and define existing information availability and needs.
5. Estimate the sensitivity of the indicators to detect change, to guide final indicator choice, and monitoring design.
6. Describe a process by which management can identify thresholds of change requiring a management response as indicated by causal factors.
7. Identify clear connections between the overall monitoring program and management decision process.

B.2.5. Resource Monitoring Table

The resource monitoring table (Table B.1, "Resource Monitoring Table" (p. 1579)) identifies the indicator that will be monitored to detect change in resource conditions, the method or technique of monitoring, the locations for monitoring, the unit of measurement for monitoring, the frequency for monitoring, and the action triggers that indicate the effectiveness of the management action. Footnotes in Table B.1, "Resource Monitoring Table" (p. 1579) indicate where monitoring is generally conducted by stakeholders or cooperating agencies.

Table B.1. Resource Monitoring Table

Resource	Record Number	Indicator	Method or Technique	Location	Unit of Measure	Frequency	Action Triggers
Physical Resources							
Air Quality[1]	Air-1	Criteria Pollutants	Ambient air sampling	Air quality monitoring stations	Varies (e.g., parts per million, parts per billion, micrograms per cubic meter)	Varies (e.g., hourly, 8-hour, 24-hour)	Monitored exceedence of National Ambient Air Quality Standards
	Air-2	Air Quality Related Values	Ambient air sampling; monitoring of deposition, visibility, lake chemistry	Air quality monitoring stations; sampling locations in Class II sensitive areas; National Atmospheric Deposition Program and Interagency Monitoring of Protected Visual Environments monitoring stations	Varies (e.g., parts per million, kilograms per hectare, change in light extinction)	Varies (e.g., hourly, 8-hour, 24-hour, annual)	Critical loads exceeded, decreasing visibility trends, and/or increasing lake acidification
Soils	Soil-1	Soil erosion uplands	Visual observation and surveyed erosion pins	Area wide where land use activities are occurring	Soil loss in tons per acre	Visual examination while land use activity is active and annual site surveys	When soil loss is accelerated beyond natural levels
	Soil-2	Soil erosion on stream banks and floodplains	Visual observation and surveyed erosion pins	Area wide where land use activities are occurring	Area affected in square feet or acres	Visual examination while land use activity is active and annual site surveys	Water table is shrinking beyond average precipitation fluctuations
	Soil-3	Soil compaction	Penetrometer or visual inspection	Area affected by land use activities	Pounds per square inch	1 to 2 times annually	Compaction restricts water infiltration and plant growth
	Soil-4	Soil compaction, porosity, permeability, and depth to water	Monitoring wells (peizometers)	Riparian areas	Depth to water table	Every 2 to 3 years	Accelerated stream bank soil loss

Resource	Record Number	Indicator	Method or Technique	Location	Unit of Measure	Frequency	Action Triggers
Water Resources	M-30	Surface water quality[2]	Water sampling	All surface water	Milligrams per liter and tons per day	On a priority basis	Water quality does not meet state standards
	M-31	Groundwater quality[2]	Groundwater sampling	Established monitoring stations	Representative sample of water quality	Annually	Water quality does not meet state standards and water is migrating from one aquifer to another
	M-32	Channel geometry	Riparian cross sections	Priority streams	Change in stream channel (width, depth, side channel modification, and bank sloughing)	Every 1 to 3 years	Conditions are moving away from Proper Functioning Condition (PFC)
Mineral Resources							
Minerals	Min-1	Surface disturbance	Remote sensing or site inspection	Mineral exploration & development sites	Acres disturbed	Annually	Acres disturbed exceeding the range established for the area
	Min-2	Compliance with authorization	Area inspection	Area wide	Compliance	As determined by the Bureau of Land Management's (BLM) Inspection & Enforcement Strategy	Non-compliance
Fire and Fuels Management							
Fire	Fire-1	Fire Regime Condition Class	Fire behavior. Re-assessment of the biophysical settings listed in Chapter 3.	Buffalo Field Office	Acres in each condition class.	3 to 5 years. Sooner as per action triggers in next column.	Fires larger than 20,000 acres where BLM within the perimeter is at least 20% ownership.
Biological Resources							
Forest and Woodland Communities	Forest-1	Forest Health	Ecological site condition and trend	Forested lands	Representative sample area	Every 3 to 5 years	Disease, insect infestation, or encroachment of undesirable plant species threatens forest health
Grassland and Shrubland Communities	Grass-1	Trend	BLM approved monitoring methods	Area wide	Representative sample	On a priority basis	Not achieving desired conditions set forth in SS WL-4032
Riparian and Wetland Communities	Rip–1	Wetland/ riparian condition	PFC	Priority wetlands/ riparian areas	Stream miles and acres along with rating	On a priority basis	Not achieving PFC or not exhibiting and upward trend

Resource	Record Number	Indicator	Method or Technique	Location	Unit of Measure	Frequency	Action Triggers
Invasive Species	Pest-1	Noxious weed and invasive plant trends[3]	Remote sensing or site visit	Priority areas	Acres of established weeds and potential habitat areas	Annually	Spreading or establishment of invasive species in new areas
Special Status Species – Plants	SSP-1	Special Status Species	Site inspection	Special status species' habitats	Population and trend	Every 2 to 10 years	A declining trend in populations
Fish[4]	Fish-1	Fish Populations	Population sampling	Perennial water bodes	Species and populations of game fish	According to Wyoming Game and Fish Department (WGFD) schedule	A change in numbers beyond the normal fluctuations
	Fish-2	Macroinverte-brate indicator species	Collecting macroinvertebrate species	Perennial streams	Species and condition of macroinvertebrates	According to WGFD schedule	No presence of macroinvertebrates that represent good quality water in the stream
Wildlife[4]	Wldf-1	Big game seasonal habitat	Aerial and field inspections	Crucial wildlife habitat areas	Numbers during occupancy periods	Annually	A change in numbers beyond the normal fluctuations
	Wldf-2	Special Status Species occupancy and productivity	Aerial and field inspections	Suitable habitat and established management buffer zones (i.e. areas where lease stipulations have been applied)	Numbers during occupancy periods	According to WGFD schedule	A decline in numbers beyond the normal fluctuations
	Wldf-3	Neo-tropical bird habitat	Field inspections and site visits	Area wide	Species numbers during occupancy period	According to WGFD schedule	Declining trend in habitat occupancy
	Wldf-4	Raptors	Field inspections and site visits	Area wide	Nest occupancy rate	According to WGFD schedule	Declining trend in nest site occupancy
Special Status Species – Wildlife[4]	Wldf-5	Threatened and Endangered species occupancy and productivity	Aerial and field inspections	Suitable habitat and established management buffer zones (i.e. areas where lease stipulations have been applied)	Numbers during occupancy periods	According to WGFD schedule	A decline in numbers beyond the normal fluctuations
	Wldf-6	Greater Sage-Grouse	Site visits and aerial and field inspections	Lek sites	Number of males	Annually	Declining trend in the number of males

Resource	Record Number	Indicator	Method or Technique	Location	Unit of Measure	Frequency	Action Triggers
Heritage and Visual Resources							
Cultural[5]	Cult-1	National Register eligible sites	Site inspection	Area wide	Disturbance	Annually	Disturbance as a result of land uses or vandalism
Paleontology	Paleo-1	Significant paleontological resources	Site inspection	Site	Degradation or loss of significant fossil resources	Annually	Loss or damage to significant fossil resources as a result of human or natural causes
Visual Resource Management (VRM)	VRM-1	Project conformance with VRM Class Objectives	Remote sensing or site visit; Visual Contrast Rating from Key Observation Point	Class I, II, and sensitive III areas	Repetition of elements of the natural landscape (color, form, line, etc.) before and after implementation of an action.	Visual Contrast Ratings will be prepared for projects in visually sensitive areas; Comparison of pre- and post-implementation data will evaluate and sufficiency of project design features in meeting VRM Class Objectives	Intrusion that exceeds thresholds for meeting VRM objectives
Land Resources							
Forest Products	FP-1	Timber stands	Timber stand examination	Commercial forested areas	Board feet, age class, and damages	Every 10 to 20 years	Basal area growth does not meet timber type standards
Lands and Realty	LR-1	Realty authorization compliance	Site compliance inspection	Area wide	Number of site inspections	Annually	Non-compliance or non-use

Resource	Record Number	Indicator	Method or Technique	Location	Unit of Measure	Frequency	Action Triggers
Travel and Transportation Management	TTM-1	Roads and trails[6]	Route management categories and maintenance levels; onsite inspection or remote sensing; traffic counter data	Area wide	Miles	Per Facility Asset Management System Condition Assessment Plans	Conditions represent a hazard to public health and safety or property; route conditions do not meet identified road standards
	TTM-2	Effect of seasonal closures on wildlife	Remote sensing; radio collar data, or site visit	Travel Management Areas (TMAs) with seasonal closures for wildlife	Acres	Monitoring objectives developed in conjunction with WGFD; Each TMA should be monitored at least every 5 years	Changes in target species use or occupation of seasonal habitat requiring closure
	TTM-3	Off-highway vehicle disturbance; establishment of unauthorized vehicle routes	Remote sensing or site visit; traffic counter data	TMA; site-specific to area of disturbance	Miles of routes; acres of disturbance	Prioritize areas and monitor higher priority areas every 1-3 years and lower priority areas every 5–10 years	Disturbance exceeding the baseline, accelerated soil erosion occurring, and intense vegetation removal
Recreation	Rec-1	General recreation use	Onsite inspection, visitor use data, surveys; documented user conflicts or complaints	Area wide with emphasis on Special Recreation Management Areas and Extensive Recreation Management Areas with high visitation	Changes to recreation setting characteristics; changes in types, seasons or levels of use	Prioritize areas and monitor higher priority areas every 1-3 years and lower priority areas every 3–5 years	When visitor surveys or public comments indicate that recreation area management objectives are not met
	Rec-2	Concentrated recreation use	Inspect developed recreation sites or areas that have facilities	Recreation site	Condition of developed recreation site, facilities, visits and visitor days	Annually	When change is causing undue or unnecessary degradation of facilities and use areas; public complaints
	Rec-3	Compliance with Special Recreation Permit authorization	Administrative review, site inspection	Activity site	Permit stipulations, resource conditions, and site restoration	During and after an event; annually for other commercial users	When non-compliance is determined or degradation of resources is documented

Resource	Record Number	Indicator	Method or Technique	Location	Unit of Measure	Frequency	Action Triggers
Lands with Wilderness Characteristics (LWC)	LWC-1	Wilderness Characteristics (size, naturalness, outstanding opportunities for primitive and unconfined recreation or solitude, supplemental values)	Site visit or remote sensing	12,237 acres	Miles of linear human intrusions; acres disturbed; impacts to wilderness characteristics identified by onsite visit or public comment	Annually	Failure to meet the objectives outlined in the Preferred Alternative (LWC-6002) (6,864 acres)
Livestock Grazing	Graz-1	Vegetation condition	BLM approved monitoring methods; monitoring plans are included in Allotment Management Plans (AMPs)	All areas being grazed	Representative sample of grazed area	Monitor allotments on a priority basis	Conditions are not meeting goals and objectives for vegetation due specifically to livestock grazing management. Conditions are not meeting goals and objectives for vegetation. Inconsistent with Wyoming Healthy Rangelands and Guidelines for Livestock Grazing Management, and similar guidance updated over time.
	Graz-2	Forage utilization	Utilization study plot or site visit; monitoring plans are included in AMPs	Priority Allotments or as needed	Representative sample of grazed area	On a priority basis, monitor allotments before and after the area has been grazed	Utilization exceeds prescribed levels or key plants vigor declining
	Graz-3	Livestock numbers	Counts and site visits; monitoring plans are included in AMPs	Allotments	Number of allotments or operators inspected	Monitor allotments on a priority basis	Livestock numbers exceeding permitted numbers or in areas unauthorized
Special Designations							

Resource	Record Number	Indicator	Method or Technique	Location	Unit of Measure	Frequency	Action Triggers
Areas of Critical Environmental Concern (ACECs)	ACEC-1	Resource condition	Site visit or remote sensing	ACEC (35,451 acres)	Miles of linear human intrusions; acres disturbed; Impacts to relevant and important values	Every 1 to 5 years	Undue or unnecessary degradation or loss of identified resources or relevant and important values as a result of human or natural causes
Wild and Scenic Rivers (WSR)	WSR-1	Resource condition	Site visit or remote sensing	WSR corridor (Middle Fork Powder River, 2,664 acres)	Miles of linear human intrusions; acres disturbed; impacts to outstandingly remarkable values identified by onsite visit or public comment	Annually	Documented impacts to the free-flowing condition, water quality or outstandingly remarkable values or other objectives outlined in Manual 6400
Wilderness Study Areas (WSAs)	WSA-1	Wilderness Characteristics (size, naturalness, outstanding opportunities for primitive and unconfined recreation or solitude, supplemental values)	Site visit or remote sensing	WSAs (28,931 acres)	Miles of linear human intrusions; acres disturbed; impacts to wilderness characteristics identified by onsite visit or public comment	Annually	Failure to meet the non-impairment standard or other objectives outlined in Manual 6330

[1] Wyoming Department of Environmental Quality, Air Quality Division is responsible for data collection.
[2] Wyoming Department of Environmental Quality, Water Division is responsible for data collection.
[3] The Weed and Pest District and the Animal and Plant Health Inspection Service are responsible for data collection.
[4] WGFD is responsible for data collection.
[5] The State Historic Preservation Officer is responsible for data collection.
[6] The agencies with jurisdiction over the various public roads are responsible for data collection.

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Appendix C. Public Involvement, Consultation, and Coordination

C.1. Introduction

Public involvement, consultation, and coordination initiated prior to and occurred throughout preparation of the Buffalo Resource Management Plan (RMP) revision and associated Environmental Impact Statement (EIS). The Bureau of Land Management (BLM) incorporated public involvement, consultation, and coordination through public meetings, informal meetings, individual contacts, news releases, planning bulletins, workshops, a planning website, and the Federal Register. This appendix describes the public involvement process, as well as other key consultation and coordination activities undertaken to prepare the EIS in support of the RMP revision.

The BLM decision-making process is conducted in accordance with the requirements of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA, and the United States (U.S.) Department of the Interior (DOI) and BLM policies and procedures implementing NEPA. NEPA and the associated regulatory and policy framework require that all federal agencies involve the interested public and potentially affected parties in their decision-making, consider reasonable alternatives to proposed actions, and prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

A Notice of Intent (NOI) published in the Federal Register on November 14, 2008, formally announced the BLM's intent to revise the existing plans and prepare the associated EIS. The NOI initiated the scoping process and invited participation of affected and interested agencies, organizations, and members of the public in determining the scope and issues to be addressed by alternatives and analyzed in the EIS. The BLM solicited additional public involvement, including cooperating agency meetings and workshops, to help identify issues to be addressed in developing a full range of land management alternatives. Table C.1, "Public Involvement, Coordination, and Consultation Events" (p. 1587) lists public involvement, coordination, and consultation events.

Table C.1. Public Involvement, Coordination, and Consultation Events

Date	Location	Event
December 1, 2008	Wright, Wyoming	Public Scoping Meeting
December 2, 2008	Buffalo, Wyoming	Public Scoping Meeting
December 3, 2008	Gillette, Wyoming	Public Scoping Meeting
December 4, 2008	Sheridan, Wyoming	Public Scoping Meeting
December 5, 2008	Kaycee, Wyoming	Public Scoping Meeting
October 22, 2008	Buffalo, Wyoming	Socioeconomic Workshop
October 22-23, 2008	Buffalo, Wyoming	Cooperating Agency Training
May 20 – 22, 2009	Buffalo, Wyoming	Goals and Objectives Development Workshop
June 17 – 18, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
July 15 – 16, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
August 19 – 20, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop

Date	Location	Event
September 16 – 17, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
October 7 – 8, 2009	Buffalo, Wyoming	Range of Alternatives Development Workshop
December 14, 2009	Buffalo, Wyoming	Open House
December 15, 2009	Gillette, Wyoming	Open House
April 27 – 29, 2010	Buffalo, Wyoming	Preferred Alternative Development Workshop

C.2. Public Involvement

In accordance with CEQ scoping guidance, the BLM provided opportunities for public involvement as an integral part of revising the RMP and preparing the EIS. CEQ scoping guidance defines scoping as the process by which lead agencies solicit input from the public and interested agencies on the nature and extent of issues and impacts to be addressed and the methods by which they will be evaluated. The scoping report, which summarizes public participation during scoping and issues identified during the scoping process, is available on the Buffalo RMP website at http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html.

The intent of the scoping process is to provide an opportunity for the public, tribes, other government agencies, and interest groups to learn about the project and provide input on the planning issues, impacts, and potential alternatives that will be addressed in the EIS, and the extent to which those issues will be analyzed. In general, public involvement during scoping assists the agency through the following:

- Broadening the information base for decision-making.
- Informing the public about the EIS and proposed RMP and the potential impacts associated with various management decisions.
- Ensuring public needs and viewpoints are brought to the attention of the agency.
- Determining the scope and the significant issues to be analyzed in depth in the EIS.

Scoping Period

The scoping process for the Buffalo RMP revision began with the publication of the NOI in the Federal Register on November 14, 2008 and went through January 5, 2009. The scoping period provides an opportunity for the public to identify potential planning issues and concerns associated with the RMP and EIS. Information obtained by the BLM during scoping is combined with issues identified by the agencies to form the scope of the EIS.

Public Notification of Scoping

News Release

The BLM issued a news release to local media on August 13, 2008 announcing plans to revise the Buffalo RMP. On November 10, 2008, the BLM issued a news release describing the public scoping period and listing the time, date, and location of the public scoping meetings. The news releases went out to numerous radio stations and newspapers within and outside of the planning area.

Planning Bulletin

Another means of outreach prior to the public scoping meetings included a bulletin announcing

the scoping meetings. This bulletin included general information about the planning process and planning area for the RMP; contact information and comment submission instructions; and a list of the dates, times, and locations of the public scoping meetings. The BLM mailed the bulletin to potentially interested individuals and organizations who had participated in past BLM projects.

Website

The website provides background information on the project, a description of the scoping process and meeting locations, instructions on how to submit comments, a general overview of potential planning topics, and copies of public information documents such as the NOI and the existing plan. The website is one of the methods used to communicate project news and updates to the public. The website may be accessed at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html.

Scoping Meetings

During the week of December 1, 2008, the BLM hosted scoping meetings in five locations across the planning area. All meetings ran from 3:00 p.m. until 8:00 p.m. Table C.1, "Public Involvement, Coordination, and Consultation Events" (p. 1587) lists the scoping meeting locations and dates. The five public scoping meetings provided the public with an opportunity to learn and ask questions about the project and the planning process and to submit their issues and concerns to the BLM. The BLM gave two formal presentations, one at 3:30 p.m. and one at 6:00 p.m., each of which was followed by an open house format discussion between the BLM and meeting attendees. The formal presentations were designed to provide participants a good foundation in the RMP revision process, how to provide effective comments, and some of the resource issues to be covered in the RMP revision. Each formal presentation also included a question and answer session. The open house portions of the meetings were designed to allow attendees to learn about the project at their own pace and to enable them to ask BLM representatives questions in an informal one-on-one setting.

In addition to members of the BLM interdisciplinary team, a total of 129 people attended the scoping meetings. The BLM provided four handouts and displayed a series of four 3-panel table top boards at each scoping meeting.

The BLM encouraged meeting attendees to comment by submitting written comment forms (either at the meetings or via mail), or by sending an email. Comment forms were available to attendees at all meetings, as was a computer kiosk where the public could type and submit their comments. The BLM also provided an easel with a pad of paper for meeting attendees to write comments on.

Open Houses/Public Meetings

The BLM held two open house meetings in December 2009 in Buffalo and Gillette, Wyoming. Similar to the public scoping meetings, the open house meetings provided the public an opportunity to ask questions of BLM staff and learn about the progress of the project. Several BLM specialists and other representatives of the BLM were in attendance to provide information and address questions and concerns.

Mailing List

The BLM compiled a list of 1,217 individuals, agencies, and organizations that participated in past BLM projects or requested to be on the general mailing list. The BLM mailed the initial

planning bulletin to each individual on this list. Visitors to the scoping meetings were asked to sign in and provide their mailing address so that they could also be added to the mailing list. Other additions to the mailing list include those individuals who have submitted requests to be added to the list. Duplicate entries, changes of address, and return-to-sender mailings were deleted from the official project mailing list as identified. Through this process, the general mailing list was revised to approximately 1,500 entries. Requests to be added to or to remain on the official mailing list will continue to be accepted throughout the planning process.

Planning Bulletins

Periodic planning bulletins have been and are being developed and distributed to keep the public informed of the Buffalo RMP revision. Seven planning bulletins have been emailed and mailed to individuals on the Buffalo RMP mailing list prior to the issuance of the Buffalo Draft RMP and EIS. The planning bulletins have also been made available for download on the Buffalo RMP revision website.

Website

The Buffalo RMP revision website can be found at: http://www.blm.gov/wy/st/en/programs/Planning/rmps/buffalo.html. The site provides individuals with RMP news and information and access to documents related to the revision. The website serves as a virtual repository for documents related to the development of the RMP, including announcements, planning bulletins, and documents. The documents are available in PDF format to ensure they are accessible to the widest range of interested parties. The website provides the public an opportunity to submit their comments for consideration as part of the planning process and to be added to the project mailing list.

Future Public Involvement

Public participation efforts will be ongoing throughout the remainder of the process of revising the RMP and developing the EIS. During the 90-day public comment period for the Draft RMP and EIS, public meetings will be held. The Final RMP and EIS will consider all substantive oral and written comments on the Draft RMP and EIS. Members of the public with standing will have the opportunity to protest the content of the Proposed RMP and Final EIS during the specified 30-day protest period. The Record of Decision will be issued by the BLM after the release of the Final EIS, the Governor's Consistency Review, and protest resolution.

C.3. Consultation and Coordination

This section documents the consultation and coordination efforts undertaken by the BLM throughout the process of revising the RMP and developing the EIS. Title II, Section 202 of the Federal Land Policy and Management Act (FLPMA) directs the BLM to coordinate inventory, planning, and management efforts with the land use planning and management programs of Native American Tribes, other federal departments, and agencies of the state and local governments as part of its land use planning process, to the extent consistent with the laws governing the administration of the public lands. The BLM is directed to integrate NEPA requirements with other environmental review and consultation requirements to reduce paperwork and delays (40 Code of Federal Regulations 1500.4-5). The BLM accomplished coordination with other agencies and consistency with other plans through ongoing communications, meetings, and collaborative efforts with the BLM Interdisciplinary Team, which includes BLM specialists, and federal, state, and local agencies.

Cooperating Agencies

The BLM invited local, state, federal, and tribal representatives to participate as cooperating agencies on the Buffalo RMP revision and EIS. The BLM invited the following entities to participate because they have jurisdiction by law or because they could offer special expertise:

Counties

- Campbell County Commission
- Crook County Commission
- Johnson County Commission
- Sheridan County Commission

Conservation Districts

- Campbell County Conservation District
- Lake DeSmet Conservation District
- Powder River Conservation District
- Sheridan County Conservation District

Wyoming State Agencies

- Office of the Governor
- Office of State Lands and Investments
- Wyoming Department of Agriculture
- Wyoming Department of Environmental Quality
- Wyoming Department of Revenue
- Wyoming Department of State Parks and Cultural Resources
- Wyoming Department of Transportation
- Wyoming Game and Fish Department
- Wyoming Oil and Gas Conservation Commission
- Wyoming State Engineer's Office
- Wyoming State Forestry Division
- Wyoming State Geological Survey
- Wyoming State Historic Preservation Office
- Wyoming State Planning Office
- Wyoming Trails
- Wyoming Water Development Commission

Federal Agencies

- Bighorn National Forest
- Medicine Bow-Routt National Forest, Thunder Basin National Grasslands
- U.S. DOI – Office of Surface Mining
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Nuclear Regulatory Commission

Tribes

- Cheyenne River Sioux
- Crow
- Eastern Shoshone
- Ft. Peck/Assiniboine/Sioux

- Northern Arapaho
- Northern Cheyenne
- Oglala Sioux
- Three Affiliated Tribes

The BLM formally invited the cooperating agencies to participate in developing the alternatives and RMP and EIS, and to provide data and other information relative to their agency responsibilities, goals, mandates, and expertise. Cooperating agencies provided input during the initial scoping process. The BLM held general meetings with cooperators to discuss procedures and processes. The BLM and cooperating agencies held several workshops to develop goals and objectives, a range of alternatives, and the Preferred Alternative between May 2009 and April 2010. Cooperating agencies have also provided comments on draft RMP related documents throughout the revision process.

In addition, the following federal Congressional Offices participated in the meetings with cooperating agencies.

- U.S. Senator Michael Enzi's Office
- U.S. Senator John Barrasso's Office
- U.S. Representative Cynthia Lummis' Office

Endangered Species Act Consultation

The Buffalo Field Office contacted the U.S. Fish and Wildlife Service (USFWS) regarding Section 7 of the Endangered Species Act and the Buffalo RMP revision. The BLM sent a scoping letter to the USFWS requesting comments concerning Section 7 consultation and the Buffalo RMP revision project. On January 5, 2010 the USFWS provided comments on (1) Threatened and Endangered species, (2) migratory birds, and (3) wetlands and riparian areas. Within these comments the USFWS provided a list of Threatened and Endangered species likely to occur on BLM-administered land in the Buffalo Field Office, for evaluating BLM Section 7 responsibilities. The USFWS was also provided opportunities to comment on chapters 2, 3, and 4 of the draft RMP and EIS. Consultation letters concerning the Buffalo RMP revision project are located at the end of this appendix. The Buffalo Field Office will continue consultation with the USFWS regarding the RMP revision through completion of the final biological assessment and Final EIS and Proposed RMP.

Native American Consultation

Consultation with Native American tribes is part of the NEPA process and a requirement of FLPMA. The BLM invited Native American tribes to be cooperating agencies as part of the RMP revision. The Northern Cheyenne Tribe accepted the invitation and attended cooperator meetings. On September 22, 2008, the BLM sent letters to the following tribes inviting them to be part of the planning process through consultation and public scoping meetings:

- Cheyenne River Sioux
- Crow
- Eastern Shoshone
- Ft. Peck/Assiniboine/Sioux
- Northern Arapaho
- Northern Cheyenne
- Oglala Sioux

- Three Affiliated Tribes

The consultation letters invited Native American tribes to comment on interests or concerns related to management in the planning area and asked tribes to identify any places of traditional religious or cultural importance within the planning area. An example consultation letter between the Native American tribes and the BLM is located at the end of this appendix. In November of 2010, May of 2011, June of 2011, February of 2012, May of 2012, and June of 2012, the BLM met with representatives from the Standing Rock, Cheyenne River Sioux, Rosebud Sioux, Crow Creek Sioux, Lower Brule Sioux, Oglala Sioux, Sisseton Wahpeton Oyate, Yankton Sioux, Flandreau Santee, Fort Peck, Three Affiliated, Crow, Northern Arapaho, and Northern Cheyenne Tribes to coordinate and discuss the RMP. These meetings were not considered government-to-government consultation by either party, but the BLM did take note of several tribal concerns from official tribal representatives and elected officials. The BLM will continue efforts toward government-to-government consultation with all interested tribes after publication of this draft and throughout the remainder of the RMP process.

C.4. Distribution List

The BLM distributed the Draft RMP and EIS to the following entities for their review and comment.

TRIBAL GOVERNMENTS

- Cheyenne River Sioux
- Crow
- Eastern Shoshone
- Ft. Peck/Assiniboine/Sioux
- Northern Arapahoe
- Northern Cheyenne
- Oglala Sioux
- Three Affiliated Tribes

LOCAL GOVERNMENTS (COUNTIES, CITIES, TOWNS)

Campbell County, Wyoming

- Campbell County Commission
- Campbell County Conservation District
- City of Gillette
- Town of Wright

Crook County, Wyoming

- Crook County Commission

Johnson County, Wyoming

- Johnson County Commission
- Lake DeSmet Conservation District
- Powder River Conservation District
- City of Buffalo
- Town of Kaycee

Sheridan County, Wyoming

- Sheridan County Commission
- Sheridan Conservation District
- City of Sheridan

WYOMING STATE AGENCIES

- Office of the Governor, Environmental Policy Division
- Business Council
- Department of Environmental Quality
  - Air Quality Division
  - Land Quality Division
  - Water Quality Division
- Department of Agriculture
- Department of State Parks and Cultural Resources
  - State Museum
- Department of Transportation
- State Planning Office
- Game and Fish Department
- State Geologic Survey
- Office of State Lands and Investments
- State Engineer's Office
- State Historic Preservation Office
- Department of Administration and Information
- Department of Employment, Research, and Planning Division

WYOMING STATE BOARDS/COMMISSIONS

- Air Quality Advisory Board
- Board of Wildlife Commissioners
- Natural Gas Pipeline Authority
- Agriculture Board
- Environmental Quality Council
- Farm Bureau Federation
- Land Quality Advisory Board
- Livestock Board
- Mining Council
- Oil and Gas Conservation Commission
- State Board of Outfitters and Professional Guides
- State Grazing Board
- Trails Council

WEED AND PEST CONTROL DISTRICTS

- Campbell County Weed and Pest Control District
- Johnson County Weed and Pest Control District
- Sheridan County Weed and Pest Control District

LOCAL GOVERNMENT ASSOCIATIONS/COUNCILS

- Wyoming Association of Municipalities
- Wyoming County Commissioners Association
- Wyoming Association of Conservation Districts

NON–GOVERNMENT ORGANIZATIONS

- Alliance for Historic Wyoming
- Audubon Society
- Audubon Wyoming
- Biodiversity Conservation Alliance
- Coalbed Natural Gas Alliance
- Foundation for North American Wild Sheep
- Independent Petroleum Association of Mountain States
- Izaak Walton League
- National Wildlife Federation
- Natural Resources Defense Council
- Petroleum Association of Wyoming
- Powder River Basin Resource Council
- Public Lands Foundation
- Rocky Mountain Elk Foundation
- Sierra Club
- The Conservation Fund
- The Land Trust Alliance
- The Nature Conservancy
- The Wilderness Society
- The Wildlife Society
- Trout Unlimited
- Western Watersheds Project
- Wildlife Habitat Council
- Wyoming Livestock Roundup
- Wyoming Mining Association
- Wyoming Natural Diversity Database
- Wyoming Nature Conservancy
- Wyoming Outdoor Council
- Wyoming Stockgrowers Association
- Wyoming Wilderness Association
- Wyoming Wildlife Federation
- Wyoming Wildlife Trust Fund
- Wyoming Woolgrowers Association

CONGRESSIONAL DELEGATION

- U.S. Senator Michael Enzi
- U.S. Senator John Barrasso
- U.S. Representative Cynthia Lummis

U.S. DEPARTMENT OF THE INTERIOR

- Bureau of Indian Affairs
- U.S. Bureau of Reclamation
- National Park Service
- Office of Environmental Policy and Compliance
- Natural Resources Library
- Office of Surface Mining
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
    - Washington, D.C.

  - Cheyenne, Wyoming
- Bureau of Land Management
  - Washington, D.C.
  - Wyoming State Office, Cheyenne
  - Wyoming District Offices: Casper, Rock Springs, Worland
  - Wyoming Field Offices: Casper, Cody, Kemmerer, Lander, Newcastle, Pinedale, Rawlins, Rock Springs, and Worland

OTHER FEDERAL AGENCIES

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture Forest Service
  - Bighorn National Forest
  - Medicine Bow-Routt National Forest and Thunder Basin National Grassland
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- Department of Energy Western Area Power Administration
- Federal Highway Administration
- Federal Energy Regulatory Commission
- U.S. Government Printing Office
- National Oceanic and Atmospheric Administration National Weather Service

LIBRARIES

- Library of Congress
- University of Wyoming Library
- Campbell County Library
- Johnson County Library
- Sheridan County Public Library

EDUCATIONAL INSTITUTIONS

- University of Wyoming
- Wyoming Community College Commission
- Northern Wyoming Community College District
  - Buffalo Campus
  - Gillette Campus
  - Sheridan Campus

NEWSPAPERS

- Buffalo Bulletin, Buffalo, Wyoming
- Billings Gazette, Billings, Montana
- Casper Star Tribune, Casper, Wyoming
- Casper Journal, Casper, Wyoming
- Douglas Budget, Douglas, Wyoming
- Gillette News-Record, Gillette, Wyoming
- Glenrock Independent, Glenrock, Wyoming
- Guernsey Gazette, Guernsey, Wyoming
- High Plains Sentinel, Wright, Wyoming
- Kaycee Community Voice, Kaycee, Wyoming
- Lingle Guide, Lingle, Wyoming
- Lusk Herald, Lusk, Wyoming

- Moorcroft Leader, Moorcroft, Wyoming
- Newcastle Newsletter Journal, Newcastle, Wyoming
- Our Town, Casper, Wyoming
- Platte County Record Times, Wheatland, Wyoming
- Sheridan Press, Sheridan, Wyoming
- Sundance Times, Sundance, Wyoming
- Torrington Telegram, Torrington, Wyoming
- Weston County Gazette, Upton, Wyoming
- Wyoming Associated Press
- Wyoming Business Report
- Wyoming Livestock Roundup

RADIO

- KLGT-FM/KBBS-AM, Buffalo
- KTWO-AM/KMGW-FM/KWYY-FM, Casper
- KRVK-FM/KKTL-AM/KTRS-FM, Casper
- KASS/KQLT/K MLD/KHOC/KVOC/KERM-KGOS, Casper
- KKTY-AM, Douglas
- KYOD- FM, Douglas
- KIML-AM/KAML-FM, Gillette
- KGOS-AM/KERM-FM, Torrington
- KASL-AM, Newcastle
- KWYO-AM/KROE-AM/KZWY-FM/KYTI-FM, Sheridan
- KBFS-AM/KYDT-FM, Sundance
- KYCN-AM/KZEW-FM, Wheatland
- Northern Broadcasting System, Montana
- Wyoming Public Radio, Laramie
- Wyoming Outdoor Radio

C.5. Consultation Letters

Section 7 Consultation Letter

United States Department of the Inte

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

In Reply Refer To:
ES-61411/W.02/WY09FA0031

JAN

Memorandum

To: Field Manager, Bureau of Land Management, Buffalo Field Of
Wyoming

From: for Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Fie
Cheyenne, Wyoming Scott Hicks

Subject: Scoping Comments for Buffalo Resource Management Plan

Thank you for the opportunity to provide scoping comments on the propose
Management Plan (RMP). The Buffalo RMP will replace the current Buffa
Buffalo Field Office RMP will provide future direction for managing appro
acres of U.S. Bureau of Land Management (Bureau)-administered surface l
acres of Bureau–administered mineral estate in Campbell, Johnson, and Sh
north-central Wyoming. Emerging issues and changing laws necessitate re
RMP as described in the 2008 scoping notice. The Bureau is requesting the
identifying additional issues to be addressed in the planning effort.

In response to your request to review the proposed action, we are providing
on (1) threatened and endangered species, (2) migratory birds, and (3) wetla
areas. The Service provides recommendations for protective measures for t
endangered species in accordance with the Endangered Species Act (Act) o
(16 U.S.C. 1531 *et seq.*). Protective measures for migratory birds are provi
with the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 and the Bald a
Protection Act (BGEPA), 16 U.S.C. 668. Wetlands are afforded protection
Orders 11990 (wetland protection) and 11988 (floodplain management), as
the Clean Water Act. Other fish and wildlife resources are considered unde
Wildlife Coordination Act and the Fish and Wildlife Act of 1956, as amend
U.S.C. 742a-742j.

Threatened and Endangered Species
The following threatened or endangered species could occur in the project a

Black-footed ferret: Black-footed ferrets (*Mustela nigripes*) may be affecte
are impacted. Please be aware that black-footed ferret surveys are no longe
black-tailed prairie dog towns (see our February 2, 2004, letter previously p
office). However, we encourage the Bureau to protect all prairie dog towns for their value to the prairie ecosystem and the many species that rely on them. We further encourage you to analyze potentially disturbed prairie dog towns for their value to future black-footed ferret reintroduction.

Blowout penstemon: Blowout penstemon (*Penstemon haydenii*) is a perennial herb with stems less than 12 inches tall. The inflorescence is 2-6 inches long and has 6-10 compact whorls of milky-blue to pale lavender flowers. Blowout penstemon was listed as endangered on October 1 1987. Blowout penstemon is known from multiple populations in western Nebraska (Fertig 2001). The plant's current known range in Wyoming consists of the Ferris dunes area in northwest Carbon County where the plant is restricted to two habitat types: steep, northwest facing slopes of active sand dunes with less than 5 percent vegetative cover; and on north facing sandy slopes, on the lee side of active blowouts with 25-40 percent vegetative cover. Known populations in Wyoming are found between 6680-7440 feet (Fertig 2001). However, recent surveys have indicated that systematic surveys may be warranted in some lower elevations (below 6700 feet) in Wyoming where active sand blowout features occur (BLM 2005, Fertig 2001).

Blowouts are formed as strong winds deposit sands from the windward side of a dune to the leeward side and result in a sparsely vegetated crater-like depression. Associated vegetation includes blowout grass, thickspike wheatgrass, lemon scurfpea, Indian ricegrass and western wheatgrass. Threats to the plant occur when sand dunes are removed or overly disturbed by vehicular traffic. Surveys should be conducted from mid-June to early-July when flowering occurs by knowledgeable botanists trained in conducting rare plant surveys. The Service does not maintain a list of "qualified" surveyors but can refer those wishing to become familiar with the blowout penstemon to experts who can provide training/services.

Ute ladies'-tresses: Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial, terrestrial orchid, 8 to 20 inches tall, with white or ivory flowers clustered into a spike arrangement at the top of the stem. *S. diluvialis* typically blooms from late July through August; however, depending on location and climatic conditions, it may bloom in early July or still be in flower as late as early October. *S. diluvialis* is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet (although no known populations in Wyoming occur above 5,500 feet) in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows. Soils where *S. diluvialis* have been found typically range from fine silt/sand, to gravels and cobbles, as well as to highly organic and peaty soil types. *S. diluvialis* is not found in heavy or tight clay soils or in extremely saline or alkaline soils. *S. diluvialis* seems intolerant of shade and small scattered groups are found primarily in areas where vegetation is relatively open. Surveys should be conducted by knowledgeable botanists trained in conducting rare plant surveys. *S. diluvialis* is difficult to survey for primarily due to its unpredictability of emergence of flowering parts and subsequent rapid desiccation of specimens. The Service does not maintain a list of "qualified" surveyors but can refer those wishing to become familiar with the orchid to experts who can provide training or services.

Species of Concern
Greater Sage-grouse: The Service is currently conducting a review to determine if the greater sage-grouse (*Centrocercus urophasianus*) warrants listing. Greater sage-grouse are dependent on sagebrush habitats year-round. Habitat loss and degradation, as well as loss of population connectivity have been identified as important factors contributing to the decline of greater sage-

2

grouse populations rangewide (Braun 1998, Wisdom *et al.* 2002). Therefo result in loss or degradation of sagebrush habitats that are important to this closely evaluated for their impacts to sage-grouse. If important breeding ha brood rearing habitat) is present in the project area, the Service recommend disturbance March 1 through June 30, annually. Minimization of disturban nesting, and brood rearing is critical to sage-grouse persistence within these important winter habitats are present (Doherty *et al.* 2008), we recommend disturbance November 15 through March 14, annually.

We recommend you contact the Wyoming Game and Fish Department to ic greater sage-grouse habitats within the project area, and appropriate mitigat minimize potential impacts from the proposed project. The Service recom mapping of important greater sage-grouse habitats where local information results of these surveys should be used in project planning, to minimize pot species. No project activities that may exacerbate habitat loss or degradatic in important habitats. Additionally, unless site-specific information is avai grouse habitat should be managed following the guidelines by Connelly *et* as the Western Association of Fish and Wildlife Agencies [WAFWA] guid

In Wyoming, information suggests that greater sage-grouse populations are by energy development activities, especially those that degrade important s when mitigative measures are implemented (Braun 1998, Lyon 2000, Naug Greater sage-grouse populations can repopulate areas developed for resourc habitat reclamation for the species (Braun 1987). However, there is no evic attain their previous levels and reestablishment of sage-grouse in a reclaime 30 years, or longer (Braun 1998). Therefore, this project should be carefull term and cumulative effects on the greater sage-grouse, since reclamation n populations to pre-activity levels. The Bureau should ensure this activity d greater sage-grouse declines on either a local or range-wide level.

Black-tailed prairie dog: The Service is currently conducting a review to d tailed prairie dog (*Cynomys ludovicianus*) warrants listing under the Act (7 black-tailed prairie dog may be found scattered in remnant populations thro range that it once occupied. A significant portion of existing occupied habi in a few large complexes. We encourage you to protect all prairie dog tow the prairie ecosystem and the many species that rely on them.

Migratory Birds

Under the MBTA and BGEPA, the Federal agency has a mandatory obligat many species of migratory birds, including eagles and other raptors which n under its jurisdiction. Of particular focus are the species identified in the S *Conservation Concern 2002.* In accordance with the Fish and Wildlife Co USC 2912 (a)(3)), this report identifies "species, subspecies, and populatior nongame birds that, without additional conservation actions, are likely to be listing" under the Act. This report is intended to stimulate coordinated and conservation actions among Federal, State, and private partners and is avail http://www.fws.gov/migratorybirds/reports/bcc2002.pdf.

In order to promote the conservation of migratory bird populations and their habitats, the Service recommends that the Federal agency implement those strategies outlined within the Memorandum of Understanding directed by the President of the U.S. under Executive Order 13186, where possible.

During project planning analysis of the following information is recommended to determine project effects to migratory birds:

1. The current status and habitat use of migratory birds in the project area. This may include number of individuals, breeding pairs, population trends, and active nests within and adjacent to the project area.
2. An analysis of the effects of the proposed action on migratory birds and their habitats. Measures that will reduce or eliminate adverse impacts to migratory birds, including protective buffers, seasonal restrictions, maintenance of habitat within the project area, raptor-proofing power lines, and netting of waste pits.
3. The projected short and long term impacts to migratory birds and their trends during and after project completion using monitoring, modeling and current literature.

Potential adverse effects to migratory birds from power lines should be identified and every attempt to mitigate such effects should be implemented. Structures that are identified as affecting birds should be made safe to prevent subsequent mortalities. If you determine that power poles and/or stretches of power line are resulting in electrocution of migratory birds, especially raptors, the Service requests that specific information be documented regarding these mortalities. Based on regulations pursuant to the MBTA and BGEPA, migratory bird carcasses may only be collected, possessed or moved by state game wardens, Service refuge officers, Service special agents, or persons holding a valid salvage permit issued by the Service and the applicable state. When a migratory bird mortality is observed the Service recommends that as much of the following information as possible be documented: legal location, GPS location, all identifying numbers from the nearest power pole, date of observation, species, photographs of pole (top section), and the dead bird, and directions to the scene. Please contact our office with the information and call or email Dominic Domenici of the Service's Law Enforcement Office at 307-261-6365 /dominic_domenici@fws.gov to report your observation and obtain further guidance. The Service appreciates your efforts to protect migratory birds.

Wetlands

The functions and values of wetlands are well documented and are especially important in the arid west. Substantial degradation diminishes the effectiveness of wetlands to function as food, cover, and breeding sites for wetland dependent species; sediment transport systems; water retention/storage sites; contaminant sinks; and chemical exchange sites. To ensure the Service has sufficient information to assess project impacts on wetlands, assessments should include:

1. An enumeration of the acreage of wetlands, by type, impacted by the proposed action.
2. A discussion of why wetlands cannot be avoided.
3. A description of the functions and values of the wetlands, including sediment transport, water storage, habitat for aquatic and terrestrial organisms, and contaminant sinks, as well as the potential risks of water removal for these functions and values.

4. Measures that will reduce or eliminate adverse impacts to wetlands plan to offset unavoidable impacts, protective buffers, seasonal and maintenance of the natural hydrograph, and development and imple monitoring program to track the effectiveness of mitigation measure
5. Results of wetland monitoring or management activities in, or adjac project site.
6. The anticipated short and long term effects to wetland and riparian a project completion.

We recommend addressing each of the above concerns where applicable to appreciate your efforts to ensure the conservation of Wyoming's natural res questions regarding this letter or resources described above, please contact office at the letterhead address or phone (307) 772-2374, extension 238.

cc: WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M
WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)

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Tribal Consultation Letter

SEP 22 2008

In Reply Refer To:
1610/Buffalo RMP Revision

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. Carl Venne
Crow Tribal Council
P.O. Box 159
Crow Agency, MT 59022

Dear Mr. Venne:

The Buffalo Field Office is revising its 1985 land use plan. The revised Buffi
Management Plan (RMP) will serve as our general direction for all resource a
management decisions for the BLM-administered public lands and resources
administrative area. The plan will guide the use, protection, and management
cultural resources on the public lands in Campbell, Johnson, and Sheridan co

In an effort to keep you informed of the status of our planning effort, we are c
who have previously expressed cultural concerns relating to the planning area
traditional lands coincide with the planning area. We greatly appreciate the cc
accomplished with you in the past and would like to continue our relationship

We would like to invite you to become a cooperating agency. Cooperating ag
available to government entities with jurisdiction by law or special expertise.
agency provides staff to the BLM planning team to develop analysis for whic
particular expertise. The cooperating agency must develop a Memorandum o
with the federal agency and must fund its own participation. Please note that
participation as a cooperating agency does not satisfy the BLM's obligation t
government-to-government basis. Therefore, regardless of your tribe's decisi
not as a cooperating agency, our government-to-government consultation wil

Enclosed for your consideration are several documents: 1) a cooperating agen
self-addressed, stamped envelope for ease in responding to our invitation, 2)
on no-cost training opportunities sponsored by the BLM in the near future alc
hotel accommodations in the Buffalo area, and 3) an example Memorandum
be executed should you accept our invitation to become a cooperator in the R

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We value your knowledge, concerns, and perspectives relating to the planning area. If you would like further information regarding cooperating agency status, please contact Linda Slone, Project Manger, at 307-261-7520. With regard to cultural heritage issues, you may wish to contact Buck Damone, Archaeologist, at 307-684-1100.

Sincerely,

/s/ Paul Beels
Acting Field Manager
Buffalo Field Office

Chris E. Hanson
Field Manager, Casper

5 Attachments:
1 – Cooperating Agency Return Form
2 – Planning Nuts & Bolts Training
3 – Cooperating Agency Training with Economic Profile System Workshop
4 – List of Buffalo Motels
5 – Example Memorandum of Understanding

cc: Mr. Dale Old Horn
Crow Tribal Cultural Resources
P.O. Box 159
Crow Agency, MT 59022

bcc: Buffalo RMP Revision – Administrative Record (LSlone)
L.Slone:lms:09/19/08

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Appendix D. Best Management Practices

Best management practices (BMPs) are environmental protection measures developed by governmental bodies, industry, and scientific or other working groups. BMPs are mitigation measures applied on a site-specific basis to reduce, prevent, or avoid adverse environmental or social impacts. These practices are applied to help ensure that development is conducted in an environmentally responsible manner. Some BMPs are as simple as choosing a paint color that helps oil and natural gas equipment blend with the natural surroundings, turning development almost invisible. Other BMPs may reduce the amount of vegetation lost to development, may speed the re-growth of vegetation, or may reduce the amount of wildlife disturbance in important habitats. Public land users are encouraged to review these practices, incorporate them where appropriate, or develop better methods for achieving the same goal.

The purpose of this section is not to select certain practices or designs and require that only those be used. It is not possible to evaluate all the known practices and make determinations as to which are best. BMPs should be matched and adapted to meet the site-specific requirements of the management action, project and local environment. No one management practice is best suited to every site or situation. BMPs must be adaptive and monitored regularly to evaluate effectiveness.

The following sources contain information regarding the development and implementation of BMPs. These references are not to be considered as exclusive sources of information; rather, they should be used as a starting point when evaluating specific BMPs during project design and implementation.

D.1. Bureau of Land Management (BLM) BMP Resources

BLM BMPs: This website provides an introduction to BLM BMPs with links to BLM contacts, specific resources, and other BMP links, and other resources related to BLM BMPs. http://www.blm.gov/bmp/

General Information for Oil and Gas BMPs: This resource provides general information regarding BLM BMPs for oil and gas development. A sample of BMPs are provided with a brief description of types of BMPs and terminology. http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/general_information.html

BMP Frequently Asked Questions: The link below provides responses to frequently asked questions regarding BLM BMPs. http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/frequently_asked_questions.html

BMP Technical Information: The slide shows at the link below provide a detailed look at a menu of possible oil and natural gas development BMPs. These slide shows are only a starting point and are not intended to serve as a comprehensive list of BMPs. http://www.blm.gov/nhp/efoia/wo/fy05/im2005-069.htm

Oil and Gas Exploration – The Gold Book: The publication Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (commonly referred to as The Gold Book) was developed to assist operators by providing information on the requirements for obtaining permit approval and conducting environmentally responsible oil and gas operations on

federal lands and on private surface over federal minerals (split-estate). Split-estate surface owners will also find the Gold Book to be a useful reference guide. In 2007, the Gold Book was updated to incorporate changes resulting from the new Onshore Oil and Gas Order No. 1 regulations. http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html

Visual Resources: There are numerous design techniques that can be used to reduce the visual impacts from surface-disturbing projects. The techniques described here should be used in conjunction with BLM's visual resource contrast rating process wherein both the existing landscape and the proposed development or activity are analyzed for their basic elements of form, line, color, and texture. http://www.blm.gov/wo/st/en/prog/Recreation/recreation_national/RMS/2.html

Renewable Energy Development BMPs: The following resources provide information on BMPs related to renewable energy development.

- *Wind Energy Development Programmatic Environmental Impact Statement [EIS]:* The scope of the Wind Energy Programmatic EIS analysis includes an assessment of the positive and negative environmental, social, and economic impacts; discussion of relevant mitigation measures to address these impacts; and identification of appropriate, programmatic policies and BMPs to be included in the proposed Wind Energy Development Program. http://windeis.anl.gov/documents/fpeis/index.cfm

- *BLM Instruction Memorandum [IM] 2009-043, Rights-of-Way, Wind Energy:* This IM further clarifies the BLM Wind Energy Development policies and BMPs provided in the Wind Energy Development Programmatic EIS. http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2009/IM_2009-043.html

- *Record of Decision for the Geothermal Resource Leasing Programmatic Environmental Impact Statement:* This Record of Decision (ROD) provides a list of sample BMPs that have been collected from various BLM and United States Forest Service documents addressing geothermal and fluid mineral leasing and development, including resource management plans (RMPs), forest plans, and environmental reports for geothermal leasing and development. The document provides guidance on incorporating BMPs, as appropriate, into the geothermal permit application or as Conditions of Approval (COAs). http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/energy/geothermal_eis/final_programmatic.Par.90935.File.dat/ROD_Geothermal_12-17-08.pdf

- *Solar Energy Development Programmatic Environmental Impact Statement:* This Programmatic EIS is currently under development (as of Summer 2011) and when finalized will include policies and mitigation measures adopted as part of the proposed solar energy deployment program. The Solar Energy Development Programmatic EIS will identify for the Department of Energy, industry, and stakeholders the best practices for deploying solar energy and ensuring minimal impact to natural and cultural resources on BLM-administered lands or other federal, state, tribal, or private lands. http://www.solareis.anl.gov/

D.2. Other Agency BMP Resources

U.S. Environmental Protection Agency (EPA) BMP Resources

Healthy Watersheds: This resource provides conservation approaches and tools designed to ensure healthy watersheds remain intact. The website provides example approaches that are generally site-specific, and watershed managers are encouraged to use the examples as guidance in developing local conservation strategies. The website also supplies outreach strategies to encourage stakeholder engagement in conservation and protection of healthy watersheds.
http://www.epa.gov/owow/nps/

Storm Water BMPs: This online menu provides BMPs designed to meet the minimum requirements for six control measures specified by the EPA's Phase II Stormwater Program. The control measures include public education, public involvement, illicit discharge detection and elimination, construction, post-construction, and pollution prevention/good housekeeping. The menu also provides case studies assessing the performance of various stormwater BMPs.
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/menu.cfm

Pasture, Rangeland, and Grazing Operations BMPs: The link below provides BMPs compiled by the EPA to prevent or reduce pollution associated with livestock grazing. Topics include practices to reduce methane production, managing nonpoint source pollution, controlled grazing, reducing animal feeding operation pollution, and manure management.
http://www.epa.gov/oecaagct/anprgbmp.html

U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS) BMP Resources

National Conservation Practice Standards: This website provides links for national conservation practices developed by the NRCS on topics such as herbaceous wind barriers, feed management, forest stand improvement, and irrigation management. The conservation practice standard contains information on why and where the practice is applied, and sets forth the minimum quality criteria that must be met during the application of that practice in order for it to achieve its intended purpose.
http://www.nrcs.usda.gov/Technical/Standards/nhcp.html

National Range and Pasture Handbook: Developed by NRCS grazing land specialists, this handbook provides a source of expertise to guide cooperators in solving resource problems and in sustaining or improving their grazing lands resources and operations.
http://www.glti.nrcs.usda.gov/technical/publications/nrph.html

Wyoming Game and Fish Department BMP Resources

Aquatic Invasive Species: This resource provides information about how to recognize aquatic invasive species and how to avoid introducing them or spreading them through Wyoming's waters. The website contains links to external resources including a link to waterbodies in the United States currently known to be impacted by zebra and quagga mussels. The website also contains information about how to decontaminate equipment and watercraft suspected of harboring aquatic invasive species.
http://gf.state.wy.us/fish/AIS/index.asp

D.3. Greater Sage-Grouse: Required Design Features and Best Management Practices

D.3.1. Required Design Features

The practices listed in this section are from the BLM National Technical Team (NTT) report (BLM 2012h) and are treated in the RMP as required design features (RDFs) to ensure regulatory certainty for the conservation of Greater Sage-Grouse. The BLM will adopt them as operational requirements, through issuance of the RMP ROD. The RDFs are primarily written for priority Greater Sage-Grouse habitat (Core Populations Areas and Connectivity Corridors). Within general habitat, the RDFs applied are determined on a project specific basis. The BLM may add additional RDFs as deemed necessary by further environmental analysis and as developed through coordination with other federal, state, and local regulatory and resource agencies. Because practices change, based on new information, the RDFs will be updated periodically.

The EIS for the RMP may not decide or dictate the exact wording or inclusion of the RDFs. Rather, they are used in the RMP process as a tool to help develop the RMP alternatives and to provide a baseline for comparative impact analysis in arriving at RMP decisions. They will be used in the same manner in analyzing activity plans and other site-specific proposals. Design features and management practices and their wording can be a matter of policy. As such, specific wording is subject to change primarily through administrative review, not through the RMP and EIS process. Any further changes that may be made in the continuing refinement of these RDFs and any development of program-specific standard stipulations will be handled in another forum, including appropriate public involvement and input.

BLM reserves the right to modify the operations of surface-disturbing or disruptive activities as part of the statutory requirements for environmental protection. Those measures selected for implementation will be identified in the site-specific ROD or decision record for those activities and will inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands and minerals. These measures have been written in a format that will allow for either their direct use as stipulations or operating standards or in addition to specific or specialized mitigation following the submission of a detailed development plan or other project proposal and an environmental analysis. These operating standards are given as acceptable methods for mitigating anticipated effects and achieving the desired plan outcomes but are not prescribed as the only method for achieving the outcomes.

Because of site-specific circumstances, some RDFs may not apply to all activities (e.g., a resource or conflict is not present on a given site) and/or may require slight variations. Proposed variations will be analyzed and may be applied in the site specific permitting process. All variations will require appropriate analysis and disclosure as part of activity authorization. It is anticipated that variations will be approved in very limited circumstances and only in coordination with the Wyoming Game and Fish Department (WGFD) and/or U.S. Fish and Wildlife Department (USFWS).

Project proponents are encouraged to include all appropriate RDFs in their proposals. The BLM will require application of all appropriate measures, warranted by site-specific analysis, in order to avoid, minimize, rectify, reduce, or compensate for impacts. RDFs not included in project proposals and determined appropriate from the site-specific analysis will be required as COAs.

Additional COAs developed through consultation with other federal, state, and local regulatory and resource agencies may be applied when supported by site-specific analysis.

The proponent must implement all identified measures because they are commitments made as part of the BLM decision. Because the decision document creates a clear obligation for the BLM to ensure any proposed mitigation adopted in the environmental analysis is performed, there is the expectation that applied mitigation will lead to a reduction of environmental impacts in the implementation stage and include binding mechanisms for enforcement (Council on Environmental Quality Memorandum for Heads of Federal Departments and Agencies 2011). The determination of adequate application of the mitigation measures and conservation actions for specific projects will remain with the BLM's authorized officer.

Those resource activities or programs currently without a standardized set of permit or operation stipulations can use the RDFs for Greater Sage-Grouse as stipulations or as COAs or as a baseline for developing specific stipulations for a given activity or program.

At the project level, to prioritize certain general habitat areas over marginal or substandard habitat, consideration should be given to:

- the capability of the habitat to provide connectivity among Greater Sage-Grouse Core Population Areas;
- habitats occupied by Greater Sage-Grouse where enhancing habitat can offset losses to habitat or populations elsewhere; and
- the potential to replace lost priority habitat or needed changes in priority habitat resulting from perturbations or disturbances to support Greater Sage-Grouse objectives.

Lands and Realty

- Where existing leases or Rights-of-Way (ROWs) have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. Within designated priority habitat, reclaim by removing these features and restoring the habitat of these ROW that are no longer in use.

West Nile virus

- Increase the size of ponds to accommodate a greater volume of water than is discharged. This will result in un-vegetated and muddy shorelines that breeding *Cx. tarsalis* avoid (De Szalay and Resh 2000). This modification may reduce *Cx. tarsalis* habitat but could create larval habitat for *Culicoides sonorensis*, a vector of blue tongue disease, and should be used sparingly (Schmidtmann et al. 2000). Steep shorelines should be used in combination with this technique whenever possible (Knight et al. 2003).
- Build steep shorelines to reduce shallow water (greater than 60 centimeters) and aquatic vegetation around the perimeter of impoundments (Knight et al. 2003). Construction of steep shorelines also will create more permanent ponds that are a deterrent to colonizing mosquito species like *Cx. tarsalis* which prefer newly flooded sites with high primary productivity (Knight et al. 2003).
- Maintain the water level below that of rooted vegetation for a muddy shoreline that is unfavorable habitat for mosquito larvae. Rooted vegetation includes both aquatic and upland vegetative types. Avoid flooding terrestrial vegetation in flat terrain or low lying areas. Aquatic habitats with a vegetated inflow and outflow separated by open water produce 5-10 fold fewer *Culex* mosquitoes than completely vegetated wetlands (Walton and Workman 1998). Wetlands with open water also had significantly fewer stage III and IV instars which

may be attributed to increased predator abundances in open water habitats (Walton and Workman 1998).

- Construct dams or impoundments that restrict down slope seepage or overflow by digging ponds in flat areas rather than damming natural draws for effluent water storage, or lining constructed ponds in areas where seepage is anticipated (Knight et al. 2003).
- Line the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water, thus precluding shallow surface inflow and accumulation of sediment that promotes aquatic vegetation.
- Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.
- Fence pond site to restrict access by livestock and other wild ungulates that trample and disturb shorelines, enrich sediments with manure and create hoof print pockets of water that are attractive to breeding mosquitoes.

Fluid Minerals

- Use only closed-loop systems for drilling operations, with no reserve pits.
- Require noise shields when drilling during the lek, nesting, brood-rearing, and wintering seasons.
- Design new transmission towers with anti-perching devices and retrofit existing towers to discourage use by raptors.
- Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.
- Locate man camps outside priority Greater Sage-Grouse habitats.
- Roads (Priority Habitat Area)
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Locate roads to avoid important areas and habitats.
  - Coordinate road construction and use among ROW holders.
  - Construct road crossing at right angles to ephemeral drainages and stream crossings.
  - Establish slow speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
  - Establish trip restrictions (Lyon and Anderson 2003) or minimization through use of telemetry and remote well control (e.g., Supervisory Control and Data Acquisition).
  - Do not issue ROWs to counties on newly constructed energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
  - Restrict vehicle traffic to only authorized users on newly constructed routes (use signing, gates, etc.).
  - Apply dust abatement practices on roads and pads.
  - Close and rehabilitate duplicate roads.
- Roads (General Habitat)
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Do not issue ROWs to counties on energy development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
  - Establish speed limits to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
  - Coordinate road construction and use among ROW holders.
  - Construct road crossing at right angles to ephemeral drainages and stream crossings.
  - Apply dust abatement practices on roads and pads.

  - Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.
- Operations (Priority Habitat)
  - Clean up refuse to avoid attracting predators (Bui et al. 2010).
  - Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.
  - Use directional and horizontal drilling to reduce surface disturbance.
  - Place infrastructure in already disturbed locations where the habitat has not been restored.
  - Consider using oak (or other material) mats for drilling activities to reduce vegetation disturbance and for roads between closely spaced wells to reduce soil compaction and maintain soil structure to increase likelihood of vegetation reestablishment following drilling.
  - Apply a phased development approach with concurrent reclamation.
  - Place liquid gathering facilities outside of priority areas. Have no tanks at well locations within priority areas (minimizes perching and nesting opportunities for ravens and raptors and truck traffic). Pipelines must be under or immediately adjacent to the road (Bui et al. 2010).
  - Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use (Lyon and Anderson 2003).
  - Restrict the construction of tall facilities and fences to the minimum number and amount needed.
  - Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.
  - Collocate new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
  - Bury new distribution power lines except when an existing line is already in place.
  - Collocate powerlines, flowlines, and small pipelines under or immediately adjacent to existing roads (Bui et al. 2010).
  - Design or site permanent structures which create movement (e.g., a pump jack) to minimize impacts to Greater Sage-Grouse.
  - Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce Greater Sage-Grouse mortality.
  - Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
  - Control the spread and effects of non-native plant species (Evangelista et al. 2011). (e.g., by washing vehicles and equipment.)
- Operations (General Habitat)
  - Cluster disturbances, operations (fracture stimulation, liquids gathering, etc.), and facilities.
  - Use directional and horizontal drilling to reduce surface disturbance.
  - Clean up refuse (Bui et al. 2010).
  - Restrict the construction of tall facilities and fences to the minimum number and amount needed.
  - Cover (e.g., fine mesh netting or use other effective techniques) all drilling and production pits and tanks regardless of size to reduce Greater Sage-Grouse mortality.
  - Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.
  - Use remote monitoring techniques for production facilities and develop a plan to reduce the frequency of vehicle use.

  - Control the spread and effects from non-native plant species. (e.g,. by washing vehicles and equipment.)
  - Apply West Nile Virus (WNv) BMPs (Doherty 2007).
- Reclamation
  - Include objectives for ensuring habitat restoration to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve Greater Sage-Grouse habitat needs.
  - Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.
  - Restore disturbed areas at final reclamation to the pre-disturbance landforms and desired plant community.
  - Implement irrigation during interim or final reclamation for sites where establishment of seedlings has been shown or is expected to be difficult due to dry conditions.
  - Use mulching, soil amendments, and/or erosion blankets to expedite reclamation and to protect soils.

Locatable Minerals

- Locate new compressor stations outside priority habitats and design them to reduce noise that may be directed towards priority habitat.
- Locate man camps outside priority sage-grouse habitats.
- Roads
  - Design roads to an appropriate standard no higher than necessary to accommodate their intended purpose.
  - Locate roads to avoid important areas and habitats.
  - Coordinate road construction and use among ROW holders.
  - Construct road crossing at right angles to ephemeral drainages and stream crossings.
  - Establish speed limits on BLM system roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds.
  - Do not issue ROWs to counties on mining development roads, unless for a temporary use consistent with all other terms and conditions included in this document.
  - Restrict vehicle traffic to only authorized users on newly constructed routes (e.g., use signing, gates, etc.).
  - Use dust abatement practices on roads and pads.
  - Close and reclaim duplicate roads, by restoring original landform and establishing desired vegetation.
- Operations
  - Cluster disturbances associated with operations and facilities as close as possible.
  - Place infrastructure in already disturbed locations where the habitat has not been restored.
  - Restrict the construction of tall facilities and fences to the minimum number and amount needed.
  - Site and/or minimize linear ROWs to reduce disturbance to sagebrush habitats.
  - Place new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors.
  - Bury power lines.
  - Cover (e.g., fine mesh netting or use other effective techniques) all pits and tanks regardless of size to reduce sage-grouse mortality.
  - Equip tanks and other above ground facilities with structures or devices that discourage nesting of raptors and corvids.

  - Control the spread and effects of non-native plant species (Gelbard and Belnap 2003; Bergquist et al. 2007).
  - Apply WNv BMPs (Doherty 2007).
  - Require Greater Sage-Grouse-safe fences around sumps.
  - Clean up refuse (Bui et al. 2010).
  - Locate man camps outside of priority Greater Sage-Grouse habitats.
- Reclamation
  - Include restoration objectives to meet Greater Sage-Grouse habitat needs in reclamation practices/sites.
  - Address post reclamation management in reclamation plan such that goals and objectives are to protect and improve sage-grouse habitat needs.
  - Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, topsoiling and revegetating cut and fill slopes.
  - Restore disturbed areas at final reclamation to pre-disturbance landform and desired plant community.
  - Irrigate interim reclamation as necessary during dry periods.

Solid Minerals – Coal

- For coal mining operations on existing leases: in priority sage-grouse habitat areas, place any new appurtenant facilities outside of priority areas. Where new appurtenant facilities associated with the existing lease cannot be located outside the priority sage-grouse habitat area, co-locate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary.

Fuels Management (Original source BLM IM 2011-138)

- Design fuels treatment objective to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patters which most benefit sage-grouse habitat.
- Provide training to fuels treatment personnel on sage-grouse biology, habitat requirements, and identification of areas utilized locally.
- Use fire prescriptions that minimize undesirable effects on vegetation or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).
- Ensure proposed sagebrush treatments are planned with interdisciplinary input from BLM and/or state wildlife agency biologist and that treatment acreage is conservative in the context of surrounding Greater Sage-Grouse seasonal habitats and landscape.
- Ensure that treatments are configured in a manner (e.g., strips) that promotes use by sage-grouse (Connelly et al. 2000).
- Incorporate roads and natural fuel breaks into fuel break design.
- Power-wash all vehicles and equipment involved in fuels management activities prior to entering the area to minimize the introduction of undesirable and/or invasive plant species.
- Design vegetation treatment in areas of high frequency to facilitate firefighting safety, reduce the risk of extreme fire behavior; and to reduce the risk and rate of fire spread to sage-grouse priority habitats.
- Give priority for implementing specific sage-grouse habitat restoration projects in annual grasslands first to sites which are adjacent to or surrounded by sage-grouse priority habitat. Annual grasslands are second priority for restoration when the sites not adjacent to priority habitat, but within two miles of priority habitat. The third priority for annual grasslands

habitat restoration projects are sites beyond two miles of priority habitat. The intent is to focus restoration outward from existing, intact habitat.

- As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.
- Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions.
- Remove standing and encroaching trees within at least 100 meters of occupied sage-grouse leks and other habitats (e.g., nesting, wintering, and brood rearing) to reduce the availability of perch sites for avian predators, as appropriate, and resources permit.
- Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road ROW.
- Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to ail in controlling wildfire should wildfire occur near key habitats or important restoration areas (such as where investments in restoration have already been made).
- In priority habitat, design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems.
    - Do not reduce sagebrush canopy cover to less than 15% (Connelly et al. 2000; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of priority sage-grouse habitat and conserve habitat quality for the species. Closely evaluate the benefits of fuel break against the additional loss of sagebrush cover in the Environmental Assessment process.
    - Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present in a priority area.
    - Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.
    - Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape would be considered, in stands where cheatgrass is a very minor component in the understory (BLM 2012h).
    - Monitor and control invasive vegetation post treatment.
    - Rest treated areas from grazing for two full growing seasons unless vegetation recovery dictates otherwise (WGFD 2011).
    - Require use of native seeds for fuels management treatment based on availability, adaptation (site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet sage-grouse habitat objectives (Pyke 2011).
    - Design post fuels management projects to ensure long term persistence of seeded or pretreatment native plants. This may require temporary or long-term changes in livestock grazing management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006).
- Design fuels management projects in sage-grouse habitat to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design (Launchbaugh et al. 2007).
- During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond et al. 2009), and implement grazing management that will

accomplish this objective (Davies et al. 2011; Launchbaugh et al. 2007). Consult with ecologists to minimize impacts to native perennial grasses.

- Restore annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs.
- Reduce the risk of vehicle or human-caused wildfires and the spread of invasive species by planting perennial vegetation (e.g., green-strips) paralleling road ROWs.
- Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, and strictly managed grazed strips) to ail in controlling wildfire should wildfire occur near habitats or important restoration areas (such as where investments in restoration have already been made).

Fire Management (Original source BLM IM 2011-138)

- Develop state-specific sage-grouse toolboxes containing maps, a list of resource advisors, contact information, local guidance, and other relevant information.
- Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.
- Assign a sage-grouse resource advisor to all extended attack fires in or near priority Greater Sage-Grouse habitat. Prior to the fire season, provide training to sage-grouse resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals.
- On critical fire weather days, pre-position additional fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas.
- During periods of multiple fires, ensure line officers are involved in setting priorities.
- Locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, heli-bases) in areas where physical disturbance to sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover.
- Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and All Terrain Vehicles prior to deploying in or near sage-grouse habitat areas to minimize noxious weed spread.
- Minimize unnecessary cross-country vehicle travel during fire operations in sage-grouse habitat.
- Minimize burnout operations in a sage-grouse habitat areas by constructing direct fireline whenever safe and practical to do so.
- Utilize retardant and mechanized equipment to minimize burned acreage during initial attack.
- As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.
- Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.
- Design post Emergency Stabilization and Rehabilitation (ES&R) management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing and travel management, etc., to achieve and maintain the desired condition of ES&R projects to benefit sage-grouse (Eiswerth and Shonkwiler 2006).
- Post fire recovery must include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery.
- Where burned sage-grouse habitat cannot be fenced from other unburned habitat, the entire area (e.g., allotment/pasture) should be closed to grazing until recovered.
- Mowing of grass will be used in any fuelbreak fuels reduction project (roadsides or other areas).

- Any fuels treatments will focus on interfaces with human habitation or significant existing disturbances.
- In priority sage-grouse habitat areas, prioritize suppression immediately after firefighter and public safety to conserve the habitat.
- Prioritize native seed allocation for use in sage-grouse habitat in years when preferred native seed is in short supply .
- Use native plant seeds for vegetation seedings based on availability, adaptation (site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet sage-grouse habitat conservation objectives (Pyke 2011).
- In fire prone areas where sagebrush seed is required for sage-grouse habitat restoration, consider establishing seed harvest areas that are managed for seed production (Armstrong 2007) and are a priority for protection from outside disturbances.
- Consider potential changes in climate (Miller et al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed (Kramer and Havens 2009).

Habitat Restoration/Vegetation Management

- Include sage-grouse habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007) or if available, State Sage-Grouse Conservation plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within priority sage-grouse habitat areas the highest restoration priority.

Recreation

- Only allow SRPs in priority habitat that have neutral or beneficial effects to priority habitat areas.

Travel and Transportation Management

- Use existing roads, or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then make additional, effective mitigation necessary to offset the resulting loss of sage-grouse habitat.
- Allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road.
- Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety.
- Conduct restoration of roads, primitive roads and trails not designated in travel management plans. This also includes primitive route/roads that were not designated in Wilderness Study Areas and within lands with wilderness characteristics that have been selected for protection.
- In priority habitat, limit motorized travel to existing roads, primitive roads, and trails at a minimum, until such time as travel management planning is complete and routes are either designated or closed.
- When reseeding roads, primitive roads, and trails in priority habitat, use appropriate seed mixes and consider the use of transplanted sagebrush.

Rights-of-Ways and Corridors

- Evaluate and take advantage of opportunities to remove or modify existing power lines within priority sage-grouse habitat areas. When possible, require perch deterrents on existing or new overhead facilities.
- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat. Within designated priority habitat reclaim by removing these features and restoring the habitat of these ROW that are no longer in use.
- Where new ROWs are necessary, co-locate new ROWs within existing ROWs where possible.

Livestock Grazing Management

- Work cooperatively with permittees, lessees and other landowners to develop grazing management strategies that integrate both public and private lands into single management units.

D.3.2. Best Management Practices

The management practices in this section are additional practices available for consideration at the project level; best management practices are discretionary. Proponents are encouraged to apply appropriate measures to project proposals to minimize adverse impacts to Greater Sage-Grouse.

Recommendations from Scoping for BLM's National Greater Sage-Grouse Land Use Planning Strategy

Fluid Minerals

- Any oil, gas, geothermal activity will be conducted to maximize avoidance of impacts, based on evolving scientific knowledge of impacts.
- Prohibit the surface disposal of coalbed methane wastewater, as well as the construction of evaporation or infiltration reservoirs to hold wastewater. Inject coalbed methane wastewater underground into a formation of equal or lower water quality.
- Any oil, gas, or geothermal activity will be conducted to maximize avoidance of impacts, based on evolving scientific knowledge of impacts.

Fuels and Fire Management

- Monitor and control invasive vegetation in treated, burned, or restored sagebrush steppe. Rapidly restore burned or disturbed sagebrush steppe to prevent incursion of invasive plants.
- Vehicles will be washed following projects in known invasive species infestation areas.
- Design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems.
    - Retain sagebrush canopy cover at what is expected for that ecological site, consistent with sage-grouse habitat objectives (Connelly et al. 2000; Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of sage-grouse habitat and conserve habitat quality for the species.
    - Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in future National Environmental Policy Act documents.
    - Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present.

  - Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.
  - Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory (BLM 2012h).
  - Design post fuels management projects to ensure long term persistence of seeded or pre-treatment native plants, including sagebrush. This may require temporary or long-term changes in livestock grazing management, travel management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006).
- Reduce grazing in advance of predicted drought so that, to the degree possible, sagebrush habitat continues to meet sage-grouse habitat objectives. During drought periods, prioritize evaluating effects of the drought in sage-grouse habitat areas relative to their biological needs, as well as drought effects on ungrazed reference areas. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in sage-grouse habitat areas based on sage-grouse habitat objectives.
- Ensure that vegetation treatments create landscape patterns which most benefit sage-grouse. Only allow treatments that are demonstrated to benefit sage-grouse and retain sagebrush height and cover consistent with sage-grouse habitat objectives (this includes treatments that benefit livestock as part of an Allotment Management Plan (AMP)/Conservation Plan to improve sage-grouse habitat).
- Evaluate existing structural range developments and location of supplements (salt or protein blocks) to document that they conserve, enhance or restore sage-grouse habitat.
- Include sage-grouse habitat objectives in habitat restoration projects. Make meeting these objectives within occupied sage-grouse habitat the highest restoration priority.
- Design post restoration management to ensure long term Greater Sage-Grouse persistence. This could include changes in livestock grazing management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).
- Avoid sagebrush reduction/treatments to increase livestock or big game forage in occupied habitat and include plans to restore high-quality habitat in areas with invasive species.
- In sage-grouse habitat, ensure that soil cover and native herbaceous plants are at their Ecological Site Description (ESD) potential to help protect against invasive plants.
- Consider potential changes in climate (Miller et al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species' current range for selection of native seed. (Kramer and Havens 2009).
- Establish and strengthen networks with seed growers to assure availability of native seed for restoration projects.
- Post fire recovery will include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery.
- Where burned sage-grouse habitat cannot be fenced from other unburned habitat, the entire area (e.g., allotment/pasture) should be closed to grazing until recovered.
- Mowing of grass will be used in any fuelbreak fuels reduction project (roadsides or other areas).

Vegetation Management

- Composition, function, and structure of native vegetation communities will meet ESD and will provide for healthy, resilient, and recovering sage-grouse habitat components.
- Avoid sagebrush reduction/treatments to increase livestock or big game forage in occupied habitat and include plans to restore high-quality habitat in areas with invasive species.
- Include sage-grouse habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007), or if available State Sage-Grouse Conservation Plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within priority sage-grouse habitat areas the highest restoration preference.
- Design post restoration management to ensure long term persistence. This could include changes to livestock grazing management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).
- Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings using native plants. Consider collection from warmer component of the species current range when selecting native species (Kramer and Havens 2009).

Invasive Species and Pest Management

- In sage-grouse habitat, ensure that soil cover and native herbaceous plants are at their ESD potential to help protect against invasive plants.

Travel and Transportation Management

- Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Mitigate any impacts with methods that have been demonstrated to be effective to offset the loss of sage-grouse habitat.
- Use existing roads, or realignments to access valid existing rights. If valid existing rights cannot be accessed via existing roads, then, following the lek prohibitions, build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance. If the disturbance cap is exceeded, then make additional, mitigation that has been demonstrated to be effective to offset the resulting loss of sage-grouse habitat.

Livestock Grazing Management

- Reduce grazing in advance of predicted drought so that, to the degree possible, sagebrush habitat continues to meet sage-grouse habitat objectives. During drought periods, prioritize evaluating effects of the drought in sage-grouse habitat areas relative to their biological needs, as well as drought effects on ungrazed reference areas. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in sage-grouse habitat areas based on sage-grouse habitat objectives.
- Avoid grazing and trailing within lekking, nesting, brood-rearing, and winter habitats during periods of the year when these habitats are utilized by sage-grouse.
- Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are monitored for at least three years before grazing returns. Continue monitoring for five years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.

- Implement management actions (grazing decisions, AMP/Conservation Plan development, or other agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements (Connelly et al. 2011). Consider singly, or in combination, changes in:
  1. Season or timing of use;
  2. Number of livestock (includes temporary non-use or livestock removal);
  3. Distribution of livestock use;
  4. Intensity of use; and
  5. Type of livestock (e.g., cattle, sheep, horses, llamas, yaks, alpacas and goats) (Briske et al. 2011).
- During drought periods, prioritize evaluating effects of the drought in priority sage-grouse habitat areas relative to their needs for food and cover. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in priority sage-grouse habitats.
- Reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by sage-grouse in the hot season (summer) (Aldridge and Brigham 2002; Crawford et al. 2004; Hagen et al. 2007).
- Avoid grazing and trailing within lekking, nesting, brood-rearing, and winter habitats during periods of the year when these habitats are utilized by sage-grouse.
- In priority habitat, only allow treatments that conserve, enhance or restore sage-grouse habitat (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve sage-grouse habitat).
- Prioritize completion of land health assessments and processing grazing permits within priority sage-grouse habitat areas. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for sage-grouse. Utilize sage-grouse habitat objectives to conduct land health assessments to determine if standards of rangeland health are being met.
- Design any new structural range improvements to conserve, enhance, or restore sage-grouse habitat through an improved grazing management system relative to sage-grouse objectives. Structural range improvements, in this context, include but are not limited to: cattleguards, fences, enclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments.
- Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to sage-grouse habitat to determine if they should be restored to sagebrush or habitat of higher quality for sage-grouse. If these seedings provide value in conserving or enhancing sage-grouse habitats, then no restoration would be necessary. Assess the compatibility of these seedings for sage-grouse habitat during the land health assessments.
- Evaluate existing structural range improvements and location of supplements (salt or protein blocks) to make sure they conserve, enhance or restore sage-grouse habitat.
- Design all range projects in a manner that minimizes potential for invasive species establishment. Monitor for, and treat invasive species associated with existing range developments (Gelbard and Belnap 2003; Bergquist et al. 2007).
- When developing or modifying water developments, use applicable BMPs to mitigate potential impacts from WNv (Clark et al. 2006; Doherty 2007; Walker et al. 2007b; Walker and Naugle 2011).

- Restore seedings of introduced perennial grass to sagebrush habitat where feasible, unless the seedings offer a specific purpose related to achievement of sage-grouse habitat objective. An example of a related purpose would be a seeded pasture that supports a grazing strategy beneficial to sagebrush habitat in associated pastures.
- Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are monitored for at least three years before grazing returns. Continue monitoring for five years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.

Sage-grouse Conservation Related to Wildland Fire and Fuels Management (BLM IM 2011-138) (BLM 2011d)

Many Greater Sage-Grouse conservation measures from BLM IM 2011-138 were included in BLM IM 2012-044. The following measures from BLM IM 2011-138 were not identified in BLM IM 2012-044, but the BMPs are nevertheless available for consideration at the project level:

Wildland Fire Operations

- utilize available maps and spatial data depicting sage-grouse habitats in suppression response and staging decisions;
- use predictive services to help prioritize firefighting resources and, to the extent possible, pre-position those resources to optimize an efficient response in critical habitat areas;
- improve firefighter awareness of the importance of sagebrush habitat;
- continue use of resource advisors familiar with local sage-grouse habitat needs during initial and extended attack who are trained in suppression procedures and can advise about most appropriate tactics, etc.;
- emphasize habitat conservation during resource allocation decisions, such as in local and geographic area multi-agency coordination group meetings;
- apply local, state, or national-level BMPs.

Wildland Fire management protocols should be established to address sage-grouse and fire suppression activities. Examples of these protocols are:

Preseason:

- Ensuring that RMPs and fire management plans are current and include guidance for managing sage-grouse and sage-grouse habitat.
- Conducting informational meetings and workshops with federal, state, and local cooperators to share sage-grouse information such as the location of key habitat, standard operating procedures (SOPs) for suppression activities in habitat areas, rehabilitation guidelines in habitat areas, etc.
- Ensuring that suppression priorities include critical resources (i.e., sage-grouse, cultural resources), and use these priorities during periods of fire activity to prioritize incidents and assign resources.

Initial Attack:

- Ensuring that interagency fire managers update pre-planned responses within the dispatch zone to align the initial attack response with protection priorities and resource values.

- Encouraging dispatch center to utilize geographic information system (GIS) maps in Wildland Fire Computer Aided Dispatch (WildCAD) to determine if new starts are within sage-grouse habitat or in close proximity to other identified values or assets, and relay that information to responders.
- Briefing all local initial attack crews on the importance of identifying sage-grouse habitat during response and suppression, and the need to follow the sage-grouse suppression SOPs (include a form of text instruction and key habitat maps).
- Ensuring out-of-area resources (severity crews, overhead, etc.) receive a full briefing, which includes, among other things, the importance of identifying sage-grouse habitat during response and suppression, and the need to follow the sage-grouse suppression SOPs.

Extended Attack:

- Ensuring resource advisors (READ) are assigned to fires in the zone whenever fire suppression activities may affect resource values, including sage-grouse habitat.
- Ensuring READs are assigned to incidents as early as possible.
- Ensuring READs participate in annual READ workshops which address, among other things, sage-grouse concerns and SOPs.
- Ensuring READs have access to pre-built kits which include hard copy and electronic resource information, GIS sage-grouse habitat data, fire suppression SOPs for sage-grouse, and rehabilitation guidelines.
- Ensuring sage-grouse issues are addressed throughout the Wildland Fire Decision Support System process (particularly in decision documents) and specified in delegations of authority to incident management teams and incident commanders.
- Ensuring READs are assigned to large incidents managed by an incident management teams for the duration of the incident. Ensure that per delegations of authority, READS are included in planning meetings, firefighter briefings, and provide input to the incident action plan.

Post-Incident:

- Ensuring READs complete a READ report upon demobilization of an incident. This report should summarize suppression actions, suppression damage, and damage caused by the fire itself. The READ report should provide preliminary recommendations for stabilization, rehabilitation, and restoration. This preliminary assessment and subsequent emergency stabilization and burned area rehabilitation plan should include impacts to sage-grouse habitat and recommendations for mitigation.

Fuels management

- The fuels treatment prioritization process will address sage-grouse habitat conservation in project design, treatment location, and documentation.
- Fuels programs will use local toolboxes, national resources, and Fuels Management BMPs for Sage-Grouse Conservation to identify, enhance, and conserve sage-grouse habitats.
- Fuels management objectives may include protecting existing patches, modifying fire behavior, restoring native plants, or otherwise creating landscape patterns which most benefit sage-grouse habitat.
- Sage-grouse objectives from land use and fire management plans will be used as a framework for fuels project design.

BLM National Sage-Grouse Habitat Conservation Strategy (BLM 2004b)

- Develop cooperative agreements with other land owners to maintain sagebrush patches within developed lands (housing developments, croplands, business developments etc.). Avoid the impact of construction and operations by not placing mines, oil and gas and geothermal drilling sites and facilities, roads, and mineral material disposal sites in or next to sensitive habitats such as Greater Sage-Grouse leks, nesting, early brood-rearing, breeding, and wintering habitat. When habitat loss cannot be avoided, stipulations, COAs, or mitigating measures should be developed to reduce impacts on Greater Sage-Grouse habitats.
- Whenever feasible and environmentally preferred, avoid surface occupancy by roads, livestock management facilities, well pads, powerlines, fences, or other structures adjacent to occupied leks. Signage, including Off Highway Vehicle designations, identifying and/or protecting sensitive areas should be considered. Dust abatement measures should be employed.
- Locate or construct facilities such as oil and gas compressor stations so that the noise from the station does not disturb grouse activities at the lek. Installing mufflers and baffle panels, berm the station (where invasive weeds are not an issue), or placing restrictions on how close these facilities can be located to leks, nesting and early brood-rearing habitat should be considered. New recreational facilities such as campgrounds should also be located so that the noise does not disturb grouse activities at the lek. Construction and/or maintenance should be scheduled to minimize conflicts with any known leks. Greater Sage-Grouse are sensitive to noise levels from all activities during early evening and morning hours when strutting occurs during March and April, so actions to reduce noise levels during these periods should be taken.
- Reduce habitat loss associated with mineral exploration and development by consolidating facilities as much as possible. The possibility of burying utility and flow lines beneath or along roads, centralizing tank batteries, and drilling multiple wells from a single location should be considered.
- Design and construct mineral exploration and development operations so as to disturb the smallest footprint practical on the landscape while meeting all safety requirements. Where feasible, consider mowing of parking and storage areas on portions of oil and gas well drilling locations rather than stripping the topsoil and vegetation from the entire location, and the use of two-track trails to conduct exploration activities. Minimize traffic by limiting public vehicular access in new development areas, use remote monitoring of production facilities, encourage car-pooling and the use of buses, and encourage operator-enforced speed limits to reduce dust, noise, and potential collisions with Greater Sage-Grouse so as to reduce habitat impacts. Consider using stakeless geophysical exploration activities to reduce vehicle traffic in sagebrush habitat.
- Plan and construct mining and mineral development activities, to the degree possible given State water rights, to minimize disturbances that would result in alterations to springs and riparian habitat. Greater Sage-Grouse can be impacted by the loss of surface water. Alternative water sources should be developed to replace natural sources that have been negatively affected or destroyed during these development activities. Water storage impoundments should be designed to avoid or minimize loss or degradation of Greater Sage-Grouse habitat. Water storage impoundments should be monitored and treated to prevent mosquito breeding (and the associated spread of WNv). Evaporation, reserve, work over, and production pits should also be designed with adequate fencing/netting or other protective features to reduce mortality of Greater Sage-Grouse due to drowning or entrapment.
- Carefully consider impacts to Greater Sage-Grouse and their habitats when reviewing requests for exceptions, waivers, or modifications to lease stipulations or evaluating requests for waivers of COAs.

- Evaluate land exchanges, acquisitions and disposals to determine if important Greater Sage-Grouse habitat would be impacted or whether the BLM would be acquiring important Greater Sage-Grouse habitat.
- Evaluate proposed agricultural leases, range improvements, recreational special use permits and habitat improvement projects to determine if Greater Sage-Grouse and their habitats would be impacted.
- Conduct fire management activities to minimize overall wildfire size and frequency in sagebrush plant communities where Greater Sage-Grouse habitat objectives will not be met if a fire occurs. Wildfire suppression in sagebrush habitat with an understory of invasive, annual species is crucial. Prioritization of suppression actions should take into account the value and rarity of sagebrush habitat and Greater Sage-Grouse. Retain unburned areas, including interior islands and patches, of sagebrush unless there are compelling safety, private property, resource protection, or control objectives at risk. Burnout operations in areas where there are no threats to human life, private property or other important resources identified in land management plans should be minimized in crucial Greater Sage-Grouse habitats as identified in land and fire management plans.
- Annually update Fire Management Plans to incorporate new sagebrush habitat information as well as fire suppression priorities in sagebrush habitats. Objectives for the management of sagebrush ecosystems should be incorporated into Fire Management Plans and provided to initial attack personnel at the beginning of each fire season.
- Provide Fire Management Plans to the Incident Management Team. The Field Office should provide Resource Advisors to assist the Incident Commander or Incident Management Teams in developing timely fire suppression priorities in crucial Greater Sage-Grouse habitat.
- Evaluate impacts on Greater Sage-Grouse habitat in areas where wildland fire use for resource benefits may be implemented. Also consider the interval since last fire, fire size and past plant community response to burning during this process.
- Establish fuels treatment projects at strategic locations to minimize size of wildfires and limit further loss of sagebrush. Fuels treatment may include the use of green-strips (strips of fire resistant vegetation) to help reduce the spread of wildfires into sagebrush communities.
- Use prescriptive livestock grazing, where appropriate, to reduce annual grass production and the spread of wildfire into sagebrush communities. Timing of grazing and effects on residual native plants need to be carefully evaluated.
- Consider removal of conifers (e.g., cutting, burning, chaining, etc.) where they have encroached upon Greater Sage-Grouse habitat. Areas of dense conifers (pinyon pine, juniper, ponderosa pine, Douglas fir) may require cutting or chaining to reestablish sagebrush plant communities (prescribed fire may not be feasible given the lack of understory and high woody fuel loads). Sites selected for cutting or chaining should have conifers that have established after the early to mid-1800s. Sites should also have evidence of past sagebrush plant communities as evidenced by residual native plants or soils that support a rangeland not a woodland ecological site. Cutting and chaining may occur as a single treatment or a preparatory treatment for prescribed burning. Post-treatment seeding will probably be required in areas where residual, herbaceous vegetation is inadequate to recover once the conifer competition is removed.
- Steps such as recontouring, respreading topsoil, revegetating all disturbed areas not needed for well or mine production, including cuts, fills, borrow ditches, and well pads up to the production facilities are suggested. Additionally, allowing room for the setup of work over rigs, and allowing future setup and parking on the top of new vegetation will minimize the need for future disturbances. The use of native species of shrubs, forbs, and grasses in seed mixes appropriate for each ecological site will also enhance habitat value or Greater Sage-Grouse.

- Evaluate (e.g., monitor) burned areas for up to three years post-fire and continue management restrictions until the recovering or seeded plant community reflects the desired condition.
- Reclaim unnecessary or redundant roads and facilities by removing surfacing material, reestablishing the original contour, spreading topsoil, and seeding to restore habitat.
- Utilize the ES&R program to apply appropriate post-wildfire treatments (livestock and/or recreation exclusion, reseeding, erosion control structures, etc.) within Greater Sage-Grouse habitat. Use of native species is encouraged dependent on cost, availability and chance for success. Seed mixtures should be designed to reestablish important seasonal habitat components for Greater Sage-Grouse.
- Install anti-perching devices on existing or new powerlines in occupied Greater Sage-Grouse habitat, or habitat identified for restoration, to minimize raptor use of these poles.
- Encourage placement of new utility developments (power lines, pipelines, etc.) and transportation routes in existing utility or transportation corridors to minimize fragmentation of Greater Sage-Grouse habitat. If corridors do not exist, consider consolidating utility lines, pipelines, and other structures along the same new route (e.g., at one location) that least impacts sagebrush habitat.
- Place new roads where construction activity and use is concentrated and does not impact critical areas such as leks, nesting, early brood-rearing, winter habitat, riparian areas, springs and wetlands.
- Manage existing road use to decrease the level of disturbance during critical periods such as breeding (lek use) by implementing seasonal or daily use schedules, by limiting traffic volume, and/or by posting speed limits.
- Locate new structures associated with recreation (picnic areas, campgrounds, wildlife viewing sites, dispersed recreation sites, kiosks and parking lots) and livestock management facilities (corrals, water pipelines and tanks/troughs, exclosures, etc.) away from crucial breeding, brood-rearing and winter areas; or manage disturbance with seasonal or daily timing restrictions. Construction of recreational-related facilities (kiosks, toilets, signs, etc.) that provide avian perches should be avoided unless they include mitigating features such as perch guards. Manage use at established structures/developments to reduce impacts to Greater Sage-Grouse during critical periods of their life cycle.
- Design and locate the placement of fences for livestock, wildlife, recreation and developed site protection so as not to disturb important Greater Sage-Grouse habitat areas. Impacts of livestock congregation against fences and its effect on Greater Sage-Grouse habitat near leks, nesting, and wintering areas should be considered.
- Design wind energy facilities to reduce habitat fragmentation and mortality to Greater Sage-Grouse. Tubular tower designs to reduce raptor perches and noise reduction to minimize disturbance to nesting birds are encouraged. Design criteria for these projects should include minimizing the facility footprint (including the road network required to service the generators) in Greater Sage-Grouse habitat. BMPs for wind energy are currently being developed in the Wind Energy Programmatic EIS. The BMPs that address the conservation of Greater Sage-Grouse and their habitat are adopted by reference.
- Manage dispersed recreation activities like hiking, mountain biking, and horseback riding to minimize impacts to vegetation and Greater Sage-Grouse in sensitive Greater Sage-Grouse habitat areas. Keeping these users on established trails will minimize impacts to Greater Sage-Grouse habitat and activities.
- Consider seasonal closures to protect priority Greater Sage-Grouse habitat if other alternatives will not achieve desired objectives.
- Reclaim unused roads and facilities by reseeding sagebrush, shrubs, and native grasses and forbs to help improve Greater Sage-Grouse habitat and reduce weed invasion.

- Encourage vegetative restoration along roads, ROWs, on well pads, and at existing facilities where habitat needs for Greater Sage-Grouse are not currently met.
- Require successful seeding of appropriate vegetation on any new disturbance associated with mineral and energy facility developments, livestock management facilities, and recreation facilities.
- Restore small areas dominated by invasive species with desirable vegetation to minimize fragmentation of habitat.
- Where good habitat quality exists, maintain current management practices considering plant composition and soil type.
- Use grazing practices that promote the growth and persistence of native shrubs, grasses and forbs needed by Greater Sage-Grouse for seasonal food and concealment. Vegetation structure (height) should be managed so as to provide adequate cover for Greater Sage-Grouse during the nesting period.
- Change mineral supplement and/or watering locations to move domestic livestock to desired areas. However, any change in location of supplement or watering location should consider potential effects to Greater Sage-Grouse habitat.
- Coordinate with state wildlife agencies where wildlife use detrimentally affects Greater Sage-Grouse habitat quality.
- Construct and maintain water developments at key locations in Greater Sage-Grouse habitat. Install or retrofit water developments with wildlife escape ramps.
- Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas. Consider fencing if vegetation associated with these wet areas cannot be maintained with current livestock or wildlife use and the impacts of the fence are outweighed by the improved habitat quality.
- Maintain sagebrush and understory diversity (relative to site potential) adjacent to crucial seasonal Greater Sage-Grouse habitats unless such removal is necessary to achieve Greater Sage-Grouse habitat management objectives.
- Encourage the use of insecticide baits and natural pathogens instead of broad-spectrum insecticides where insect control is required. Improper use of pesticides to control insect outbreaks can result in a reduction of food resources for Greater Sage-Grouse, particularly nesting females and chicks. While the Animal and Plant Inspection Service is responsible for controlling these insects on public lands, the BLM should recommend avoidance areas as well as the type of treatment. Target pest control toward key problem areas, and schedule applications to be effective in minimum doses. Broadcast spraying should generally be avoided in favor of ground applications to minimize drift into non-target areas. Avoid applying pesticides to Greater Sage-Grouse breeding habitat during the brood-rearing season (mid-May through mid-July) to reduce the loss of food supply to chicks and avoid the chance of secondary poisoning.
- Grazing use should be adjusted during extended drought periods. Consider transitioning back to pre-drought use when drought conditions have ended.
- Reduce the density of conifers that have encroached into but do not yet dominate sagebrush plant communities. Site selection should be based on proximity to occupied habitat, site potential, herbaceous invasive species, or other factors that affect the potential for sagebrush plant communities to be reestablished.
- Where other grazing management options are not achieving, or cannot achieve, the desired objectives, a short-term option may be livestock exclusion.
- Restore lost riparian and wetland plant species diversity and structure by replanting appropriate species near crucial Greater Sage-Grouse habitat.

- Treatments should be designed to improve a deficient condition within the community (e.g. poor cover of herbaceous understory).
- Reintroduction of appropriate fire regimes will help to limit conifer encroachment into the sagebrush plant communities. Prioritization of areas to be burned or mechanically treated should take into account invasive herbaceous species, fire regime, and condition class (measure of departure from historic fire regime). A balance should be achieved between treating areas that have significantly departed from historic fire regime (condition class 3) and areas that are functioning within an appropriate fire regime (condition class 1).
- Seeding may be required in areas where residual perennial vegetation is insufficient to respond following prescribed burning. Minimize seeding with non-native species that may create a continuous perennial grass cover and restrict reestablishment of native vegetation. However, non-native seed may be appropriate on severely degraded sites if native species would not be successful or are not available.
- Evaluate all wildfires in known Greater Sage-Grouse habitat to ensure that the appropriate plant species are reseeded relative to site potential and seasonal Greater Sage-Grouse habitat requirements. Emphasize the use of native species in these seed mixtures and minimize the use of introduced grasses. Make burned Greater Sage-Grouse habitats a high priority for restoration if funds are limited in the ES&R Program. If native plant seed is scarce, assign a priority that this seed be reallocated to ES&R projects in critical Greater Sage-Grouse habitat areas. Seeding of non-native species may be necessary in areas where invasive plants dominate or have the potential to dominate the post-fire plant community.
- BMPs for this species identified in Grazing Influence, Objective Development, and Management in Wyoming's Greater Sage-Grouse Habitat as Grazing Management Recommendations include the following:
  - Avoid any new sources of disturbance such as range improvements on leks sites. Identify the location of leks through consultation with local biologists to provide appropriate emphasis.
  - Maintain the Sagebrush/Bunchgrass Plant Community wherever currently present. Manage for high vigor in all plant communities. Avoid repeatedly using cool-season bunchgrass in the critical growing season and limit utilization to moderate levels to assure that the previous year's standing crop is available for hiding cover.
  - Avoid repeatedly grazing riparian areas in seasons when temperatures are high.
  - Avoid levels of browsing on sagebrush that would limit Greater Sage-Grouse access to their food supply and cover. Additionally, avoid heavy use of herbaceous standing crop as this will adversely affect hiding cover the following spring.
  - Carefully consider changes in management that would increase utilization or change the timing of grazing on bunchgrass community sites.
  - Avoid confining animals on inadequate pasture or supplemental feeding to compensate for a lack of natural forage.
  - Restrict grazing in conjunction with restoration efforts until the site is ready to sustain grazing.

Northeast Wyoming Sage-Grouse Conservation Plan (NWSGLWG 2006)

- **Road Building Maintenance and Usage**
  1. Work cooperatively with all involved permittees, lease holders or field operators, and affected landowners, develop a road use and travel plan for areas within 3 miles (5 km) of sage-grouse leks (Connelly et al. 2000).

2. Coordinate planning among all companies operating in the same field and strongly encourage everyone involved to follow the same road use plan.
3. Map all existing and proposed roads for areas to be developed, and consolidate activities using existing roads and other facilities where possible.
4. Minimize the number of vehicles per visit, and the number of roads used within the area.
5. Encourage remote monitoring of production sites to minimize road use and reduce harassment of birds during critical seasons (breeding, nesting, brood-rearing, and winter).
6. Allow traffic at most, only every other day, less frequently if possible.
7. Limit traffic on all roads to three, one-hour travel periods per day spaced at least two hours apart.
8. Establish acceptable stopping points and "drive through only" areas.
9. Sign roads as appropriate to prevent off-road travel and to inform all users of the roads of acceptable use times and approved stopping areas.
10. As appropriate, gate and close all newly constructed (project related) roads to public travel.
11. Consider using pipelines to bring product to a central facility to reduce needed number of roads and traffic.
12. Minimize visual/auditory impacts where practicable (e.g., place roads below ridgelines or along topographic features).
13. Place roads outside of riparian areas where possible.
14. If avoidance is not possible, minimize impacts to riparian, wetland, or wet meadow habitats to limit impacts to brood rearing areas. (exploration, drilling, production and operations).
15. Avoid placement of well pads, roads and other well field facilities on mapped winter habitats, or within a 1/8-mile (200 m) buffer surrounding winter habitat.
16. Encourage road rehabilitation or realignment to minimize impacts to sage-grouse.
17. Select sites for construction that will not disturb suitable nest cover or brood-rearing habitats within 3 miles (5 km) of occupied leks, or within identified nesting and brood-rearing habitats outside the 3-mile (5 km) perimeter (Connelly et al. 2000).
18. Utilize minimum construction and maintenance standards appropriate for the operation.
19. Establish acceptable times for road construction and maintenance that will minimize disturbance during critical seasonal use periods.
20. Reclaim roads that are only needed periodically, and allow operators to drive over reclaimed roads when needed.

- **Powerline Construction and Maintenance**
  1. Working cooperatively with all involved permittees, lease holders or field operators to develop a master powerline plan for all areas within 3 miles (5 km) (Connelly et al. 2000) of sage-grouse leks and on other identified sage-grouse habitats.
  2. Where feasible, bury new powerlines.
  3. Map all existing and proposed powerlines for the area, consolidating new powerlines into existing disturbance corridors.
  4. Coordinate planning and powerline needs among companies operating in the same field.
  5. Include powerline access roads in the road use and travel plan to include power companies in appropriate use times.
  6. Select sites for construction that will not disturb suitable nest cover and brood-rearing habitats within 3 miles (Connelly et al. 2000) of a lek.
  7. Select sites for construction that will not disturb wintering habitat.

8. Locate any above-ground powerlines off of ridges and out of riparian areas (1,000 ft (300 m) riparian buffer where feasible).
9. Direct powerline construction (above or underground) to areas of existing disturbance corridors (i.e., existing roads, railroads, powerlines, etc.).
10. Recommend the lowest voltage powerline needed for the project while considering future needs.
11. Reduce existing above ground powerlines by burying them as opportunities (such as rebuilds) arise.
    a. If burying powerlines cannot be accomplished, install perch guards to prevent raptor use.
    b. Recommend on-site power generation to minimize overhead power lines.
    c. Visibility markers should be included on above ground lines in high avian use areas such as across drainages, water bodies, prairie dog colonies, etc.

- **General Mineral Development**
  1. Evaluate and address the needs of sage-grouse when placing well sites, mines, pits and infrastructure. Develop a plan for roads, pipelines, etc. to minimize impacts to sage-grouse.
  2. Consider developing travel management plans that would allow seasonal closure of roads for all but permitted uses (i.e., recreation and hunting) and encourage the reclamation of unnecessary or redundant roads.
  3. Where mineral development occurs in sage-grouse habitat, tailor reclamation to restore, replace or augment needed habitat types.
  4. Where necessary to build or maintain fences, evaluate whether increased visibility, alternate location, or different fence design will reduce hazards to flying grouse.
  5. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures to prevent perching raptors, where possible.
  6. Reduce noise from industrial development or traffic, especially in breeding and brood rearing habitats.
  7. Manage water production to enhance or maintain sage-grouse habitat.
  8. Avoid surface and sub-surface water depletion that impacts sage-grouse habitats.
  9. Consider an exception or waiver of seasonal stipulations if technologies that significantly reduce surface disturbance are used.
  10. Control dust from roads and other surface disturbances within the population's seasonal habitats.
  11. Continue research efforts to determine the effects of mineral development on sage-grouse populations.
  12. Consider off-site mitigation as an alternative mitigation for mineral development impacts on known sage-grouse habitat. Work with mineral entities to develop and implement acceptable offsite mitigative measures for enhancing sage-grouse or habitat, as needed, to offset impacts of surface disturbing activities.
- **Oil and Gas Development and Sand and Gravel Mining**
  1. As a general rule, do not drill or permit new or expand existing sand and gravel activities within 3 miles (5 km) (Connelly et al. 2000) of active leks between March 1st and July 15th. As seasonal habitat mapping efforts are completed, re-direct efforts towards protecting nesting habitat. (Dates and distances of agency proposed action will be used.)
  2. Avoid surface disturbance or occupancy on or within 1/4 miles of known active lek sites. (Distances of agency proposed action will be used.)

3. Evaluate well spacing and location requirements under Wyoming Oil and Gas Conservation Commission jurisdiction in light of sage-grouse habitat needs and consider spacing exceptions that protect habitat. The limitations of obtaining spacing exceptions must be recognized.
4. To minimize disturbance during the breeding season, avoid human activity within 1/4 mile of occupied sage-grouse leks. (Dates and distances of agency proposed action will be used.)
5. Where technically and economically feasible, use directional drilling or multiple wells from the same pad.
6. Where facilities are developed within sage-grouse habitat, minimize potential use by predators (i.e., raptor proof power poles, eliminate crawlspaces under buildings).
7. Encourage the development of new technologies that would reduce total surface disturbance within occupied sage-grouse habitat (i.e., directional drilling, multiple wells from the same well pad and reinjection of produced water).

- **Vegetation Management**
  1. Develop priorities and implement habitat enhancements in areas currently occupied by sage-grouse.
  2. Develop priorities and implement habitat enhancements in historical or potential sage-grouse habitats.
  3. Develop and implement wildfire suppression guidelines that address sage-grouse habitat health and management.
  4. Remove juniper and other conifers where they have invaded sagebrush sites important to sage-grouse.
  5. Ensure vegetation treatments and post-treatment management actions are appropriate to the soil, climate, and landform of the area.
  6. Recognize that fire provides a natural diversity component in sagebrush habitats; manage fire on a landscape and patch scale at a local level.
     a. Use prescribed fire to maintain, enhance or promote sagebrush ecosystem health by mimicking natural fire frequencies.
     b. Where sage-grouse are present or desired, fire management objectives should recognize that fire generally burns the better sage-grouse nesting and severe winter habitat.
     c. Evaluate all wildfires greater than 40 acres in occupied sage-grouse habitat to determine if rehabilitation of the burned area is needed with emphasis placed on habitats that would be susceptible to invasion by annual grasses.
  7. When rehabilitation is necessary, the first priority is protection of the soil resource. Use appropriate mixtures of sagebrush, native grasses, and forbs that permit burned areas to recover to a sagebrush-perennial grass habitat.
  8. Grazing management following sagebrush treatments or manipulations should be designed to benefit long-term sagebrush diversity and ecosystem health. Grazing management strategies should be designed to permit reestablishment of native sagebrush, grasses, and forbs that benefit sage-grouse.
  9. Experiments in habitat manipulation should be relatively small in comparison to a specific sage-grouse population.
  10. Determine threshold levels of habitat alteration that can occur without negatively impacting specific sage-grouse populations. As a general rule, treat no more than 20% of any seasonal habitat type until results are evaluated.
  11. Treat sagebrush in patches rather than contiguous blocks.
  12. Protect patches of sagebrush within burned areas from disturbance and manipulation.

13. Consider all alternatives when designing sagebrush treatments.
14. Additional treatments in adjacent areas should be deferred until the previously treated area again provides suitable sage-grouse habitat.
15. Avoid removing sagebrush adjacent to sage-grouse foraging areas along riparian zones, meadows, lake beds and farmland unless such removal is necessary to achieve habitat management goals.
16. Use mechanical or other appropriate treatments such as herbicides in areas with relatively high shrub cover (>30%) and a poor herbaceous component in order to improve brood-rearing habitats.
17. Implement effective monitoring plans to determine the effectiveness of vegetation treatments.
18. Develop and maintain cumulative records for all vegetation treatments to determine and evaluate site specific and cumulative impacts to sage-grouse habitats and identify recommended management practices for successful vegetation treatments.

- **Invasive Plants**
  1. Identify invasive plants of concern in sage-grouse habitats.
  2. Map areas where invasive plants of concern already exist.
  3. Implement strategies to assist in prevention of the spread of noxious weeds or invasive plants detrimental to sage-grouse.
  4. Prioritize and aggressively treat invasive plants in identified areas of concern.
  5. Employ appropriate site preparation techniques and timely reseeding with approved seed mixes of any disturbed areas to prevent encroachment of invasive plants.
  6. Maintain cumulative records for invasive plants treatment and prevention programs to evaluate site specific and cumulative impacts to sage-grouse habitats.
- **Land Use**
  1. Encourage assimilation of sage-grouse information into plans as they are developed. Develop and distribute appropriate literature.
  2. Limit free-roaming dogs and cats.
  3. Maintain appropriate stocking rates of livestock.
  4. Encourage cluster development, road consolidation and common facilities that would have a reduced impact on sage-grouse.
  5. Where necessary to build or maintain fences, evaluate whether increased visibility, alternate location, or different fence design will reduce hazards to flying grouse.
  6. Maintain healthy sagebrush communities.
  7. Plan development to allow for sage-grouse movement.
  8. Where possible protect habitat through conservation (i.e., land exchanges, conservation easements, leases or Conservation Reservation Program type programs).
  9. Locate and manage facilities to eliminate predator impacts to sage-grouse.
  10. Provide education on the effects of development on sage-grouse habitat and populations. Facilitate conservation districts and extension agents' ability to educate the public about sage-grouse.
  11. Consider developing travel management plans that would allow seasonal closure and reclamation of roads.
  12. Reduce noise from industrial development or traffic especially in breeding and brood rearing habitats.
  13. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures in key areas (priority habitat).
  14. Control dust from roads and other surface disturbances.

- **Parasites and Diseases**
  1. Investigate and record deaths that could be attributed to parasites or disease.
  2. Develop and implement strategies to deal with disease outbreaks where appropriate.
  3. Implement pond design standards to minimize mosquito breeding habitat.
     a. Overbuild the size of ponds to accommodate a greater volume of water than is discharged. This will result in non-vegetated and muddy shorelines that breeding mosquitoes avoid.
     b. Build steep shorelines to reduce shallow water and aquatic vegetation around the perimeter of impoundments. Construction of steep shorelines also will increase wave action that deters mosquito production.
     c. Maintain the water level below that of rooted vegetation for a muddy shoreline that is unfavorable habitat for mosquito larvae. Rooted vegetation includes both aquatic and upland vegetative types. Always avoid flooding terrestrial vegetation in flat terrain or low lying areas.
     d. Construct dams or impoundments that restrict down slope seepage or overflow. Seepage and overflow results in down-grade accumulation of vegetated shallow water areas that support breeding mosquitoes.
     e. Line the channel where discharge water flows into the pond with crushed rock, or use a horizontal pipe to discharge inflow directly into existing open water, thus precluding shallow surface inflow and accumulation of sediment that promotes aquatic vegetation.
     f. Line the overflow spillway with crushed rock, and construct the spillway with steep sides to preclude the accumulation of shallow water and vegetation.
     g. Fence pond sites to restrict access by livestock and other wild ungulates that trample and disturb shorelines, enrich sediments with manure and create hoof print pockets of water that are attractive to breeding mosquitoes.
- **Predation**

  Predation recommended management practices on public lands would only be implemented in coordination with U.S. Department of Agriculture (USDA) Wildlife Services.
  1. Predator control may be warranted to maintain or enhance local sage-grouse populations when there is a demonstrated need such as a population is trending downward over a 3-year period; populations of "newcomer" predators are artificially high in sage-grouse habitat; specific sage-grouse populations need short-term help.
  2. Develop and distribute educational materials regarding human practices that may allow establishment/expansion of predator populations. Examples of these activities include landfills and other garbage/waste disposal that may provide artificial food sources for a variety of predators, and buildings/structures that provide nesting/roosting habitat for ravens/raptors.
  3. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures in key areas.
  4. Predator control to enhance sage-grouse survival should be targeted only predators identified as impacting that sage-grouse population.
  5. Better quantify and qualify the role of predation on sage-grouse in Wyoming.
  6. Discourage the establishment, and bring into balance artificially high populations of “newcomer” predators in sage-grouse habitat.
  7. Monitor the effectiveness of any predator control efforts that are implemented.
- **Livestock Grazing Management**

1. In interactions between wildlife professionals, livestock producers and other interested parties, employ tolerance and understanding, and respect other perspectives. Focus on areas of mutual interest.
2. Evaluate effects of different grazing treatments on sage-grouse productivity, survival, and habitat use.
3. Actively educate stakeholders about grazing strategies that can be used to improve or maintain sage-grouse habitats. Cooperate to create and distribute a Wyoming guide to enhancing sage-grouse habitat.
4. In general, avoid yearlong and spring-to-fall continuous grazing schemes in sagegrouse habitat. Yearlong and spring-to-fall grazing may be a tool if it is not continued each year.
5. Where appropriate, implement livestock grazing systems that provide for areas and times of rest or deferment.
6. Where practicable, avoid heavy utilization of grazed pastures to compensate for rested pastures (a year of rest cannot compensate for a year of excessive use).
7. Design grazing systems that provide sage-grouse habitat in riparian areas and around water sources.
8. During periods of forage drought, utilize grazing schemes that reduce impacts to sage-grouse (e.g., adjust intensity, timing and/or duration of grazing).
9. Investigate the possibility of developing forage banks for use during periods of drought to alleviate inappropriate use by grazing animals on sage-grouse habitat.
10. Reduce disturbance to sage-grouse habitat from livestock management activities (e.g., salting or mineral placement, turnout or gathering, bed ground/camp locations, etc.)
11. Develop and implement management plans for grazing that take into consideration the seasonal sage-grouse habitat needs. These management plans could include a variety of grazing systems designed to reach habitat goals, including short-duration, rest rotation, etc.
12. Look for ways to minimize negative impacts and enhance sage-grouse habitat when establishing livestock range improvement projects (e.g., water overflow for sage-grouse from water developments, placement of fences, facilities that provide raptor perch sites, construction of roads, salt grounds).
13. Avoid human activity near leks during the breeding season between the hours of 8 p.m. to 8 a.m.
14. Except for livestock guard dogs, avoid allowing dogs to run unchecked in sage-grouse habitats.
15. Experiment with types of grazing to improve sage-grouse habitat accompanied by monitoring to determine effects on sage-grouse.
16. Use techniques such as increased visibility, alternate location, or different design to build and maintain fences that are not hazards to flying grouse.
17. During the breeding season (March 1st through May 15th), use sheep bedding grounds at least ½ mile from leks. Should herding practices regain popularity, herders should attempt to avoid disturbing occupied leks with their sheep bands, once they leave the bed ground and begin their daily movements.
18. During the breeding season (March 1st through May 15th), reduce physical disturbance to breeding sage-grouse by placing salt or mineral supplements beyond 1/4 mile of lek locations.
19. In suitable nesting habitats within 3 miles of leks, design grazing systems to manage for residual herbaceous vegetation to provide cover for nesting sage-grouse hens. Options to promote herbaceous cover include:

   a. When circumstances allow, shift early-season livestock use to pastures with minimal, or no, potential for nesting (e.g., pastures lacking sagebrush, exotic grass seedings, annual grasslands, etc.).
   b. When pastures with potential nesting habitat are grazed early in the season, use an appropriate stocking rate when herbaceous plants are not rapidly growing (generally prior to late-April). Options for monitoring grazing can be found in the Wyoming Rangeland Monitoring Guide.
20. Manage stocking rates and rotations to maintain the health and productivity of rangelands for livestock and sage-grouse. Incorporate one of the monitoring programs from the Wyoming Rangeland Monitoring Guide to ensure proper grazing utilization and plant recovery.
21. If your goal is to increase production of grasses and forbs, manage for increased soil water intake by promoting residual vegetation and mulch through implementation of light grazing intensities.
22. In pastures with riparian habitats (assuming riparian vegetation is actively growing), manage livestock grazing to allow herbaceous vegetation recovery.
23. Supplemental winter-feeding of livestock in occupied sage-grouse winter habitats should be avoided for both sheep and cattle operations to prevent over-utilization of sagebrush resources by sheep and trampling damage by cattle.
24. Utilization of sagebrush plants should not exceed 20% by livestock and big game.
25. Placement of new fences and structures should include consideration of their impact on sage-grouse. In general, avoid constructing fences within ½ mile of leks. Avoid locating fences in swales and on ridge tops. Minimize fence height and maximize bottom wire height to the extent possible. In areas with documented collisions make fences as visible as possible, (e.g., wire markers, use white-topped steel fence posts, use wooden stays and/or reduce spacing between fence posts, etc.).
26. Where feasible, place new, taller structures such as corrals, loading facilities, water storage tanks, windmills, etc. at least ½ miles from leks to reduce opportunities for perching raptors.
27. New spring developments in sage-grouse habitat should be designed to maintain or enhance the free-flowing characteristics of springs and wet meadows with the use of float valves on troughs or other features where feasible. Spring and wet meadows should be protected from over utilization and trampling by livestock.
28. Equip new and existing livestock troughs and open water storage tanks with ramps to facilitate the use of, and escape from, troughs by sage-grouse and other wildlife.

- **Weather**
  1. Where drought has been documented for two consecutive years, consider implementation of Recommended Management Practices in year three that may include:
     a. Drought management of livestock and wildlife grazing.
     b. Protection of critical sage-grouse habitats from wildfire and prescribed fire.
     c. Reduced bag limits during sage-grouse hunting seasons. (not within BLM management authority)
     d. Predator management programs to enhance nesting and early-brood-rearing success of impacted populations. (would only be implemented in coordination with USDA Wildlife Services when a need has been determined.)
     e. Water hauling and protection of water sources from evaporation.
     f. Installation of guzzlers, snow fences and fencing of water source overflows.
     g. Insure wildlife escape ramps are in place on existing water sources.

h. Implement other appropriate management options developed by local sagegrouse working groups.

- **Coal Exploration, Mining, and Reclamation**
  1. Evaluate and address the needs of sage-grouse when siting mines, and mining related infrastructure. Impacts to sage-grouse should be minimized where practicable.
  2. Tailor reclamation to replace or augment sage-grouse habitat to the extent practicable in instances where such habitat is adversely affected.
  3. Evaluate fence design, location and visibility to reduce hazards to flying grouse.
  4. Manage water production to enhance or maintain sage-grouse habitat.
  5. Control dust from roads.
  6. Control mosquito larvae, to the extent practicable and feasible, in mine-related surface water impoundments.
  7. Install wildlife escape ramps in mine reclamation-related livestock watering facilities (tanks).
  8. Continue sage-grouse and sage-grouse habitat-related research and monitoring efforts.
  9. Remove only that amount of topsoil necessary to support continued mining operations on an annual basis or otherwise manage topsoil removal operations to minimize the impact on sage-grouse.
  10. Consider alternative mitigation measures for mining impacts on known sage-grouse habitat. This may include, but not be limited to, implementing offsite mitigative measures for enhancing sage-grouse habitat to offset the temporary impacts of coal mine surface disturbing activities.
  11. When feasible and practicable, new or expanded exploration within two miles of active leks should occur prior to March 15th or after July 15th. Following initiation of mining (i.e., topsoil removal) this recommendation will not be applicable.
  12. When feasible and practicable, plan to avoid new surface occupancy or disturbance activities on or within ¼ mile (400 m) of the perimeter of known active lek sites from March 1 to May 15. Following initiation of mining (i.e., topsoil removal) this recommendation will not be applicable. (Active coal mines are located outside of priority habitat.)
  13. Continue the effort to establish Wyoming big sagebrush to meet shrub density requirements.
- **Other Solid Mineral Mining Operations**
  1. When feasible, new or expanded exploration and/or mining activities within 3 miles (5 km) (Connelly et al. 2000) of active leks should be avoided between March 1st and July 15th. Following initiation of mining (i.e., topsoil stripping) this recommendation would not be applied. As seasonal habitat mapping efforts are completed, re-direct efforts towards protecting nesting habitat.
  2. When feasible, plan to avoid new surface occupancy or disturbance activities within 3 miles (5 km) (Connelly et al. 2000) of the perimeter of known active lek sites from March 1 to May 15.
  3. Where sage-grouse are present or desired, avoid human activity adjacent to leks during the breeding season between the hours of 8 p.m. and 8 a.m.
- **Pesticides**
  1. Determine the extent of pesticide use within sage-grouse habitats.
  2. Examine what, if any, effects each pesticide use may have on sage-grouse populations.
  3. Where possible, adjust management instead of applying pesticides.
  4. Make use of current laboratory analysis procedures where sage-grouse mortality is observed. Report where pesticides have caused mortality in sage-grouse.

5. Determine which pesticides and application strategies are least harmful to sage-grouse.
6. Research effects of pesticides on sage-grouse in Wyoming with a specific goal of testing impacts of actual rangeland applications.
7. Work with county Weed and Pest Districts to identify low-toxicity alternatives to pesticides classified as a medium to very high risk to game birds.
8. Assist in providing Wyoming retail dealers, Weed and Pest Districts, and county extension agents with information intended for users regarding product toxicity levels to sage-grouse, and alternatives that are effective while less toxic.
9. Encourage simple, standardized record-keeping formats, and allow access to pesticide use information.
10. Address grasshopper issues using Reduced Agent Area Treatments approach.
11. Avoid broadcast spraying during the nesting season, March 1 to July 15, within three miles of a sage-grouse lek site.

- **Recreation**
  1. Develop travel management plans and enforce existing plans.
  2. Restrict off-road-vehicle use in occupied sage-grouse habitats.
  3. Avoid recreational activities in sage-grouse nesting habitat during the nesting season.
  4. Restrict organized recreational activities between March 1 and July 15 within 3 miles (5 km) (Connelly et al. 2000) of a lek site.
  5. Recreational facilities shall be located at least 3 miles (5 km) (Connelly et al. 2000) from lek sites and in areas that are not in crucial sage-grouse habitat.
  6. In coordination with the WGFD, establish and maintain a small number of lek viewing sites and minimize viewing impacts on these sites. Viewing sage-grouse on leks (and censusing leks) should be conducted so that disturbance to birds is minimized or preferably eliminated.
  7. Do not provide all lek locations to individuals simply interested in viewing birds.
  8. Develop and provide information related to recreation and its impacts on sage-grouse habitat.
  9. Discourage dispersed camping within important riparian habitats occupied by sage-grouse during late summer.
  10. Avoid construction of overhead lines and other perch sites in occupied sage-grouse habitat. Where these structures must be built, or presently exist, bury the lines, locate along existing utility corridors or modify the structures in key areas.
  11. Control dust from roads and other surface disturbances.
  12. Inform the public that dog training on sage-grouse outside the hunting season is wildlife harassment and therefore illegal.

Northeast Wyoming Sage-Grouse Working Group: Recommendations for Development Within Connectivity Corridors (NWSGLWG 2010)

1. Encourage the suspension of federal and state leases in the connectivity corridors where mutually agreed to by the leasing agency and the operator. These suspensions should be allowed until additional information clarifies their continued need. Where suspensions cannot be accommodated, or at the option of the operator, limit disturbance to no more than 5% (up to 32 acres) per 640 acres of suitable Greater Sage-Grouse habitat within connectivity corridors.
2. Carefully plan developments to avoid or minimize fragmentation of sagebrush habitats in connectivity corridors. The Northeast Wyoming Sage-Grouse Working Group expects industry, BLM and WGFD to work closely together to minimize the overall acreages

disturbed with efficient road and well pad designs to avoid excessive engineering and size of pads. BLM should especially be judicious in its application of Gold Book Standards within connectivity corridors using minimum standards whenever possible.

3. The Northeast Wyoming Sage-Grouse Working Group recognizes that reducing human disturbance during the breeding season is beneficial for sage-grouse within important habitats in connectivity corridors. The Northeast Wyoming Sage-Grouse Working Group recommends that a Controlled Surface Use buffer of 0.6 miles around leks or their documented perimeters and a March 15 – June 30 Timing Limitation Stipulation (TLS) be required within nesting habitat within 4 miles of leks. These stipulations will be followed regardless of surface or mineral ownership.
4. Utility providers will work closely with State and Federal agencies to ensure that new distribution power lines are sited with consideration for sage-grouse habitat within connectivity corridors. Eliminate or minimize the use of overhead power lines after power is delivered ("dropped") to the development by the utility company. Electrical, gas and water lines should be constructed outside of sage-grouse habitat. Within sage-grouse habitat, consolidate these utility lines within a common corridor. Utility providers will work closely with WGFD, landowners and land management agencies to ensure that source lines are sited with consideration for sage-grouse habitat. Energy companies will be encouraged in the COAs in their plans of development to request overhead power lines be immediately retired after they are no longer needed for development of minerals. Alternatives to overhead power will be investigated if the landowner requests the power line to remain for developing water wells for livestock or wildlife.
5. Water reservoirs for Coalbed Natural Gas produced water or other uses may provide habitat for mosquitoes, which spread WNv, promote habitat for newcomer predators (e.g., red fox, raccoon and striped skunk) and occupy acreage that would otherwise be suitable for sage-grouse. Water management will minimize reservoir use. The Northeast Wyoming Sage-Grouse Working Group encourages treatment and discharge into perennial streams, reinjection or other nonsurface discharge options within connectivity corridors.
6. With an effort led by the Governor's office or other agencies, develop a comprehensive larvicide program to manage mosquitoes for all waters within the connectivity corridor. This will include pre and post treatment monitoring to document presence of the primary WNv vector (*Culex tarsalis*) and determine efficacy of the treatment program.
7. Energy operators should use telemetry systems to remotely monitor system performance and safety issues. Non-emergency visits will observe timing restrictions during the TLS window, avoiding sunrise/sunset time periods when grouse are most active and obey conservative speed limits. Minimize noise levels and locations of compressors and generators within connectivity areas.
8. Require the use of site specific and beneficial seed mixtures for sage-grouse on interim and final reclamation. Reference ESDs from NRCS or other professional service. Allow for spring seeding exceptions from TLS to ensure that forb species are planted during optimum precipitation periods (e.g., spring). Promote the inclusion of sagebrush seeds in final reclamation efforts.
9. The Northeast Wyoming Sage-Grouse Working Group encourages landowners within connectivity corridors to consider participation in USDA/NRCS conservation programs for sage-grouse and other wildlife. These efforts should be further supported by industry, Conservation Districts, and State and Federal agencies wherever possible by promoting participation, sponsoring education opportunities and cost sharing programs.
10. All stakeholders need to be vigilant in identifying invasive weed establishment, treating them appropriately and preventing further spread by routine washing of vehicles and equipment.

11. The WGFD will coordinate monitoring in connectivity corridors including:
    - lek counts and surveys;
    - perform genetic analyses using DNA from collected feathers, blood samples, etc.;
    - monitor a radio-marked sample of sage-grouse in this area for seasonal habitat use and assess the role that WNv may have in annual mortality rates.
12. Coordinate response to range fires in sagebrush habitats with respective counties and other appropriate agencies. Sagebrush habitats should receive a priority response.

Appendix E. Livestock Grazing Allotments

E.1. Livestock Grazing Allotments within the Buffalo Planning Area

Table E.1. Current Livestock Grazing Allotment Information

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
12182	4mile Creek/RC	C	369		41
02378	76 Creek	C	200		33
02314	Adon	C	40		6
22115	Allemandll	C	1,520		184
02246	Anderson Draw	C	178		21
12173	Antelope Basin	C	449		47
02366	Antelope Draw	C	40		6
02493	Armstrong Prong	C	223		51
02433	Arpan Butte	C	1,259		137
00698	Ash Draw	C	240		47
02323	Bader Gulch	C	83		20
02377	Badger Creek	C	40		8
02437	Badger Tract	C	40		7
22204	Baldwin Creek	C	640		47
22009	Bales Ranch Inc	C	80		11
02328	Banner	C	120		24
22011	Barbe Dorie J	C	120		13
32013	Barlow	C	89		13
02442	Barnum Mountain Rd.	C	2,735		277
02414	Barnum Mtn Road	C	40		8
22224	Barnum Mtn Spring	C	80		13
12236	Bates Creek	C	80		12
02475	Bayer Creek	C	120		34
12191	Bear Gulch	M	3,837		612
12168	Beartrap	C	483		76
12072	Beartrap Creek	I	2,171		249
22111	Beaver Creek	C	440		54
12157	Beaver Creek Slope	I	8,098		546
12041	Bed Springs Draw	C	358		23
02478	Beebee	C	320		211
22127	Bekebrede Draw	C	80		20
12209	Belle Fourche Tr	C	800		159
02288	Belus	C	120		30
22017	Belus Ranch	C	292		51
32019	Betz Alvin F.	C	185		21
02262	Billy Creek	C	280		44
12228	Billy Creek Camp	C	80		6
02324	Billy Creek School	C	40		10
22021	Bishop	M	8,632		1,483

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
12048	Bitter Creek	C	1,025		122
22022	Bittercreek	C	80		16
22028	Black Draw	C	2,581		300
12230	Black Stump Draw	C	200		50
42013	Blue Creek	M	2,221		223
12189	Bode Gulch	C	560		59
22210	Bone Pile Creek	C	241		45
02254	Box Elder Draw	C	71		8
32005	Bridge Draw	M	2,720		274
12219	Bright Spring Draw	C	240		61
02243	Brower Draw	C	310		30
12035	Brown Kennedy Ranch	M	2,122		501
12192	Bugher Draw	C	1510		123
12213	Bull Camp	M	2,475		252
02474	Bull Camp Canyon	C	315		24
22212	Bull Creek	C	2,713		250
32018	Bull Creek	C	278		40
12161	Burnt Hollow	I	13,790	AMP IMPLEMENTED	2,400
12046	Butcher	C	640		119
12047	Butcher Ranch	C	240		61
12208	Caballo Draw	C	680		113
02258	Cabin Canyon	C	2,366		356
02299	Cabin Creek	M	3,139		309
12049	Camblin	C	690		130
02289	Campbell Draw	C	413		56
22201	Carpenter Draw	C	760		81
02265	Carr	C	400		43
12053	Carson Dan	C	80		16
12052	Carson, O. And R.J.	C	240		37
02450	Carter Draw	C	220		30
12165	Carter Draw	C	880		45
12054	Cash	C	80		14
12177	Castle Rock	M	5,256		610
02376	Cat Creek	I	5,696		552
12175	Cates Draw	C	1,689		173
12057	Chabot, August, Et Al	C	280		19
02384	Chabot, August, Et Al	C	147		14
02468	Chalk Hills	C	203		29
12211	Charlie Draw	C	1,482		306
02290	Chicken Creek Divide	C	40		7
32020	Clark,Glen L	C	1,247		131
02398	Claypit, Trough Draw	C	1,120		132
02093	Clear Creek	C	396		39

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
12065	Clear Creek Grazing	C	908		92
12149	Coal Creek	C	117		18
12069	Cook	C	40		6
02248	Coon Track Creek	C	121		18
22027	Cordero Allotment	C	480		78
12024	Corral Creek	C	36		5
00754	Cotton	C	40		4
02424	Cottonwood (Knudson)	C	923		106
02261	Cottonwood Creek	C	120		26
22130	Cottonwood Creek E	C	80		12
12143	Cottonwood Creek I	C	160		47
02427	Cottonwood Draw	C	400		72
12179	Cottonwood Draw	C	1,020		105
02357	County Line	C	1,122		153
22132	Coutant Creek	C	320		39
12186	Cow Creek	C	2,706		251
22125	Cow's Face	C	360		24
12059	Craney Draw	M	0		0
12094	Crazy Woman Creek	C	760		80
12218	Crenshaw Hill	C	719		87
12090	Cromack Draw	C	427		93
02426	Crooked Creek	I	20,367	AMP IMPLEMENTED	2,694
22206	Cross H Creek	C	313		49
12184	Croton	M	1,028		174
02352	Cutler Draw	C	161		27
02332	Dabney	C	80		11
12074	Daly	C	120		22
12075	Daly Livestock Co.	C	6,138		1,107
02397	Davis Draw	M	788		81
12105	Davis Draw Common	M	970		156
02400	Davis Draw/ Johnson Allotment	M	1,394		149
02322	Dead Horse	C	85		8
12176	Dead Horse Creek	I	9,119		993
22113	Dead Horse Creek Oilfield	C	1,261		216
12062	Deadman Draw	C	1,890		186
02396	Dean Graves	C	720		94
02267	Deep Creek	C	160		41
22102	Deer Creek	M	10,958		1,245
32004	Deer Creek I	C	80		10
12096	Deer Gulch	M	5,566		1,135

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
02270	Dixie Reece	C	263		30
02402	Donlin	C	501		134
12039	Drainage Draw	C	80		11
02412	Dry Creek	C	372		42
22229	Dry Creek Basin	C	79		14
12080	Dry Creek Ranch Inc.	M	4,948		1,074
02285	Dry Creek Res.	C	40		4
02250	Dry Fork	C	3,314		488
02341	Dry Fork P.R.	C	1,406		235
02407	Dry Muddy Creek	C	80		18
12144	Dry Trail Creek	C	2,086		389
02344	Dry Vee	M	4,442	AMP PROPOSED	911
02374	Duck Creek	C	41		12
22026	Duck Creek 2	C	217		60
02453	Dugout Creek	I	9,341		1,217
22124	Dull Knife	I	9,173		553
12031	Dull Knife Pass	M	5,047		603
02317	Dutch Creek	C	80		14
12200	E.K. Mountain	C	156		26
12037	East Fork	C	680		128
22225	East Spring Draw	M	5,683		550
12232	Echeta	C	320		37
02388	Eighty-Five Divide	C	1,319		328
12100	Eighty-Five Divide	M	1,679		384
12034	Elk Creek Road	C	40		8
12086	Elliot Curtis	C	114		24
12089	Elsom Brothers	C	1,760		133
12067	Encres Draw	C	40		7
22215	Erickson Draw	C	840		96
12139	Falxa	I	14,759	AMP IMPLEMENTED	1,546
12097	Fauber George	C	120		7
12162	Fence Creek	I	4,820	AMP IMPLEMENTED	655
14811	Figure 8	C	494		42
12099	Fitch Draw	M	1,840		250
32006	Flats	C	2,947		254
12078	Flying E	I	16,603		1,672
12066	Flying U Ranch	M	4,236		826
12045	Forest Tract	C	320		16
12151	Fort Creek	M	19,376		2,235
42001	Fortification Creek	C	894		102
22107	Fortin Draw	C	40		10
22109	Foster, Ralph T.	C	880		147
12076	Four Corners	M	2,109		422
22126	Four Horse	C	1,175		215
02242	Four Horse Creek	C	320		84
12050	Fourmile	M	4,879		433

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
02293	Fourmile 94	C	156		15
02379	Fourmile Ranch	I	7,595		623
12070	Fowler Draw	C	151		18
12088	Freeman Camp	C	800		32
02391	Freeman Draw	M	2,710		445
12079	Gammon Draw	C	37		9
22112	Garber Victor Et Al	C	280		62
02306	Gardner Lake	C	40		13
02476	Gardner Mt. (South)	M	1,622	AMP IMPLEMENTED	193
02336	Gates-Yonkee	C	560		86
22120	Gibbs Brothers	C	95		12
12085	Goble Draw	C	478		48
12226	Gold Mine Road	C	494		63
22121	Gordon	M	6,674		761
02335	Gordon Creek	I	2,118		285
02428	Gosney Airstrip	C	40		2
02395	Gosney, Elmer	C	278		61
12193	Government Draw	M	3,590		380
02421	Grandma's Bend	C	84		14
02360	Gray Cabin Draw	C	2,230		270
12174	Green Draw	C	160		29
32003	Green Hill	C	40		5
02469	Grub Draw	I	10,120		1,019
22129	Hamm Don Robert	C	362		77
12154	Hampshire	C	1,144		129
12134	Harlan James S.	C	441		24
12136	Harper George Mary	C	120		30
14812	Harper Reservoir	C	23		2
12147	Hat Ranch	M	6,573		493
32002	Hay Creek	C	80		26
02440	Healy	C	280		35
12153	Hepp Charles	M	2,404		228
12231	Hilight	C	40		8
02443	Hill Prong	C	80		13
22114	Hines	C	120		24
12180	Hoblit	C	140		23
12169	Hoe Ranch	I	15,279		1,676
02393	Hole In The Wall	I	9,000		738
22116	Holler Draw	C	482		62
02410	Homestead Draw 4150'	C	80		11
10342	Hope	I	3,423	AMP IMPLEMENTED	555
12240	Horse Creek	M	1,110		231
02434	Horse Creek	C	2,071		427
02423	Horse Creek/ Pipeline	C	40		8
02327	Horseshoe Ranch	C	880		24

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
02461	HQ and Taylor Spring	C	912		101
02415	Indian Creek	M	2,587		301
02274	Ivy Creek	C	83		8
12061	Jackplane	C	2,664		266
02394	Jeep Trail	C	200		20
02320	Jeffers Draw	C	39		6
12158	Jiggs Reservoir	C	117		28
02257	Jim Crow Creek	C	597		113
02460	Johnson Creek	C	354		31
02401	Johnson Draw	C	2,288		232
02382	Jones Draw	C	40		6
02447	K Ranch	C	1,361		187
12148	Kaycee L And L	C	761		43
02251	Keathley Draw	C	385		39
12178	Kendrick	M	5,351		874
02277	Keyes Draw	C	79		9
22202	Kingsbury/Wild Horse	C	160		32
12038	Kline Draw	C	400		43
12056	Kurtley Draw	C	1,277		135
02364	Lanabaugh No. 4 Draw	C	40		10
02301	Larey Draw	C	2,320		385
02347	Lariat	C	200		20
22108	Larrechea	C	280		48
12190	Lawrence Charles	C	2,838		285
12188	Lawrence Land Co. Inc.	C	165		19
12023	Lawver	M	4,646		815
12194	Legerski Ranch	C	359		72
02325	Linch	C	1,441		173
12197	Linch	C	80		15
02305	Linn Draw	C	1,440		236
12198	Little Bighorn Ranch	C	40		8
12233	Little Cedar Draw	C	200		28
32007	Little Poison Creek	C	2,244		218
02358	Little Powder River	M	3,711		750
02279	Little Rawhide	C	40		10
02310	Little Willow	I	6,080	AMP IMPLEMENTED	823
02307	Little Youngs Creek	C	169		34
22123	Lone Tree	C	40		7
02343	Long Draw	C	719		99
02466	Lower Willow Glen	C	80		11
02355	Lx Bar	C	1,230		126
02368	Mark Gordon	C	1,282		132
02445	Marton	C	41		7

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
02309	Mary Straatsma Est.	C	40		6
22221	Maycock Draw	C	719		72
02406	Mayer	C	98		12
02346	Mayor	I	3,157		384
12032	Mayoworth S. Of Sdw	C	240		20
02370	Meadow Creek	M	2,355		248
02303	Meadow Draw	C	160		16
12227	Michelena	M	3,405	AMP PROPOSED	348
22055	Mickelberry Creek	C	160		16
12030	Middleberry Draw	C	1,778		178
14952	Mitchell Breaks	M	2,268	AMP IMPLEMENTED	391
02429	Mitchell Draw	M	4,306		419
12140	Montgomery	C	1,861		204
00749	Moore Reservoir	C	40		8
12235	Moore, James R.	C	3,971		782
02408	Moriarty, Jack L.	C	40		8
02435	Morris Draw	C	1,272		144
22029	Mosier Gulch	M	160		41
02373	Mountain	I	8,390	AMP IMPLEMENTED	778
02446	Mountain	C	1,846		223
02449	Mountain (Elm)	C	241		35
02338	Mountain East	C	260		26
02367	Mud Spring Creek	C	80		16
22223	Muddy Creek	C	40		18
22128	Mumma Draw	C	240		54
02354	Murray Draw	C	40		8
02362	N. Fork 9 Mile Creek	C	283		40
02431	N. Gray Cabin Draw	C	723		87
32014	N. Windmill	I	2,074	AMP IMPLEMENTED	276
02418	N. Fork Powder R.	C	212		34
02340	N. Leiter	C	117		40
02444	N. Scotch	C	201		105
02092	N. Cottonwood Cr.	C	79		23
02348	Napier	M	3,242		529
12095	Neil Butte	C	40		6
12238	Niedringhaus Lambert	C	440		24
02425	Ninemile	C	40		5
12081	Nipple Butte	C	1,928		389
02239	Norfolk John	M	1,840		299
22119	North Mitten	C	103		21

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
02363	North Ridge	C	335		57
02295	North Trabing	M	560		78
02436	North West - Iberlin	C	320		32
22008	Number Two Draw	C	1,078		170
02457	OK Creek	C	2,302		216
02390	Olmstead	I	832	AMP IMPLEMENTED	179
02058	Olsen Draw	C	4,892		592
02249	Osborn	C	280		39
02287	Padlock Ranch Co.	C	440		88
12068	Pass Reservoir	C	1,225		118
02405	Peterson Draw	C	2,736		335
12156	Petrified Tree	M	1,867		218
12159	Phinney Draw	C	878		91
02413	Pine Ridge	C	720		76
12166	Pine Ridge	C	240		49
02454	Pine Ridge	C	320		27
02256	Pinette Draw	C	200		48
12229	Piney Creek	C	40		7
02252	Ploesser	C	385		38
02472	Plosser	C	415		47
02441	Plum Creek Draw	C	390		84
32012	Pointed Butte	C	40		11
12195	Poison Creek	M	1,315		148
02419	Poker Creek	I	3,697	AMP IMPLEMENTED	837
02404	Pollard Draw	C	798		79
02430	Powder River	I	4,526	AMP IMPLEMENTED	944
02260	Powder River Ranch	I	17,085		1,779
02422	Prairie Creek	C	38		13
02350	Prong	C	534		92
12164	Prong Spotted Horse	C	2,129		271
22226	Pugsley Hill	C	40		6
12138	Pumpkin Creek	I	13,325		1,454
12172	Quinn, John, Bonnie	C	40		7
02264	Rafter L.	C	1,514		238
02266	Ramsbottom	M	7,189		430
02319	Rattlesnake Creek	C	40		12
12098	Rattlesnake Springs	C	432		46
12040	RBL	C	360		43
12171	Read Draw	C	40		4
02269	Reculusa	C	160		42
12051	Red Canyon	C	2,264		270
02365	Red Draw	M	2,115		128

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
12033	Red Fork	I	10,000	AMP IMPLEMENTED	917
02409	Red Fork Mtn Camp	C	203		7
02253	Red Hills	C	759		127
02416	Red Wall	C	459	AMP IMPLEMENTED	78
02271	Reece Ernest	M	2,715		414
02330	Reel	C	40		6
02275	Remington Creek	M	2,676	AMP IMPLEMENTED	290
02385	Reno	C	160		16
02268	Reno Draw	C	558		63
22205	Robinson Draw	C	69		9
12155	Robinson Place	C	630		68
02329	Rochelle Hills	C	80		12
12087	Rock Ridge	C	1,360		93
02321	Rocky Butte	C	2,075		367
12118	Rosie Draw	C	200		29
02491	Rossnecker Draw	C	42		6
02278	Rourke & Offutt	C	477		125
02263	Rozet	C	40		8
02465	Ryan	C	160		46
02259	S. Wyodak	C	120		32
02386	S. Fork Otter Creek	C	120		17
02452	S. Gillette Forty	C	40		10
22203	S. Leiter	C	1,457		146
02372	S.F. Crazy Woman	C	80		14
02281	S.F. Three Bar	C	215		43
22110	Sahara Draw	C	120		20
02411	Salt Creek	M	4,249		551
02272	Sand Rock/Hoe Creek	C	74		11
00743	Sawmill	C	240		12
12185	Schiermiester	C	800		114
22122	School Sec Dr/Mdlfrk	C	160		27
12073	School Section Draw	C	478		43
22214	Schoonover Ranch	I	12,482	AMP IMPLEMENTED	1,528
12137	Scotch	C	200		10
02353	Scott Draw	C	306		32
02286	Scott Marion	C	560		124
12083	Scotty Draw	C	4,500		624
02276	Se Of Buffalo Creek	C	1,140		152
02369	Senff Ditch	C	80		13
02463	SF Holler Draw	C	280		26
02375	S. Fork Arkansas Creek	C	200		36
02292	Simpson, John H.	C	1,156		198

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
02471	Sioux Battle	C	241		26
02459	Sippie Mine	C	520		53
02291	Skidmore Estate	C	26		9
02371	Slope	I	3,960	AMP IMPLEMENTED	1,044
02399	Slope/Mountain, Allotment	C	2,032		256
02297	Smith	C	322		34
02300	Smith	C	120		23
32010	Smith Creek	C	160		10
02383	Smith Cut	C	3,235		615
02294	Soldier Creek Ranch	C	1,343		229
02495	Sony Draw	M	5,101		513
02498	South Carpenter Draw	C	240		2
02451	South Fork	I	7,466		726
02389	South Fork Powder R.	M	4,890		380
02280	South Middle Butte	C	639		67
12183	South Middle Prong	C	640		73
02467	South Sussex Stkrst	C	27		14
00744	South Tabletop	C	120		15
02296	South Trabing	M	1,039		111
02351	South Twin Creek	C	200		33
22220	Spellman	C	1,278		163
02477	Spotted Horse Creek	C	961		105
02241	Spring Creek	C	1,231		287
22025	Squaw Butte	C	40		11
02298	Squaw Creek	M	2,566		289
02255	Stateline	C	71		18
12131	Steel Creek	C	200		20
02308	Stephenson, Marie	C	80		20
02387	Stone Draw	C	80		20
12160	Stotts Draw	C	1,934		193
02312	Stuart, James R.	C	80		16
02403	Stubbs Draw	C	493	AMP IMPLEMENTED	69
02313	Suel Anna Trustee	C	200		40
12167	Sussex Cutoff	I	1,318		105
12133	Sussex Oil Company	C	920		46
02420	Sussex Stockrest	I	305		50
02316	Swartz, Edward H.	M	2,480		621
02438	T.W.	I	1,840	AMP IMPLEMENTED	184
12141	Tabletop	C	80		8

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
12145	Tarver Trust	C	689		128
02458	Td Southwest	C	120		20
02333	Thom Brothers	C	31		4
02349	Three Mile Creek	C	441		90
12101	Threemile Creek Reservoir	C	80		18
02337	Throne John And Earl	C	120		24
02432	Timar East	C	1,122		116
12199	Timber Draw	C	74		10
02494	Tipperary	C	360		38
22213	Tongue River	I	1,767	AMP IMPLEMENTED	476
02339	Trail Creek	M	7,244		2,624
02417	Trail Side	C	40		14
12043	Trough Draw	C	760		34
00697	Truman Draw	M	2,032		347
02282	Ttt	M	14,155		1,563
02456	Tuttle Draw	C	320		92
02470	Tuttle Draw/Deep Crk	C	554		154
12187	Twenty Mile Creek	I	6,100		808
12142	Tyree Place	C	40		8
02448	Upper Cabin Creek	C	240		43
02273	Upper Fort Creek	C	920		205
12152	Upper Grub	C	1,640		164
12207	Upper Kaufman Draw	M	1920		262
12163	Ute Creek	C	117		17
02284	V Bar F	M	2,797		364
02345	Vanderhoff	C	360		26
02311	Vanhouten	M	1,057		107
12077	W. Sussex (Hickey)	I	3,320		483
02381	Wagensen Don Et Al	C	80		20
22106	Wagonhammer	M	3,881	AMP IMPLEMENTED	1,352
02492	Walker Draw	C	440		48
12146	Wall (East)	C	1,840		247
22104	Walsh	C	340		34
02304	Washout Dr.	M	1,859		315
02318	Water Gap Draw	M	9,043		1,127
02356	Watt Ranch	C	46		6
12181	West Bowman Hill	C	2,311		522
02490	West Coutant Creek	C	80		14
02462	West Fork	C	240		26
12091	West Timber Creek	C	240		32

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Type Management	Active Preference
02170	West Timber Draw	C	960		100
12063	Weston SW	M	4,435		829
02326	White Rock	C	440		58
02247	White Tail Creek	C	200		62
12237	Whitetail Creek	M	3,391		751
22222	Whitetail Pines	M	1,493		299
02455	Whitmeyer	C	120		21
02302	Whitmeyer Creek	C	40		6
12082	Wild Horse Creek	C	120		24
32015	Wild Horse Creek	C	80		8
02283	Wildcat	C	80		16
10069	Willow Creek	I	26,822		4,412
12036	Willow Creek	C	2,715		462
02331	Winter Draw	C	40		6
12216	Wolf Mountain	C	515		57
02380	Wormwood Ranch	I	20,699	AMP IMPLEMENTED	2,497
12042	Wyarno	C	120		24
02334	Wythom Road	C	120		20
12150	Yellowhammer	M	1,776		206

Source: BLM 2009a
AMP Allotment Management Plan
C Custodial
I Improve
M Maintain

E.2. Standards and Guidelines Status

Table E.2. Summary of Standards and Guidelines Evaluations

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Bear Gulch	12191	2006		Y	Y	Y	Y	U	U
Beartrap Creek	12072	2000		Y	Y	Y	Y	U	U
Beaver Creek Slope	12157	2002		Y	Y	Y	Y	U	U
Bishop	22021	2001		Y	Y	Y	Y	U	U
Bridge Draw	32005	2006		Y	Y	Y	Y	U	U
Bull Camp	12213	2005		Y	Y	Y	Y	U	U
Butcher	12046	2007		Y	Y	Y	Y	U	U
Cabin Creek	02299	2003		Y	Y	Y	Y	U	U
Castle Rock	12177	2007		Y	Y	Y	Y	U	U
Castle Rock	12177	2007		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Cat Creek	02376	2002		Y	Y	Y	Y	U	U
Clear Creek	02093	2008		Y	Y	Y	Y	U	U
Crooked Creek	02426	1999		Y	Y	Y	Y	U	U
Croton	12184	2006		Y	Y	Y	Y	U	U
Daly	12074	2007		Y	Y	Y	Y	U	U
Daly Livestock Co.	12075	2007		Y	Y	Y	Y	U	U
Davis Draw	02397	2005		Y	Y	Y	Y	U	U
Davis Draw Common	12105	2005	Y	N	Y	N	Y	U	U
Davis Draw/ Johnson Allotment	02400	2005		Y	Y	Y	Y	U	U
Dead Horse Creek	12176	1999		Y	Y	Y	Y	U	U
Deer Creek	22102	2000		Y	Y	Y	Y	U	U
Deer Gulch	12096	2002		Y	Y	Y	Y	U	U
Donlin	02402	2001		Y	Y	Y	Y	U	U
Dry Creek Ranch Inc.	12080	2005		Y	Y	Y	Y	U	U
Dugout Creek	02453	1999		Y	Y	Y	Y	U	U
Dull Knife	22124	2002		Y	Y	Y	Y	U	U
Dull Knife Pass	12031	2005		Y	Y	Y	Y	U	U
Eagle Creek	02344	1998		Y	Y	Y	Y	U	U
East Spring Draw	22225	2006		Y	Y	Y	Y	U	U
Eighty-Five Divide	12100	2005		Y	Y	Y	Y	U	U
Elsom Brothers	12089	2001		Y	Y	Y	Y	U	U
Falxa	12139	1999		Y	Y	Y	Y	U	U
Fence Creek	12162	1999		Y	Y	Y	Y	U	U
Fitch Draw	12099	1999		Y	Y	Y	Y	U	U
Flying E	12078	1998		Y	Y	Y	Y	U	U
Flying U Ranch	12066	2006		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Fort Creek	12151	2002		Y	Y	Y	Y	U	U
Four Corners	12076	2005		Y	Y	Y	Y	U	U
Fourmile	12050	2006		Y	Y	Y	Y	U	U
Fourmile Ranch	02379	2002		Y	Y	Y	Y	U	U
Gardner Mt. (South)	02476	1999		Y	Y	Y	Y	U	U
Gordon	22121	2002		Y	Y	Y	Y	U	U
Gordon Creek	02335	1999		Y	Y	Y	Y	U	U
Government Draw	12193	2008		Y	Y	Y	Y	U	U
Grub Draw	02469	2001		Y	Y	Y	Y	U	U
Hat Ranch	12147	2004		Y	Y	Y	Y	U	U
Hepp Charles	12153	2005		Y	Y	Y	Y	U	U
Hoe Ranch	12169	2000		Y	Y	Y	Y	U	U
Hole In The Wall	02393	2002	Y	Y	N	N	Y	U	U
Hope	10342	1999		Y	Y	Y	Y	U	U
Horse Creek	02434	2007		Y	Y	Y	Y	U	U
Indian Creek	02415	2006		Y	Y	Y	Y	U	U
Jackplane	12061	2008		Y	Y	Y	Y	U	U
Johnson Draw	02401	2008		Y	Y	Y	Y	U	U
Kendrick	12178	2006		Y	Y	Y	Y	U	U
Lawver	12023	2007		Y	Y	Y	Y	U	U
Little Powder River	02358	2001		Y	Y	Y	Y	U	U
Little Willow	02310	2002		Y	Y	Y	Y	U	U
M. Gordon	02368	2008		Y	Y	Y	Y	U	U
Mayor	02346	2001		Y	Y	Y	Y	U	U
Meadow Creek	02370	2006		Y	Y	Y	Y	U	U
Michelena	12227	2004		Y	Y	Y	Y	U	U
Mitchell Draw	02429	2006		Y	Y	Y	Y	U	U
Morris Draw	02435	2008		Y	Y	Y	Y	U	U
Mosier Gulch	22029	2006		Y	Y	Y	Y	U	U
Mountain	02373	1999		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
N Windmill	32014	1998		Y	Y	Y	Y	U	U
Napier	02348	2006		Y	Y	Y	Y	U	U
North Trabing	02295	2004		Y	Y	Y	Y	U	U
Olmstead	02390	1998		Y	Y	Y	Y	U	U
Olsen Draw	02058	2007		Y	Y	Y	Y	U	U
Petrified Tree	12156	2004		Y	Y	Y	Y	U	U
Plosser	02472	2008		Y	Y	Y	Y	U	U
Poison Creek	12195	2005		Y	Y	Y	Y	U	U
Poker Creek	02419	1999		Y	Y	Y	Y	U	U
Powder River	02430	1998		Y	Y	Y	Y	U	U
Powder River Ranch	02260	2003		Y	Y	Y	Y	U	U
Pumpkin Creek	12138	2001		Y	Y	Y	Y	U	U
Red Draw	02365	2006		Y	Y	Y	Y	U	U
Red Fork	12033	1999		Y	Y	Y	Y	U	U
Reece Ernest	02271	2006		Y	Y	Y	Y	U	U
Remington Creek	02275	2008		Y	Y	Y	Y	U	U
Rock Ridge	12087	2006		Y	Y	Y	Y	U	U
Salt Creek	02411	2005		Y	Y	Y	Y	U	U
Schiermiester	12185	2008		Y	Y	Y	Y	U	U
Schoonover Ranch	22214	1998		Y	Y	Y	Y	U	U
Sioux Battle	02471	2003	Y	Y	Y	N	Y	U	U
Slope	02371	1999		Y	Y	Y	Y	U	U
Sony Draw	02495	2006		Y	Y	Y	Y	U	U
South Fork	02451	2003		Y	Y	Y	Y	U	U
South Fork Powder R.	02389	2000		Y	Y	Y	Y	U	U
South Trabing	02296	2004		Y	Y	Y	Y	U	U
Squaw Creek	02298	2005		Y	Y	Y	Y	U	U
Stubbs Draw	02403	1999		Y	Y	Y	Y	U	U
Sussex Cutoff	12167	2000		Y	Y	Y	Y	U	U

Allotment Name	Allotment Number	Year Completed	Progress	Standard[1, 2]					
				1	2	3	4	5	6
Sussex Stockrest	02420	2000		Y	Y	Y	Y	U	U
Swartz, Edward H.	02316	2007		Y	Y	Y	Y	U	U
T.W.	02438	1998		Y	Y	Y	Y	U	U
Timar East	02432	2004		Y	Y	Y	Y	U	U
Trail Creek	02339	2006		Y	Y	Y	Y	U	U
Trough Draw	12043	2008		Y	Y	Y	Y	U	U
Ttt	02282	2000		Y	Y	Y	Y	U	U
Twenty Mile Creek	12187	2000		Y	Y	Y	Y	U	U
Upper Grub	12152	2005		Y	Y	Y	Y	U	U
Upper Kaufman Draw	12207	2006		Y	Y	Y	Y	U	U
V Bar F	02284	2006		Y	Y	Y	Y	U	U
Van-houten	02311	2003		Y	Y	Y	Y	U	U
W. Sussex (Hickey)	12077	2001		Y	Y	Y	Y	U	U
Wag-onham-mer	22106	1998		Y	Y	Y	Y	U	U
Washout Dr.	02304	2005		Y	Y	Y	Y	U	U
Water Gap Draw	02318	2005		Y	Y	Y	Y	U	U
Whitetail Creek	12237	2001		Y	Y	Y	Y	U	U
Whitetail Pines	22222	2002		Y	Y	Y	Y	U	U
Willow Creek	10069	2004		Y	Y	Y	Y	U	U
Worm-wood Ranch	02380	1998		Y	Y	Y	Y	U	U
Yel-lowham-mer	12150	2004		Y	Y	Y	Y	U	U

Source(s): BLM 1998 - 2008

[1] Codes in Progress and Standard columns are as follows:
Y Yes meets standard
N No does not meet standard
U Unknown

[2] Standards 5 and 6 are dependent upon determinations made by the Wyoming Department of Environmental Quality (DEQ). Standard 5 is Unknown if allotment specific data is not available. Wyoming DEQ has not identified air quality impairments within the Buffalo Field Office resulting in Standard 6 being met.

E.3. Livestock Grazing Allotments Within Greater Sage-Grouse Habitat

Table E.3. Grazing Allotments within 4.0 Miles of Occupied Greater Sage-Grouse Leks

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12182	4mile Creek/RC	C	369		41	
02378	76 Creek	C	200		33	X
02314	Adon	C	40		6	
22115	Allemand	C	1,520		184	X
02246	Anderson Draw	C	178		21	
12173	Antelope Basin	C	449		47	X
02366	Antelope Draw	C	40		6	X
02493	Armstrong Prong	C	223		51	X
02433	Arpan Butte	C	1,259		137	X
00698	Ash Draw	C	240		47	X
02323	Bader Gulch	C	83		20	
02377	Badger Creek	C	40		8	X
02437	Badger Tract	C	40		7	X
22204	Baldwin Creek	C	640		47	
22009	Bales Ranch Inc	C	80		11	X
02328	Banner	C	120		24	
22011	Barbe Dorie J	C	120		13	X
32013	Barlow	C	89		13	X
02442	Barnum Mountain Road	C	2,735		277	
02414	Barnum Mtn. Road	C	40		8	
22224	Barnum Mtn. Spring	C	80		13	
12236	Bates Creek	C	80		12	
02475	Bayer Creek	C	120		34	
12191	Bear Gulch	M	3,837		612	
12168	Beartrap	C	483		76	
12072	Beartrap Creek	C	2,171		249	
22111	Beaver Creek	C	440		54	
12157	Beaver Creek Slope	I	8,098		546	
12041	Bed Spring Draw	C	358		23	X
02478	Beebee	C	320		211	
22127	Bekebrede Draw	C	80		20	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12209	Belle Fourche Tr.	C	800		159	X
02288	Belus	C	120		30	
22017	Belus Ranch	C	292		51	X
32019	Betz Alvin F	C	185		21	X
02262	Billy Creek	C	280		44	
12228	Billy Creek Camp	C	80		6	
02324	Billy Creek School	C	40		10	
22021	Bishop	C	8,632		1483	X
12048	Bitter Creek	C	1,025		122	
22022	Bittercreek	C	80		16	
22028	Black Draw	C	2,581		300	
12230	Black Stump Draw	C	200		50	
42013	Blue Creek	C	2,221		223	
12189	Bode Gulch	C	560		59	
22210	Bone Pile Creek	C	241		45	X
02254	Box Elder Draw	C	71		8	X
32005	Bridge Draw	C	2,720		274	X
12219	Bright Spring Draw	C	240		61	X
02243	Brower Draw	C	310		30	X
12035	Brown Kennedy Ranch	M	2,122		501	X
12192	Bugher Draw	C	1,510		123	X
12213	Bull Camp	M	2,475		252	
02474	Bull Camp Canyon	C	315		24	
22212	Bull Creek	C	2,713		250	
32018	Bull Creek	C	278		40	
12161	Burnt Hollow	I	13,790		2400	X
12046	Butcher	C	640		119	X
12047	Butcher Ranch	C	240		61	X
12208	Caballo Draw	C	680		113	X
02258	Cabin Canyon	C	2,366		356	X
02299	Cabin Creek	M	3,139		309	X
12049	Camblin	C	690		130	X
02289	Campbell Draw	C	413		56	X
22201	Carpenter Draw	C	760		81	X
02265	Carr	C	400		43	X
12053	Carson, Dan	C	80		16	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12052	Carson, O. and R.J.	C	240		37	X
02450	Carter Draw	C	220		30	X
12165	Carter Draw	C	880		45	X
12054	Cash	C	80		14	X
12177	Castle Rock	M	5,256		610	X
02376	Cat Creek	I	5,696		552	X
12175	Cates Draw	C	1,689		173	X
12057	Chabot August Et Al	C	280		19	X
02384	Chabot August Et Al	C	147		14	
02468	Chalk Hills	C	203		29	X
12211	Charlie Draw	C	1,482		306	X
02290	Chicken Creek Divide	C	40		7	X
32020	Clark, Glen L.	C	1,247		131	X
02398	Claypit	C	1,120		132	X
02093	Clear Creek	C	396		39	X
12065	Clear Creek Grazing	C	908		92	X
12149	Coal Creek	C	117		18	X
12069	Cook	C	40		6	X
02248	Coon Track Creek	C	121		18	X
22027	Codero Allotment	C	480		78	X
12024	Corral Creek	C	36		5	X
00754	Cotton	C	40		4	X
02424	Cottonwood (Knudson)	C	923		106	X
022661	Cottonwood Creek	C	120		26	X
22130	Cottonwood Creek E	C	80		12	X
12143	Cottonwood Creek I	C	160		47	X
02427	Cottonwood Draw	C	400		72	X
12179	Cottonwood Draw	C	1,020		105	X
02357	County Line	C	1,122		153	X
22132	Coutant Creek	C	320		39	X
12186	Cow Creek	C	2,706		251	X
22125	Cow's Face	C	360		24	
12094	Crazy Woman Creek	C	760		80	X
12218	Crenshaw Hill	C	719		87	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12090	Cromack Draw	C	427		93	X
02426	Crooked Creek	I	20,367	AMP Implemented	2694	X
22206	Cross H Creek	C	313		49	X
12184	Croton	M	1,028		174	X
02352	Cutler Draw	C	161		27	
02332	Dabney	C	80		11	X
12074	Daly	C	120		22	
12075	Daly Livestock Co.	C	6,138		1107	X
02397	Davis Draw	M	788		81	X
12105	Davis Draw common	M	970		156	X
02400	Davis Draw/ Johnson	M	1,394		149	X
02322	Dead Horse	C	85		8	
12176	Dead Horse Creek	I	9,119		993	X
22113	Dead Horse Creek Oilfield	C	1,261		216	X
12062	Deadman Draw	C	1,890		186	
02396	Dean Graves	C	720		94	
02267	Deep Creek	C	160		41	X
22102	Deer Creek	M	10,958		1245	X
32004	Deer Creek I	C	80		10	X
12096	Deer Gulch	M	5,566		1135	X
02270	Dixie Reese	C	263		30	X
02402	Donlin	C	501		134	
12039	Drainage Draw	C	80		11	X
02412	Dry Creek	C	372		42	
22229	Dry Creek Basin	C	79		14	X
12080	Dry Creek Ranch	C	4,948		1074	X
02285	Dry Creek Res	C	40		4	X
02250	Dry Fork	C	3,314		488	X
02341	Dry Fork P.R.	C	1,406		235	X
02407	Dry Muddy Creek	C	80		18	
12144	Dry Trail Creek	C	2,086		389	X
02344	Dry Vee	M	4,442	AMP PROPOSED	911	X
02374	Duck Creek	C	41		12	X
22036	Duck Creek 2	C	217		60	
02453	Dugout Creek	I	9,341		1217	
22124	Dull Knife	I	9,173		553	
12031	Dull Knife Pass	M	5,047		603	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02317	Dutch Dreek	C	80		14	
12200	E.K. Mountain	C	156		26	X
12037	East Fork	C	680		128	X
22225	East Spring Draw	M	5,683		550	X
12232	Echeta	C	320		37	X
02388	Eightyfive Divide	C	1,319		328	X
12100	Eighty-five Divide	M	1,679		384	X
12034	Elk Creek Road	C	40		8	X
12086	Elliot Curtis	C	114		24	
12089	Elsom Brothers	C	1,760		133	
12067	Encres Draw	C	40		7	X
22215	Erickson Draw	C	840		96	X
12139	Falxa	I	14,759	AMP Implemented	1,546	X
12097	Fauber George	C	120		7	
12162	Fence Creek	I	4,820	AMP Implemented	655	X
14811	Figure 8	C	494		42	X
12099	Fitch Draw	M	1,840		250	X
32006	Flats	C	2947		254	X
12078	Flying E	I	16,603		1,672	X
12066	Flying U Ranch	M	4,236		826	
12045	Forest Tract	C	320		16	
12151	Fort Creek	M	19,376		2,235	X
42001	Fortification Creek	C	894		102	
22107	Fortin Draw	C	40		10	X
22109	Foster, Ralph	C	880		147	X
12076	Four Corners	M	2,109		422	X
22126	Four Horse	C	1,175		215	X
02242	Four Horse Creek	C	320		84	X
12050	Fourmile	M	4,879		433	X
02293	Fourmile 94	C	156		15	
02379	Fourmile Ranch	I	7,595		623	X
12070	Fowler Draw	C	151		18	X
12088	Freeman Camp	C	800		32	
02391	Freeman Draw	M	2,710		445	
12079	Gammon Draw	C	37		9	
22112	Garber Victor Et Al	C	280		62	
02306	Gardner Lake	C	40		13	X
02476	Gardner Mt. (South)	M	1,622	AMP Implemented	193	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02336	Gates-Yonkee	C	560		86	X
22120	Gibbs Brothers	C	95		12	
12085	Goble Draw	C	478		48	X
12226	Gold Mine Road	C	494		63	
22121	Gordon	M	6,674		761	X
02335	Gordon Creek	I	2,118		285	
02428	Gosney Airstrip	C	40		2	X
02395	Gosney, Elmer	C	278		61	X
12193	Government Draw	M	3,590		380	X
02421	Grandma's Bend	C	84		14	X
02360	Gray Cabin Draw	C	2,230		270	X
12174	Green Draw	C	160		29	X
32003	Green Hill	C	40		5	X
02469	Grub Draw	I	10,120		1019	X
22129	Hamm Don Robert	C	362		77	X
12154	Hampshire	C	1,144		129	X
12134	Harlan James S	C	441		24	
14812	Harper Reservoir	C	23		2	X
12147	Hat Ranch	M	6,573		493	X
32002	Hay Creek	C	80		26	X
02440	Healy	C	280		35	X
12153	Hepp Charles	M	2,404		228	X
12231	Hilight	C	40		8	
02443	Hill Prong	C	80		13	X
2213	Hines	C	120		24	X
12180	Hoblit	C	140		23	X
12169	Hoe Ranch	I	15,279		1676	X
02393	Hole In The Wall	I	9,000		738	X
22116	Holler Draw	C	482		62	X
02410	Homestead Draw 4150'	C	80		11	X
10342	Hope	I	3,423	AMP Implemented	555	X
12240	Horse Creek	M	1,110		231	X
02434	Horse Creek	C	2,071		427	X
02434	Horse Creek/ Pipeline	C	40		8	X
02327	Horseshoe Ranch	C	880		24	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02461	HQ and Taylor Spring	C	912		101	X
02415	Indian Creek	M	2,587		301	X
02274	Ivy Creek	C	83		8	X
12061	Jackplane	C	2,664		266	X
02394	Jeep Trail	C	200		20	X
02320	Jeffers Draw	C	39		6	X
12158	Jiggs Reservoir	C	117		28	X
02257	Jim Crow Creek	C	597		113	X
02460	Johnson Creek	C	354		31	
02401	Johnson Draw	C	2,288		232	
02382	Jones Draw	C	40		6	
02447	K Ranch	C	1,361		187	
12148	Kaycee L and L	C	761		43	
02251	Keathley Draw	C	385		39	X
12178	Kendrick	M	5,351		874	X
02277	Keyes Draw	C	79		9	X
22202	Kingsbury/ Wild Horse	C	160		32	X
12038	Kline Draw	C	400		43	X
12056	Kurtley Draw	C	1,277		135	
02364	Lanabaugh No. 4 Draw	C	40		10	
02301	Larey Draw	C	2,310		385	X
02347	Lariat	C	200		20	
22108	Larrechea	C	280		48	X
12190	Lawrence Charles	C	2838		285	X
12188	Lawrence Land Co. Inc	C	165		19	X
12023	Lawver	M	4646		815	X
12194	Legerski Ranch	C	359		72	
02325	Linch	C	1441		173	X
12197	Linch	C	80		15	
02305	Linn Draw	C	1440		236	X
12198	Little Bighorn Ranch	C	40		8	
12233	Little Cedar Draw	C	200		28	X
32007	Little Poison Creek	C	2244		218	
02358	Little Powder River	M	3711		750	X
02279	Little Rawhide	C	40		10	X
02310	Little Willow	I	6080	AMP Implemented	823	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02307	Little Youngs Creek	C	169		34	X
22123	Lone Tree	C	40		7	X
02343	Long Draw	C	719		99	X
02466	Lower Willow Glen	C	80		11	
02355	LX Bar	C	1,230		126	X
02368	Mark Gordon	C	1,282		132	X
02445	Marton	C	41		7	
02309	Mary Straatsma Est.	C	40		6	X
22221	Maycock Draw	I	719		72	X
02406	Mayer	C	98		12	X
02346	Mayor	C	3,157		384	
12032	Mayoworth S. of SDW	C	240		20	X
02370	Meadow Creek	M	2,355		248	X
02303	Meadow Draw	C	160		16	
12227	Michelena	M	3,405	AMP Proposed	348	X
22055	Mickelberry Creek	C	160		16	
12030	Middleberry Draw	C	1,778		178	
14952	Mitchell Breaks	M	2,268	AMP Implemented	391	
02429	Mitchell Draw	M	4,306		419	X
12140	Montgomery	C	1,861		204	X
00749	Moore Reservoir	C	40		8	X
12235	Moore, James R	C	3,971		782	X
02408	Moriarty, Jack L.	C	40		8	X
02435	Morris Draw	C	1,272		144	X
22029	Mosier Gulch	M	160		41	
02373	Mountain	I	8,390	AMP Implemented	778	X
02446	Mountain	C	1,846		223	
02449	Mountain (Elm)	C	241		35	
02338	Mountain East	C	260		26	
02367	Mud Spring Creek	C	80		16	
22223	Muddy Creek	C	40		18	
22128	Mumma Draw	C	240		54	X
02354	Murray Draw	C	40		8	X
02362	N Fork 9 Mile Creek	C	283		40	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02431	N Gray Cabin Creek	C	723		87	X
32014	N Windmill	I	2,074	AMP Implemented	276	X
02418	N. Fork Powder R.	C	212		34	
02340	N. Leiter	C	117		40	X
02444	N. Scotch	C	201		83	
02092	N. Cottonwood Cr.	C	79		23	X
02348	Napier	M	3,242		529	X
12095	Neil Butte	C	40		6	X
12238	Niedringhaus Lambert	C	440		24	
02425	Ninemile	C	40		5	X
12081	Nipple Butte	C	1,928		389	X
02239	Norfolk John	M	1,840		299	
22119	North Mitten	C	103		21	X
02363	North Ridge	C	335		57	
02295	North Trabing	M	560		78	
02436	North-West Iberlin	C	320		32	X
22008	Number Two Draw	C	1,078		170	X
02457	OK Creek	C	2,302	AMP Implemented	216	X
02390	Olmstead	I	832		179	X
02058	Olsen Draw	C	4,862		592	X
02249	Osborn	C	280		39	X
02287	Padlock Ranch Co.	C	440		88	X
12068	Pass Reservoir	C	1,225		118	X
02405	Peterson Draw	C	2,736		335	X
12156	Petrified Tree	M	1,867		218	X
12159	Phinney Draw	C	878		91	X
02413	Pine Ridge	C	720		76	X
12166	Pine Ridge	C	240		49	
02454	Pine Ridge	C	320		27	X
02256	Pinette Draw	C	200		48	X
12229	Piney Creek	C	40		7	X
02252	Ploesser	C	385		38	X
02472	Plosser	C	415		47	X
02441	Plum Creek Draw	C	390		84	X
32012	Pointed Butte	C	40		11	X
12195	Poison Creek	M	1,315		148	
02419	Poker Creek	I	3,697	AMP Implemented	837	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02404	Pollard Draw	C	798		79	
02430	Powder River	I	4,526	AMP Implemented	944	X
02260	Powder River Ranch	I	17,085		1,779	X
02422	Prairie Creek	C	38		13	X
02350	Prong	C	534		92	X
12164	Prong Spotted Horse	C	2,129		271	X
2226	Pugsley Hill	C	40		6	X
12138	Pumpkin Creek	I	13,325		1,454	X
12172	Quinn, John, Bonnie	C	40		7	X
02264	Rafter L	C	1,514		238	X
02266	Ramsbottom	M	7,189		430	X
02319	Rattlesnake Creek	C	40		12	X
12098	Rattlesnake Spring	C	432		46	X
12040	RBL	C	360		43	X
12171	Read Draw	C	40		4	
02269	Reculusa	C	160		42	
12051	Red Canyon	C	2,264		270	X
02365	Red Draw	M	2,115		128	
12033	Red Fork	I	10,000	AMP Implemented	917	X
02409	Red Fork Mtn Camp	C	203		7	
02253	Red Hills	C	759		127	X
02416	Red Wall	C	459	AMP Implemented	78	X
02271	Reece Ernest	M	2,715		414	X
02330	Reel	C	40		6	X
02275	Remington Creek	M	2,676	AMP Implemented	290	X
02385	Reno	C	160		16	
02268	Reno Draw	C	558		63	X
22205	Robinson Draw	C	69		9	
12155	Robinson Place	C	630		68	X
02329	Rochelle Hills	C	80		12	
12087	Rock Ridge	C	1,360		93	
02321	Rocky Butte	C	2,075		367	X
12118	Rosie Draw	C	200		29	
02491	Rossnecker Draw	C	42		6	X
02278	Rourke & Offutt	C	477		125	X
02263	Rozet	C	40		8	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02465	Ryan	C	160		46	X
02259	S. Wyodak	C	120		32	X
02386	S. Fork Otter Creek	C	120		17	
22203	S. Leiter	C	1,457		146	X
02372	S.F. Crazy Woman	C	80		14	
02281	S.F. Three Bar	C	215		43	X
22110	Sahara Draw	C	120		20	
02411	Salt Creek	M	4,249		551	X
02272	Sand Rock/Hoe Creek	C	74		11	
00743	Sawmill	C	240		12	
12185	Schiermiester	C	800		114	X
22122	School Sec Dr/Mdlfrk	C	160		27	X
12073	School Section Draw	C	478		43	X
22214	Schoonover Ranch	I	12,482	AMP Implemented	1,528	X
12137	Scotch	C	200		10	
02353	Scott Draw	C	306		32	X
02286	Scott Marion	C	560		124	X
12083	Scotty Draw	C	4,500		624	X
02276	Se of Buffalo Creek	C	1140		152	X
02369	Senff Ditch	C	80		13	X
02463	SF Holler Draw	C	280		26	X
02375	S. Fork Arkansas Creek	C	200		36	
02292	Simpson, John H	C	1,156		198	X
02471	Sioux Battle	C	241		26	
02459	Sippie Mine	C	250		53	X
02291	Skidmore Estate	C	26		9	
02371	Slope	I	3,960	AMP Implemented	1,044	X
02399	Slope/ Mountain	C	2,032		256	
02297	Smith	C	322		34	
02300	Smith	C	120		23	X
32010	Smith Creek	C	160		10	X
02383	Smith Cut	C	3,235		615	X
02294	Soldier Creek Ranch	C	1,343		229	
02495	Sony Draw	M	5,101		513	X

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02498	South Carpenter Draw	C	240		2	X
02451	South Fork	I	7,433		726	X
02389	South Fork Powder R.	M	4,890		380	X
02280	South Middle Butte	C	639		67	X
12183	South Middle Prong	C	640		73	X
02467	South Sussex Stkrst	C	27		14	
00744	South Tabletop	C	120		15	
02296	South Trabing	M	1,039		111	X
02351	South Twin Creek	C	200		33	X
22220	Spellman	C	1,278		163	X
02477	Spotted Horse Creek	C	961		105	X
02241	Spring Creek	C	1,231		287	X
22025	Squaw Butte	C	40		11	X
02298	Squaw Creek	M	2,566		289	X
02255	Stateline	C	71		18	X
12131	Steel Creek	C	200		20	
02308	Stephenson, Marie	C	80		20	
02387	Stone Draw	C	80		20	X
12160	Stotts Draw	C	1,934		193	
02312	Stuart, James R.	C	80		16	X
02403	Stubbs Draw	C	493	AMP Implemented	69	
02313	Suel Anna Trustee	C	200		40	
12167	Sussex Cutoff	I	1,318		105	
12133	Sussex Oil Company	C	920		46	
02420	Sussex Stockrest	I	305		50	
02316	Swartz, Edward H.	M	2,480		621	X
02438	T.W.	I	1,840	AMP Implemented	184	X
12141	Tabletop	C	80		8	
12145	Tarver Trust	C	689		128	X
02458	TD Southwest	C	120		20	X
02333	Thom Brothers	C	31		4	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
02349	Three Mile Creek	C	441		90	X
12101	Threemile Creek Reservoir	C	80		18	
02337	Throne John and Earl	C	120		24	X
02432	Timar East	C	1,122		116	X
12199	Timber Draw	C	74		10	X
02494	Tipperary	C	360		38	X
22213	Tongue River	I	1,767	AMP Implemented	476	X
02339	Trail Creek	M	7,244		2,624	X
02417	Trail Side	C	40		14	
12043	Trough Draw	C	760		34	X
00697	Truman Draw	M	2,032		347	X
02282	TTT	M	14,155		1,563	X
02456	Tuttle Draw	C	320		92	X
02470	Tuttle Draw/ Deep Crk	C	554		154	X
12187	Twenty Mile Creek	I	6,100		808	X
12142	Tyree Place	C	40		8	
02448	Upper Cabin Creek	C	240		43	X
02273	Upper Fort Creek	C	920		205	X
12152	Upper Grub	C	1,340		164	X
12207	Upper Kaufman Draw	M	1,920		262	X
12163	Ute Creek	C	117		17	
02284	V Bar F	M	2,797		364	X
02345	Vanderhoff	C	360		26	
02311	Vanhouten	M	1,057		107	X
12077	W. Sussex (Hickey)	I	3,320		483	
02381	Wagensen Don et al	C	80		20	X
22106	Wagonhammer	M	3,881	AMP Implemented	1,352	X
02492	Walker Draw	C	440		48	X
12146	Wall (East)	C	1840		247	
22104	Walsh	C	340		34	
02304	Washout Dr.	M	1,859		315	X
02318	Water Gap Draw	M	9,043		1,127	X
02356	Watt ranch	C	46		6	

Allotment Number	Allotment Name	Management Category	Total Federal Acres	Management Type	Active Preference	All or a portion of the Federal acres are within 4.0 Miles of a Greater Sage-Grouse Lek
12181	West Bowman Hill	C	2,311		522	X
02490	West Coutant Creek	C	80		14	
02462	West Fork	C	240		26	X
12091	West Timber Creek	C	240		32	X
02170	West Timber Draw	C	960		100	X
12063	Weston SW	M	4,435		829	X
02326	White Rock	C	440		58	X
02247	White Tail Creek	C	200		62	X
12237	Whitetail Creek	M	3,391		751	X
22222	Whitetail Pines	M	1,493		299	X
02455	Whitmeyer	C	120		21	
02302	Whitmeyer Creek	C	40		6	
12082	Wild Horse Creek	C	120		24	
32015	Wild Horse Creek	C	80		8	X
02283	Wildcat	C	80		16	X
10069	Willow Creek	I	26,822		4,412	X
12036	Willow Creek	C	2,715		462	X
02331	Winter Draw	C	40		6	
12216	Wolf Mountain	C	515		57	
02380	Wormwood Ranch	I	20,699	AMP Implemented	2,497	X
12042	Wyarno	C	120		24	
02334	Wythom Road	C	120		20	X
12150	Yellowhammer	M	1,776		206	X

Appendix F. Maps

Map 1. Surface Estate in the Planning Area

Map 2. Federal Mineral Estate in the Planning Area

Map 3. Physical Resources - Severe Erosion Hazard Soils - All Alternatives

Map 4. Physical Resources - Lands with 25 Percent Slope or Greater - All Alternatives

Map 5. Physical Resources - Lands with Poor Reclamation Suitability - All Alternatives

Map 6. Physical Resources - Miscellaneous Soil Types - All Alternatives

Map 7. Physical Resources - Cave and Karst Formations - All Alternatives

Map 8. Mineral Resources - Locatable - Existing and Recommended Withdrawals - All Alternatives

Map 9. Mineral Resources - Locatable - Potential/Active Mining Areas - All Alternatives

Map 10. Mineral Resources - Salable - Mineral Materials Development Potential - All Alternatives

Map 11. Mineral Resources - Leasable - Coal - All Alternatives

Map 12. Mineral Resources - Leasable - Oil and Gas - Existing Leases - All Alternatives

Map 13. Mineral Resources - Leasable - Oil and Gas Constraints - Alternative A

Map 14. Mineral Resources - Leasable - Oil and Gas Constraints - Alternative B

Map 15. Mineral Resources - Leasable - Oil and Gas Constraints - Alternative C

Map 16. Mineral Resources - Leasable - Oil and Gas Constraints - Alternative D

Map 17. Mineral Resources - Fluid Minerals - Conventional Oil and Gas Potential and Well Locations - All Alternatives

Map 18. Mineral Resources - Fluid Minerals - Coalbed Natural Gas Potential - All Alternatives

Map 19. Biological Resources - Vegetation - All Alternatives

Map 20. Biological Resources - Forests and Woodlands - All Alternatives

Map 21. Biological Resources - Invasive Species Potential - All Alternatives

Map 22. Biological Resources - Fish and Wildlife - Streams with Fish Populations - All Alternatives

Map 23. Biological Resources - Fish and Wildlife - Elk Seasonal Ranges and Big Game Migration Corridors - All Alternatives

Map 24. Biological Resources - Fish and Wildlife - Sharp-tailed Grouse Leks - Alternatives A, B, and D

Map 25. Biological Resources - Fish and Wildlife - Raptors - Alternatives A and C

Map 26. Biological Resources - Fish and Wildlife - Raptors - Alternative B

Map 27. Biological Resources - Fish and Wildlife - Raptors - Alternative D

Map 28. Biological Resources - Special Status Species - Plants - All Alternatives

Map 29. Biological Resources - Special Status Species - Prairie Dog Colonies - All Alternatives

Map 30. Biological Resources - Special Status Species - Greater Sage-Grouse - Alternative A

Map 31. Biological Resources - Special Status Species - Greater Sage-Grouse - Alternative B

Map 32. Biological Resources - Special Status Species - Greater Sage-Grouse - Alternative C

Map 33. Biological Resources - Special Status Species - Greater Sage-Grouse - Alternative D

Map 34. Biological Resources - Special Status Species - Bald Eagle Roosts and Nests - All Alternatives

Map 35. Biological Resources - Special Status Species - Mountain Plover - All Alternatives

Map 36. Heritage and Visual Resources - Cultural Resources - Alternative A

Map 37. Heritage and Visual Resources - Cultural Resources - Alternative B

Map 38. Heritage and Visual Resources - Cultural Resources - Alternative D

Map 39. Heritage and Visual Resources - Cultural Sub-Regions - All Alternatives

Map 40. Heritage and Visual Resources - Potential Fossil Yield Classification - All Alternatives

Map 41. Heritage and Visual Resources - Visual Resource Management - Alternative A

Map 42. Heritage and Visual Resources - Visual Resource Management - Alternative B

Map 43. Heritage and Visual Resources - Visual Resource Management - Alternative C

Map 44. Heritage and Visual Resources - Visual Resource Management - Alternative D

Map 45. Land Resources - Forest Products - All Alternatives

Map 46. Land Resources - Disposal Lands - Alternative A

Map 47. Land Resources - Disposal Lands - Alternatives B, C, and D

Map 48. Land Resources - Renewable Energy - Alternative B

Map 49. Land Resources - Renewable Energy - Alternative D

Map 50. Land Resources - Rights-of-Way Corridors - Alternatives A and C

Map 51. Land Resources - Rights-of-Way Corridors - Alternatives B and D

Map 52. Land Resources - Preliminary Transportation Network

Map 53. Land Resources - Transportation Access - Alternative A

Map 54. Land Resources - Transportation Access - Alternative B

Map 55. Land Resources - Transportation Access - Alternative C

Map 56. Land Resources - Transportation Access - Alternative D

Map 57. Land Resources - Recreation - ERMA and SRMA - Alternative B

Map 58. Land Resources - Recreation - ERMA and SRMA - Alternative C

Map 59. Land Resources - Recreation - ERMA and SRMA - Alternative D

Map 60. Land Resources - Grazing Management - All Alternatives

Map 61. ACECs, BCBs, and LWCs - Alternative B

Map 62. ACECs, BCBs, and LWCs - Alternative D

Map 63. Special Designations - WSAs and WSRs - All Alternatives

Appendix G. Surface Disturbance and Reasonable Foreseeable Actions

This appendix includes tables that provide information on surface disturbance and reasonable foreseeable actions within the planning area. Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1672) and Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1676) provide foreseeable development project assumptions by resource. Table G.3, "RFA-2 Summary of Projected Acres of Surface Disturbance by Resource" (p. 1680) provides projected acres of surface disturbance by resource; the projected surface disturbances in Table G.3, "RFA-2 Summary of Projected Acres of Surface Disturbance by Resource" (p. 1680) are based on the project assumptions in Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1672) and Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1676).

Table G.1. RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Mineral Resources – CBNG				
Federal CBNG Well Projections				
Existing Productive Federal CBNG Wells				
Number of Existing Federal CBNG Wells	9,211	9,211	9,211	9,211
Projected Number of Abandoned Existing Federal CBNG Wells	9,211	9,211	9,211	9,211
Remaining Number of Existing Productive Federal CBNG Wells	0	0	0	0
Projected New Federal CBNG Wells				
Number of Projected New Federal CBNG Wells	903	101	5,280	2,721
Projected Number of Abandoned New Federal CBNG Wells	314	35	1,836	946
Projected Productive New Federal CBNG Wells	589	66	3,444	1,775
Projected Total Productive Federal CBNG Wells				
Remaining Number of Existing Productive Federal CBNG Wells	0	0	0	0
Projected Productive New Federal CBNG Wells	589	66	3,444	1,775
Total Number Productive Federal CBNG Wells	589	66	3,444	1,775
Non-federal CBNG Well Projections (State and Fee Minerals)				
Existing Productive Non-federal CBNG Wells				
Number of Existing Non-federal CBNG Wells	16,853	16,853	16,853	16,853
Projected Number of Abandoned Non-federal CBNG Wells	16,853	16,853	16,853	16,853
Remaining Number of Existing Productive Non-federal CBNG Wells	0	0	0	0

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Projected New Non-federal CBNG Wells				
Number of Projected New Non-federal CBNG Wells	4,987	4,987	4,987	4,987
Projected Number of Abandoned New Non-federal CBNG Wells	1,734	1,734	1,734	1,734
Projected Productive New Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Projected Total Productive Non-federal CBNG Wells				
Remaining Number of Existing Productive Non-federal CBNG Wells	0	0	0	0
Projected Productive New Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Total Number Productive Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Cumulative CBNG Productive Wells				
Total Number Productive Federal CBNG Wells	589	66	3,444	1,775
Total Number Productive Non-federal CBNG Wells	3,253	3,253	3,253	3,253
Total Productive CBNG Wells	3,842	3,319	6,697	5,028
Mineral Resources – Conventional Oil and Gas				
Federal Conventional Well Projections				
Existing Productive Federal Conventional Wells				
Number of Existing Federal Conventional Wells	2,189	2,189	2,189	2,189
Projected Number of Abandoned Existing Federal Conventional Wells	882	882	882	882
Remaining Number of Existing Productive Federal Conventional Wells	1,307	1,307	1,307	1,307
Projected New Federal Conventional Wells				
Number of Projected New Federal Conventional Wells	1,828	7	1,990	1,773
Projected Number of Abandoned New Federal Conventional Wells	92	1	100	88

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Projected Productive New Federal Conventional Wells	1,736	6	1,890	1,685
Projected Total Productive Federal Conventional Wells				
Remaining Number of Existing Productive Federal Conventional Wells	1,307	1,307	1,307	1,307
Projected Productive New Federal Conventional Wells	1,736	6	1,890	1685
Total Number Productive Federal Conventional Wells	3,043	1,313	3,197	2,992
Non-federal Conventional Well Projections (State and Fee Minerals)				
Existing Productive Non-federal Conventional Wells				
Number of Existing Non-federal Conventional Wells	1,944	1,944	1,944	1,944
Projected Number of Abandoned Non-federal Conventional Wells	727	727	727	727
Remaining Number of Existing Productive Non-federal Conventional Wells	1,217	1,217	1,217	1,217
Projected New Non-federal Conventional Wells				
Number of Projected New Non-federal Conventional Wells	1,875	1,875	1,875	1,875
Projected Number of Abandoned New Non-federal Conventional Wells	94	94	94	94
Projected Productive New Non-federal Conventional Wells	1,781	1,781	1,781	1,781
Projected Total Productive Non-federal Conventional Wells				
Remaining Number of Existing Productive Non-federal Conventional Wells	1,217	1,217	1,217	1,217
Projected Productive New Non-federal Conventional Wells	1,781	1781	1781	1781

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Total Number Productive Non-federal Conventional Wells	2,998	2,998	2,998	2,998
Cumulative Conventional Productive Conventional Wells				
Total Number Productive Federal Conventional Wells	3,043	1,313	3,197	2,992
Total Number Productive Non-federal Conventional Wells	2,998	2,998	2,998	2,998
Total Productive Conventional Wells	6,041	4,311	6,195	5,990
Cumulative Productive Wells				
Total Number Productive CBNG Federal Wells	589	66	3,444	1,775
Total Number Productive Conventional Federal Wells	3,043	1,313	3,197	2,992
Total Number Productive Federal Wells	3,632	1,379	6,641	4,767
Total Number Productive CBNG Non-federal Wells	3,253	3,253	3,253	3,253
Total Number Productive Conventional Non-federal Wells	2,998	2,998	2,998	2,998
Total Number Productive Non-federal Wells	6,251	6,251	6,251	6,251
Total Productive Wells	9,883	7,630	12,892	11,018

Table G.2. RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
PHYSICAL RESOURCES				
Cave and Karst				
Gating of Specific Caves	No Previous	2	0	0
Cave Inventory	No Previous	Entire field office	None	Entire field office
Interpretive Signs	No Previous	5	0	3
Cave Registers	No Previous	5	0	3
Cave Management Plans	No Previous	All caves	Specific caves	All caves
MINERAL RESOURCES				
Mineral Resources - Locatable				
Exploration for Locatable Minerals (numbers of Notices and acres disturbed)	4 Notices/2 acres	2 Notices/1 acre	11 Notices/5.25 acres	9 Notices/4.5 acres
Development of Locatable Minerals (numbers of POOs and acres disturbed)	4 POOs/554 acres	4 POOs/277 acres	11 POOs/1,455 acres	9 POOs/1,252 acres
Mineral Resources – Leasable Coal				
Exploration for Coal (number of licenses and acreage disturbed)	65 licenses/700 acres	60 licenses/600 acres	65 licenses/700 acres	65 licenses/700 acres
Development of Coal (number of leases and net acreage disturbed by mining, i.e., new disturbance – new reclamation)	28 new leases (106,400 acres) to existing mine operators, as well as 3 leases to operators developing coal outside the high development potential area for non conventional coal conversion processes.	28 new leases (106,400 acres) to existing mine operators.	28 new leases (106,400 acres) to existing mine operators, as well as 3 leases to operators developing coal outside the high development potential area for non conventional coal conversion processes.	28 new leases (106,400 acres) to existing mine operators, as well as 3 leases to operators developing coal outside the high development potential area for non conventional coal conversion processes.
Development of Coal by Non-conventional Means (in place conversion) – number of authorizations and new acreage disturbed	No authorization policy	0/0	20 authorizations/0	No authorization policy
Mineral Resources – Leasable Geothermal				
Geothermal Development (number of leases and acres)	0/0	0/0	0/0	0/0
Mineral Resources – Other Leasable Minerals				

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Development of Other Leasable Minerals (number of leases and acres)	0/0	0/0	0/0	0/0
Mineral Resources - Salable				
Exploration for Salable Minerals (numbers of exploration sites and acres disturbed)	4 exploration sites/2 acres	1 exploration site/0.43 acre	16 exploration sites/ 7.89 acres	9 exploration sites/ 4.5 acres
Development of Salable Minerals (numbers of disposal operations and acres disturbed)	61 operations/ 530 acres	27 operations/ 114 acres	240 operations/ 2,090 acres	137 operations/ 1,193 acres
FIRE AND FUELS MANAGEMENT				
Prescribed Fire (acreage)	14,000	3,500	42,000	14,000
Mechanical Fuels Management (acreage)	0	0	0	0
BIOLOGICAL RESOURCES				
Forests, Woodlands, and Forest Products				
Forest Products Sales (acreage)	200 to 300 acres annually or 4,000 to 6,000 acres for lifetime of plan or 20 years	10 to 50 acres annually or 200 to 1,000 acres for lifetime of plan or 20 years	800 to 1,200 acres annually or 16,000 to 24,000 acres for lifetime of plan or 20 years	800 to 1000 acres annually or 16,000-20,000 acres for the lifetime of the plan
Invasive Species (treatment acres based on disturbance for other resources)				
Range Improvement Projects (acreage)	8	34	17	24
Prescribed Fire (acreage)	420	2,800	12,600	420
BLM Road Maintenance (miles/acreage)	0.5 mile/4 acres	2 miles/12 acres	1 mile/7 acres	1 mile/7 acres
Forests and Woodlands (acreage)	120	100	1,200	1,000
Not Associated with any Surface Disturbance (acreage)	8,000	15,000	10,000	12,000
Federal Oil and Gas Well Activities (acreage)	Short term: 16,473 Long term: 4,250	Short term: 9,423 Long term: 3,212	Short term: 15,343 Long term: 5,412	Short term: 16,473 Long term: 4,250
Renewable Energy Projects (acreage)	2,020	4,040	16,080	6,060
Rights-of-way (miles/acreage)	274 miles/1,990 acres	150 miles/1,094 acres	406 miles/2,953 acres	274 miles/1,990 acres
Fish and Wildlife Resources				

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Wildlife Habitat Restoration and Enhancement: Mountain Mahogany (acreage)	0	8,714	0	8,714
Wildlife Habitat Restoration and Enhancement: Greater Sage-Grouse (acreage)	0	156,420	0	77,560
Watershed Restoration and Enhancement (acreage)	0	0	0	0
Stream Restoration, Structure Removal, and Other Fisheries Enhancements (number of sites and acreage)	80 structures in <1 mile of stream. (one site)/2 acres	20 sites/20 acres	0/0	20 sites/20 acres
HERITAGE AND VISUAL RESOURCES				
Paleontological				
Fossil Collection (acreage)	0	0	0	0
LAND RESOURCES				
Renewable Energy				
Wind-Energy Testing – MET Towers (number of sites and acreage)	200 sites/200 acres	50 sites/50 acres	200 sites/200 acres	80 sites/240 acres
Wind-Energy Development (number of sites and acreage)	20 sites/ up to 20,000 acres	5 sites/5,000 acres	20 sites/ up to 40,000 acres	30 sites/up to 75,000 acres
Rights-of-Way				
Communication Site Development (number of sites/acreage)	56 sites/28 acres	28 sites/5 acres	84 sites/38 acres	56 sites/28 acres
Powerline Development (number of sites and miles/acreage)	740 rights-of-way/ 1,000 miles/ 3,600 acres	500 rights-of-way/ 425 miles/ 1,546 acres	1,500 rights-of-way/ 1,200 miles/ 4,400 acres	740 rights-of-way/ 1,000 miles/ 3,600 acres
Pipeline Development – Total Number of Projects	1,400	400	2,000	1,400
Road Development (number of sites and miles/acres)	1,100 rights-of-way/ 1,725 miles/ 6,275 acres	550 rights-of-way/ 575 miles/ 2,090 acres	1,650 rights-of-way/ 2,300 miles/ 8,364 acres	1,100 rights-of-way/ 1,725 miles/ 6,275 acres
Compressor Stations (number of sites/acreage)	52 sites/200 acres	26 sites/38 acres	78 sites/114 acres	52 sites/76 acres
Travel and Transportation Management				

Type of Development	Alternative A	Alternative B	Alternative C	Alternative D
Road Maintenance (miles/acreage)	16.5 miles (Bar C, Billy Creek, Muir, Petrified Tree, and Weston West)/120 acres	16.5 miles (Bar C, Billy Creek, Muir, Petrified Tree, and Weston West)/120 acres	~ 20 miles (Bar C, Billy Creek, Muir, Petrified Tree, and Weston West and new developed routes)/145 acres	20 miles/145 acres
BLM Nonmotorized Trail Creation (miles/acreage)	9 miles/65 acres	2 miles/14 acres	7 miles (Burnt Hollow/Mosier Ext/Etc. Trails)/51 acres	7 miles/50 acres
BLM Public Access Road Creation (miles)	0 miles	1 mile	5 Miles (Middle Fork/other access roads)	5 miles
Recreation				
Campsites (number of sites/acreage)	0/0	0/0	10/20	8/16
Interpretive Sites (number of sites/acreage)	1/2	0/0	5/2.5	5/2.5
Other Facilities (number of sites/acreage)	3/3	0/0	3/3	3/3
Livestock Grazing Management				
Reservoir/Pit Development (number of sites/acreage)	0/0	0/0	0/0	0/0
Well Development (number of sites/acreage)	4/<1	4/<1	4/<1	6/<1
Spring Development (number of sites/acreage)	40/4	40/4	40/4	42/4
Fence Development (number of sites/miles)	100/100	150/150	150/150	200/200
Reservoir Conversion from CBNG Development/water disposal to Range Improvement (acreage)	150	150	150	150
BLM – Bureau of Land Management CBNG – Coalbed natural gas POO – Plan of Operations				

Table G.3. RFA-2 Summary of Projected Acres of Surface Disturbance by Resource

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
MINERAL RESOURCES				
Mineral Resources – Locatable Exploration				
Acres Disturbed from BLM Actions	2	1	5.25	4
Acres Reclaimed from BLM Actions	2	1	5.25	4
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	200	600	300	450
Acres Reclaimed from Non-BLM Actions	200	600	300	450
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mineral Resources – Locatable Development				
Acres Disturbed from BLM Actions	554	277	1,455	1,252
Acres Reclaimed from BLM Actions	144	72	378	329
Acres Long-Term Disturbance from BLM Actions	410	205	1,077	923
Acres Disturbed from Non-BLM Actions	7,789	23,368	11,684	17,525
Acres Reclaimed from Non-BLM Actions	2,025	6,076	3,038	4,556
Acres Long-Term Disturbance from Non-BLM Actions	5,764	17,292	8,646	12,969
Mineral Resources - Leasable Coal (It is assumed that the only solid leasable will be coal – all other solid leasable minerals activity is projected to be possible, but insignificant compared to coal activity over the planning horizon.)				
Acres Disturbed from BLM Actions	195,700	186,600	195,700	195,700
Acres Reclaimed from BLM Actions	120,700	120,600	120,700	120,700
Acres Long-Term Disturbance from BLM Actions (long-term mining facilities)[1]	75,000	66,000	75,000	75,000

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Disturbed from Non-BLM Actions	10,000	10,000	10,000	10,000
Acres Reclaimed from Non-BLM Actions	6,000	6,000	6,000	6,000
Acres Long-Term Disturbance from Non-BLM Actions (long-term mining facilities)[2]	4,000	4,000	4,000	4,000
Mineral Resources – Leasable Geothermal				
Acres Disturbed from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	0	0	0	0
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mineral Resources – Leasable Oil and Gas (Coalbed Natural Gas only)				
Acres Disturbed from BLM Actions	2,258	253	13,200	6,803
Acres Reclaimed from BLM Actions	903	101	5,280	2,721
Acres Long-Term Disturbance from BLM Actions	1,355	152	7,920	4,082
Acres Disturbed from Non-BLM Actions	12,468	12,468	12,468	12,468
Acres Reclaimed from Non-BLM Actions	4,987	4,987	4,987	4,987
Acres Long-Term Disturbance from Non-BLM Actions	7,481	7,481	7,481	7,481
Mineral Resources – Leasable Oil and Gas (Conventional only)				
Acres Disturbed from BLM Actions	8,317	33	9,055	8,066
Acres Reclaimed from BLM Actions	5,575	22	6,070	5,406

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Long-Term Disturbance from BLM Actions	2,742	11	2,985	2,660
Acres Disturbed from Non-BLM Actions	8,531	8,531	8,531	8,531
Acres Reclaimed from Non-BLM Actions	5,719	5,719	5,719	5,719
Acres Long-Term Disturbance from Non-BLM Actions	2,812	2,812	2,812	2,812
Mineral Resources – Salable Exploration				
Acres Disturbed from BLM Actions	2	0.43	7.89	4.5
Acres Reclaimed from BLM Actions	2	0.43	7.89	4.5
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	200	600	300	450
Acres Reclaimed at Non-BLM Actions	200	600	300	450
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mineral Resources – Salable Development				
Acres Disturbed from BLM Actions	530	114	2,090	1,193
Acres Reclaimed from BLM Actions	99	21	392	224
Acres Long-Term Disturbance from BLM Actions	431	93	1,698	969
Acres Disturbed from Non-BLM Actions	4,568	13,704	6,852	10,728
Acres Reclaimed at Non-BLM Actions	1,188	3,564	1,782	3,123
Acres Long-Term Disturbance from Non-BLM Actions	3,380	10,140	5,070	7,605
FIRE AND FUELS MANAGEMENT				
Prescribed Fire				
Acres Treated from BLM Actions	14,000	3,500	42,000	14,000

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Reclaimed from BLM Actions	14,000	3,500	42,000	14,000
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	2,000	2,000	2,000	2,000
Acres Reclaimed from Non-BLM Actions	2,000	2,000	2,000	2,000
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Wildfire – Active Rehabilitation (fire lines, etc.)				
Acres Treated from BLM Actions	27,596	27,596	27,596	27,596
Acres Reclaimed from BLM Actions	27,596	27,596	27,596	27,596
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	139,042	139,042	139,042	139,042
Acres Reclaimed from Non-BLM Actions	139,042	139,042	139,042	139,042
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Mechanical Fuels Treatment				
Acres Treated from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	3,200	3,200	3,200	3,200
Acres Reclaimed from Non-BLM Actions	3,200	3,200	3,200	3,200
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
BIOLOGICAL RESOURCES				
Forests, Woodlands, and Forest Products				

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Treated from BLM Actions	200 to 300 acres annually or 4,000 to 6,000 acres for lifetime of plan	10 to 50 acres annually or 200 to 1,000 acres for lifetime of plan	800 to 1,200 acres annually or 16,000 to 24,000 acres for lifetime of plan	800 to 1,000 acres annually or 16,000-20,000 acres for the lifetime of the plan
Acres Reclaimed from BLM Actions	200 to 300 acres annually or 4,000 to 6,000 total acres	10 to 50 acres annually or 200 to 1,000 total acres	800 to 1,200 acres annually or 16,000 to 24,000 total acres	800 to 1,000 acres annually or 16,000-20,000 acres for the lifetime of the plan
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	4,055	2,832	80,910	10,000
Acres Reclaimed from Non-BLM Actions	4,055	2,832	80,910	10,000
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Invasive Species				
Acres Treated Disturbance from BLM Actions	8,000	15,000	10,000	12,000
Acres Reclaimed from BLM Actions	7,000	13,000	8,500	10,500
Acres Long-Term Disturbance from BLM Actions	1,000	2,000	1,500	1,500
Acres Treated from Non-BLM Actions	40,000	70,000	55,000	63,000
Acres Reclaimed from Non-BLM Actions	38,000	66,000	52,000	59,500
Acres Long-Term Disturbance from Non-BLM Actions	2,000	4,000	3,000	3,500
Fish and Wildlife Resources				
Wildlife Habitat Enhancements Activities				
Acres Treated from BLM Actions	0	165,134	0	86,274
Acres Reclaimed from BLM Actions	0	165,134	0	86,274
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Treated from Non-BLM Actions	1,414,888	1,414,888	1,414,888	1,414,888
Acres Reclaimed from Non-BLM Actions	1,414,888	1,414,888	1,414,888	1,414,888

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Fisheries, Watershed, and Stream Enhancement Activities				
Miles/Acres Treated from BLM Actions	1.5/20	10/12	0	1.5/20
Acres Reclaimed from BLM Actions	20	12	0	20
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Miles/Acres Treated from Non-BLM Actions	12/145	81/980	0	12/145
Acres Reclaimed from Non-BLM Actions	145	980	0	145
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
HERITAGE AND VISUAL RESOURCES				
Paleontological				
Acres Disturbed from BLM Actions	100	200	100	100
Acres Reclaimed from BLM Actions	100	200	100	100
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	900	1,800	900	900
Acres Reclaimed from Non-BLM Actions	900	1,800	900	900
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
LAND RESOURCES				
Renewable Energy - Wind-Energy Development				
Acres Disturbed from BLM Actions	20,000	5,000	40,000	240 acres MET Towers (3 year disturbance) and 75,000 acres wind towers and infrastructure
Acres Reclaimed from BLM Actions	17,500	4,500	22,500	240 acres MET Towers and 50,000 acres for buried power and staging

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres of Long-Term Disturbance from BLM Actions	2,500	500	17,500	25,000
Acres Disturbed from Non-BLM Actions	161,818	40,455	323,636	161,818
Acres Reclaimed from Non-BLM Actions	141,591	36,409	182,046	141,591
Acres of Long-Term Disturbance from Non-BLM Actions	20,227	4,046	141,590	20,227
Rights-of-Way (ROW)				
Pipelines (Mineral and Water)				
Acres Disturbed from BLM Actions	14,000	5,750	20,000	14,000
Acres Reclaimed from BLM Actions	14,000	5,750	20,000	14,000
Acres of Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	113,272	46,522	161,818	113,272
Acres Reclaimed from Non-BLM Actions	113,272	46,522	161,818	113,272
Acres of Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Roads				
Miles/Acres Disturbed from BLM Actions	1,725/18,550	575/9,275	2,300/27,825	1,035/18,550
Miles/Acres Reclaimed from BLM Actions	500/7,049	125/2,690	800/12,800	250/5,750
Miles/Acres of Long-Term Disturbance from BLM Actions	1,225/11,501	450/6,585	1,500/15,025	785/12,800
Acres Disturbed from Non-BLM Actions	150,086	75,043	225,130	150,086
Acres Reclaimed from Non-BLM Actions	57,033	21,765	103,564	46,523

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres of Long-Term Disturbance from Non-BLM Actions	93,054	53,279	121,566	103,564
Powerlines				
Miles/Acres Disturbed from BLM Actions	1,000/4,916	425/2,458	1,200/7,374	1,000/4,916
Miles/Acres Reclaimed from BLM Actions	100/491	42.5/245	120/737	100/491
Miles/Acres of Long-Term Disturbance from BLM Actions	900/4,425	382.5/2,213	1,080/6,637	900/4,425
Acres Disturbed from Non-BLM Actions	39,775	19,887	59,662	39,775
Acres Reclaimed from Non-BLM Actions	3,973	1,982	5,963	3,973
Acres of Long-Term Disturbance from Non-BLM Actions	35,802	17,905	53,699	35,802
Communication Sites				
Acres Disturbed from BLM Actions	56	28	84	56
Acres Reclaimed from BLM Actions	0	0	0	20
Acres of Long-Term Disturbance from BLM Actions	56	28	84	36
Acres Disturbed from Non-BLM Actions	453	227	680	453
Acres Reclaimed from Non-BLM Actions	0	0	0	162
Acres of Long-Term Disturbance from Non-BLM Actions	453	227	680	291
Compressor Sites				
Acres Disturbed from BLM Actions	200	100	300	200
Acres Reclaimed from BLM Actions	0	0	0	40

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres of Long-Term Disturbance from BLM Actions	200	100	300	160
Acres Disturbed from Non-BLM Actions	1,618	809	2,427	1,618
Acres Reclaimed from Non-BLM Actions	0	0	0	324
Acres of Long-Term Disturbance from Non-BLM Actions	1,618	809	2,427	1,295
Other Facilities				
Acres Disturbed from BLM Actions	1,040	400	1,500	1,040
Acres Reclaimed from BLM Actions	620	200	750	620
Acres of Long-Term Disturbance from BLM Actions	420	200	750	420
Acres Disturbed from Non-BLM Actions	8,415	3,236	12,136	8,415
Acres Reclaimed from Non-BLM Actions	5,016	1,618	6,068	5,016
Acres of Long-Term Disturbance from Non-BLM Actions	3,398	1,618	6,068	3,398
Travel and Transportation Management				
Nonmotorized Trails				
Miles/Acres Disturbed from BLM Actions	9/65	2/15	7/51	9/65
Miles/Acres Reclaimed from BLM Actions	0/0	0/0	0/0	0/0
Miles/Acres Long-Term Disturbance from BLM Actions	9/65	2/15	7/51	9/65
BLM Public Access Road Creation				
Miles/Acres Disturbed from BLM Actions	0/0	1/7	5/36	2/15
Miles/Acres Reclaimed from BLM Actions	0/0	0/0	0/0	0/0

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Miles/Acres Long-Term Disturbance from BLM Actions	0/0	1/7	5/36	2/15
BLM Public Access Road Reclamation[3]				
Miles/Acres Disturbed from BLM Actions	0/0	0/0	0/0	0/0
Miles/Acres Reclaimed from BLM Actions	0/0	5/36	2/15	5/36
Miles/Acres Long-Term Disturbance from BLM Actions	0/0	0/0	0/0	0/0
Recreation				
Recreational Site Development				
Acres Disturbed from BLM Actions	5	5	20	20
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	5	5	20	20
Livestock Grazing Management				
Spring Development				
Acres Disturbed from BLM Actions	4	4	4	4
Acres Reclaimed from BLM Actions	2	2	2	2
Acres Long-Term Disturbance from BLM Actions	2	2	2	2
Acres Disturbed from Non-BLM Actions	1	1	1	1
Acres Reclaimed from Non-BLM Actions	0.5	0.5	0.5	0.5
Acres Long-Term Disturbance from Non-BLM Actions	0.5	0.5	0.5	0.5
Pipeline Development				
Acres Disturbed from BLM Actions	40	40	40	40
Acres Reclaimed from BLM Actions	35	35	35	35

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Long-Term Disturbance from BLM Actions	5	5	5	5
Acres Disturbed from Non-BLM Actions	20	20	20	20
Acres Reclaimed from Non-BLM Actions	18	18	18	18
Acres Long-Term Disturbance from Non-BLM Actions	2	2	2	2
Reservoir/Pit Development				
Acres Disturbed from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	0	0	0	0
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
Fence Development				
Miles/Acres Disturbed from BLM Actions	80/70	120/100	120/100	150/38
Miles/Acres Reclaimed from BLM Actions	57/50	84/70	84/70	140/35
Miles/Acres Long-Term Disturbance from BLM Actions	23/20	36/30	36/30	10/3
Miles/Acres Disturbed from Non-BLM Actions	20/15	30/25	30/25	50/13
Miles/Acres Reclaimed from Non-BLM Actions	13/10	24/20	24/20	45/11
Miles/Acres Long-Term Disturbance from Non-BLM Actions	7/5	6/5	6/5	5/2
Well Development				
Acres Disturbed from BLM Actions	<1	<1	<1	<1

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	<1	<1	<1	<1
Acres Disturbed from Non-BLM Actions	<1	<1	<1	<1
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	<1	<1	<1	<1
Reservoir Maintenance Development				
Acres Disturbed from BLM Actions	0	0	0	0
Acres Reclaimed from BLM Actions	0	0	0	0
Acres Long-Term Disturbance from BLM Actions	0	0	0	0
Acres Disturbed from Non-BLM Actions	0	0	0	0
Acres Reclaimed from Non-BLM Actions	0	0	0	0
Acres Long-Term Disturbance from Non-BLM Actions	0	0	0	0
CUMULATIVE DISTURBANCE[4]				
Total Acres Disturbed from BLM Actions	322,026	422,903	422,544	486,957
Total Acres Reclaimed from BLM Actions	221,888	344,752	291,923	358,871
Total Acres Long-Term Disturbance from BLM Actions	100,138	78,152	130,621	128,086
Total Acres Disturbed from Non-BLM Actions	2,123,460	1,890,239	2,531,611	2,168,799
Total Acres Reclaimed from Non-BLM Actions	1,943,463	1,766,623	2,174,564	1,965,851
Total Acres Long-Term Disturbance from Non-BLM Actions	179,998	123,617	357,048	202,949

Type of Disturbance	Alternative A	Alternative B	Alternative C	Alternative D
Cumulative Long-Term Acres of Disturbance	280,135	201,768	487,669	331,035

[1]Of the 75,000 acres of long-term disturbance from BLM actions for alternatives A, C, and D, 45,500 acres are part of the active mine. Of the 66,000 acres of long-term disturbance from BLM actions for Alternative B, 36,500 acres are part of the active mine. The remaining long-term disturbance acreage for all alternatives includes buildings and processing areas.
[2]Of the 4,000 acres of long-term disturbance from non-BLM actions for all alternatives, 2,500 acres are part of the active mine. The remaining long-term disturbance acreage for all alternatives includes buildings and processing areas.
[3]Represents the projected reclamation of existing roads in the planning area. As such, there is no long-term disturbance anticipated from this action. The projected acres reclaimed from this action are not included in the cumulative disturbance acreages.
[4]Numbers may not add up due to rounding.

BLM Bureau of Land Management

Appendix H. Fluid Mineral Lease Stipulations and Process for Exceptions, Modifications, and Waivers

H.1. Introduction

The Resource Management Plan (RMP) determines which areas of the planning area are open to fluid mineral leasing, including the constraints or conditions open areas are subject to, and which areas are closed to fluid mineral leasing. The Preferred Alternative (Alternative D) proposes to close the following areas to mineral leasing: Wilderness Study Areas, recommended Wild and Scenic Rivers, certain Special Recreation Management Areas (Burnt Hollow, Dry Creek Petrified Tree, Middle Fork Powder River, Mosier Gulch, and Hole-in-the-Wall), lands with wilderness characteristics, and the Fortification Creek Area of Critical Environmental Concern.

In areas open to leasing the Bureau of Land Management (BLM) may impose lease stipulations. A lease stipulation is a condition of lease issuance that provides a level of protection for other resource values or land uses by restricting lease operations during certain times or locations or to avoid unacceptable impacts, to an extent greater than standard lease terms or regulations. These resource values and land uses generally include wildlife, soil, water, recreation, visual, and cultural resources. A stipulation is an enforceable term of the lease contract, supersedes any inconsistent provisions of the standard lease form, and is attached to and made a part of the lease. Lease stipulations further implement the BLM's regulatory authority to protect resources or resource values. Lease stipulations are developed through the land use planning process.

Exceptions, waivers, and modifications provide an effective means of applying "Adaptive Management" techniques to oil and gas leases and associated permitting activities to meet changing circumstances. The criteria for approval of exceptions, waivers, and modifications should be supported by National Environmental Policy Act (NEPA) analysis, either through the land use planning process or site-specific environmental review.

This appendix identifies fluid mineral lease stipulations and addresses the procedure for providing exceptions, modifications, and waivers of lease stipulations. Procedures for changing Conditions of Approval (COAs) placed on surface disturbance and disruptive activity authorizations to protect resource values are the same.

Definitions

The three types of surface stipulations the BLM applies are: (1) no surface occupancy (NSO), (2) timing limitation stipulation (TLS), and (3) controlled surface use (CSU).

- **NSO:** Use or occupancy of the land surface for fluid mineral exploration or development is prohibited in order to protect identified resource values. The minerals under NSO lands may potentially be developed by directionally or horizontally drilling from nearby lands that do not have the NSO limitation.
- **TLS:** Prohibits surface use during a specified time period to protect identified resource values. (Seasonal Restriction)

- **CSU:** Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify lease rights

The BLM cannot apply an NSO stipulation after oil and gas lease issuance, but can apply TLS and CSU restrictions as COAs after the oil and gas lease has been issued.

An applicant may request an exception, modification, or waiver of a stipulation or restriction included in a lease or applied as a COA.

- **Exception:** A one-time exemption to a lease stipulation or COA determined on a case-by-case basis.
- **Modification:** A change to the provisions of a lease stipulation, either temporarily or for the term of the lease.
- **Waiver:** A permanent exemption to a lease stipulation.

H.2. Lease Stipulations

The following table lists the fluid mineral lease stipulations and exception, modification, and waiver criteria for those stipulations included under the BLM's Preferred Alternative (Alternative D). Table H.1, "Lease Stipulations and Exception, Modification, and Waiver Criteria" (p. 1694) describes the stipulation (NSO, TLS, and CSU), identifies the applicable management action to which the stipulation applies, discloses the approximate acreage to which the stipulation applies, and the criteria for considering exceptions, modifications, and waivers.

Table H.1. Lease Stipulations and Exception, Modification, and Waiver Criteria

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Soil-1004	CSU	Soil: severe erosion hazard	669,739	Surface disturbance is restricted on soils with a severe erosion hazard rating. Controlled Surface Use (CSU) (1): (a) Prior to surface disturbance on soils with a severe erosion hazard rating a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the Bureau of Land Management (BLM) by the applicant as a component of the Application for Permit to Drill (APD) (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● The disturbed area will be stabilized with no evidence of accelerated erosion features. ● The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. ● Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				● The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SURGO) Order 3 soil survey and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on soils with a severe erosion hazard rating in order to meet the standards outlined in, Chapter 6 the BLM's Oil and Gas Gold Book, as revised, and the 2014 Buffalo Field Office (BFO) Resource Management Plan (RMP) Record of Decision (ROD). **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above or a BLM evaluation determines that the affected soils do not meet the severe erosion hazard rating criteria. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a NRCS soil survey or BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. **Waiver:** The BLM authorized officer determines that the entire lease area does not include soils with severe erosion hazard. This determination shall be based upon NRCS mapping and/or BLM evaluation of the area.
Soil-1006	CSU	Soil: slopes greater than 25% and less than 50%	170,590 acres	Surface disturbance is restricted on slopes greater than 25% and less than 50%. CSU (1): (a) Prior to surface disturbance on slopes greater than 25% and less than 50% a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The Plan must include designs approved and stamped by a licensed engineer. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● Slope stability is maintained preventing slope failure or mass wasting. ● The disturbed area will be stabilized with no evidence of accelerated erosion features. ● The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				site with regard to erosional features to maintain soil productivity and sustainability. ● Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. ● The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the U.S. Geological Survey (USGS) 1:24,000 scale topographic maps, USGS Digital Elevation Models, and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on slopes greater than 25% and less than 50% in order to meet the standards outlined in Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2014 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above, or a BLM evaluation determines that the disturbed area is not located on slopes greater than 25% but less than 50%. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation of the area. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. **Waiver:** The BLM authorized officer determines that the entire lease area does not include slopes greater than 25% but less than 50%. This determination shall be based upon USGS mapping and/or BLM evaluation of the area.
Soil-1006	NSO	Soil: slopes greater than 50%	45,570	No surface occupancy or use is allowed on slopes greater than 50%. On the lands described below: No Surface Occupancy (NSO) (1) as mapped by the USGS 1:24,000 scale topographic maps, USGS Digital Elevation Models, and/or as determined by a BLM evaluation of the area. For the purpose of: NSO (2) preventing mass slope failure and accelerated erosion. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a mass slope failure or accelerated erosion. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				of the area. The stipulation may be modified based on negative or positive monitoring results from similar actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area does not include slopes greater than 50%. This determination shall be based upon USGS mapping and/or BLM evaluation of the area.
Soil-1008	Lease Notice	Soil: poor reclamation suitability	1,514,445 acres	Apply a lease notice on soils with poor reclamation suitability identifying that reclamation may be challenging and that construction, stabilization, and reclamation plans are required to ensure successful reclamation and erosion control.
Soil-1010	CSU	Soil: limited reclamation potential areas	685,950 acres	Surface disturbance is prohibited or restricted on limited reclamation potential areas such as areas possessing sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock outcrops, and slopes susceptible to mass failure. CSU (1): (a) CSU (1): (a) Prior to surface disturbance on limited reclamation potential areas a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The Plan must include designs approved and stamped by a licensed engineer. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● The disturbed area will be stabilized with no evidence of accelerated erosion features. ● The disturbed area shall be managed to ensure soil characteristics approximate an appropriate reference site with regard to erosional features to maintain soil productivity and sustainability. ● Slope stability is maintained preventing slope failure and erosion. ● Sufficient viable topsoil is maintained for ensuring successful final reclamation. At locations where interim reclamation will be completed, this will be accomplished by respreading all salvaged topsoil over the areas of interim reclamation. ● The original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. On the lands described below: CSU (2) as mapped by the NRCS SSURGO Order 3 soil survey and as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring successful reclamation and erosion control on limited reclamation potential areas in order to meet the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2014 BFO RMP ROD.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Exception: The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above or a BLM evaluation determines that the area does not meet the limited reclamation criteria. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a NRCS soil survey and BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. **Waiver:** The BLM authorized officer determines that the entire lease area does not include limited reclamation potential areas. This determination shall be based upon NRCS mapping and BLM evaluation.
Water-1014	CSU	Water: surface waters	95,172 acres	Surface disturbance is restricted within 500 feet of springs, non-Coalbed Natural Gas (CBNG) reservoirs, water wells, and perennial streams. CSU (1): (a) CSU (1): (a) Prior to surface disturbance within 500 feet of springs, non-CBNG reservoirs, water wells, and perennial streams a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● storm water and surface runoff will be controlled to minimize erosion (rilling, gullying, piping, mass wasting) and offsite siltation during construction, use/operations, and reclamation. ● offsite areas will be protected from accelerated soil erosion. ● the original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. CSU (2) as mapped by the USGS National Hydrologic Inventory and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring protection of surface waters and associated riparian habitats by meeting the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2014 BFO RMP ROD. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Modification: The BLM authorized officer may modify the area subject to the stipulation based upon a USGS National Hydrologic Inventory and/or BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 500 feet of springs, non-CBNG reservoirs, water wells, and perennial streams. This determination shall be based upon USGS National Hydrologic Inventory and/or BLM evaluation.
Cave-1004	CSU	Cave and Karst: significant caves	212,626 acres	Surface disturbance is restricted within site-specific buffers (identify distance for each lease) of entrances to significant caves. CSU (1): (a) Prior to surface disturbance or disruptive activities near an entrance to a significant cave a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction that the action will not destroy, disturb, deface, mar, alter, remove, or harm any significant cave or alter the free movement of any animal or plant life into or out of any significant cave. On the lands described below: CSU (2) as mapped by the BLM. For the purpose of: CSU (3) protecting significant cave resources (any material or substance occurring naturally in caves, such as animal life, plant life, paleontological deposits, sediments, minerals, speleogens, and speleothems). **Exception:** The BLM authorized officer may grant an exception if it is determined that the significant cave resource(s) will be protected. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon on local evaluation. The stipulation and standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative of the operator subject to confirmation from BLM. **Waiver:** The BLM authorized officer determines that the entire lease area does not contain significant caves. This determination shall be based upon USGS or BLM data and field evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Coal-2002 O&G-2007	CSU	Coal: high development potential areas	304,967 acres	Surface use or occupancy is restricted within areas identified as highly likely to be considered in a Coal Lease by Application (LBA) CSU (1): Surface use or occupancy shall not be allowed by oil and gas lessee(s), operating rights holder(s), and/or oil and gas operator(s) on this federal oil and gas lease to conduct any oil and gas operation, including drilling for, removing, or disposing of oil and/or gas contained in federal coal lease(s) unless a plan for mitigation of anticipated impacts is developed between the oil and gas and the coal lessees, and the Plan is approved by the BLM authorized officer; On the lands described below: CSU (2) as mapped by the U.S. Office of Surface Mining, Wyoming Department of Environmental Quality (WDEQ), USGS, and/or BLM. For the purpose of: CSU (3) protecting the first in time valid existing rights of the coal lessee, the BLM authorized officer reserves the right to alter or modify any oil and gas operations on the lands described in this lease ensuring: a.) the orderly development of the coal resource by surface and/or underground mining methods; b.) coal mine worker safety; and/or c.) coal production rates or recovery of the coal resource. The oil and gas lessee(s), operating rights holder(s), and/or oil and gas operator(s) of this federal oil and gas lease shall not hold the United States as lessor, coal lessee(s), sub-lessee(s), and/or coal operator(s) liable for any damage or loss of the oil and gas resource, including the venting of CBNG, caused by coal exploration or mining operations conducted on federal coal lease." **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not interfere with coal operations. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites or increased national or state performance standards. **Waiver:** The BLM authorized officer determines that the entire lease area does not contain areas identified as highly likely to be considered in a coal LBA. This determination shall be based upon U.S. Office of Surface Mining, WDEQ, USGS, and/or BLM data.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Riparian-4009	CSU	Riparian and Wetlands	144,045 acres	Surface disturbance is restricted within 500 feet of riparian systems, wetlands, and aquatic habitats. CSU (1): (a) Prior to surface disturbance within 500 feet of riparian systems, wetlands, and aquatic habitats a site-specific construction, stabilization, and reclamation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the BLM authorized officer's satisfaction how the operator will meet the following performance standards: ● storm water and surface runoff will be controlled to minimize erosion (rilling, gullying, piping, mass wasting) and offsite siltation during construction, use/operations, and reclamation. ● offsite areas will be protected from accelerated soil erosion. ● the original landform and site productivity will be partially restored during interim reclamation and fully restored as a result of final reclamation. CSU (2) as mapped by the USGS National Hydrologic Inventory and/or as determined by a BLM evaluation of the area. For the purpose of: CSU (3) ensuring protection of surface waters and associated riparian habitats by meeting the standards outlined in, Chapter 6 of the BLM's Oil and Gas Gold Book, as revised, and the 2014 BFO RMP ROD. CSU (3) On the lands described below: **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a USGS National Hydrologic Inventory and/or BLM evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 500 feet of springs, non-CBNG reservoirs, water wells, and perennial streams. This determination shall be based upon USGS National Hydrologic Inventory and/or BLM field evaluation.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Fish-4013	CSU	Fish: occupied habitat	261,870 acres	Surface disturbance is restricted within 0.25 mile of naturally occurring water bodies containing native or desirable non-native fish species. CSU (1): (a) Prior to surface disturbance within 0.25 mile of naturally occurring water bodies containing native or desirable non-native fish species a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that there will not be a local decline in fish abundance or range as a result of the lease operations. Examples of a few of the items to consider are as follows: ● Spill prevention measures to ensure hydrocarbons and other potentially toxic substances used for lease activities are prevented from entering the watercourse. ● Sediment control measures to ensure increased sediment contributions are avoided. On the lands described below: CSU (2) as mapped by the Wyoming Game and Fish Department (WGFD) and/or BLM. For the purpose of: CSU (3) protecting native and desirable non-native fish populations and habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a local decline in native or desirable non-native fish abundance or range. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD or BLM evaluation. The stipulation may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 0.25 mile of naturally occurring water bodies containing native and desirable non-native fish species. This determination shall be based upon WGFD mapping and onsite evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4015	NSO	Wildlife: Big game habitat management areas	14,216 acres	No surface occupancy or use is allowed within WGFD Big Game Habitat Management Areas (Ed O. Taylor, Kerns, Bud Love, and Amsden Creek). On the lands described below: NSO (1) as mapped by the WGFD. For the purpose of: NSO (2) ensuring the function and suitability of WGFD Big Game Habitat Management Areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of WGFD Big Game Habitat Management Areas. **Modification:** The BLM-authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within a WGFD big game habitat management area. This determination shall be based upon WGFD and BLM evaluation.
WL-4017	TLS	Wildlife: crucial big game ranges	winter range: 81,437 acres elk calving: 37,549 acres	Surface-disturbing and disruptive activities are prohibited or restricted from November 15 to April 30 within big-game crucial winter range, or from May 1 to June 15 within elk calving areas (WGFD 2009b). On the lands described below: Timing Limitation Stipulation (TLS) (1) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (2) ensuring the function and suitability of crucial big game winter ranges and elk calving areas. **Exception:** The BLM authorized officer may grant an exception if the operator demonstrates that the crucial habitat is not occupied during the period of concern, subject to confirmation by the WGFD and BLM; or it is determined that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within big game crucial winter range or an elk calving area. This determination shall be based upon WGFD and BLM evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4017	CSU	Wildlife: crucial big game ranges	winter range: 81,437 acres elk calving: 37,549 acres	Surface disturbance is prohibited or restricted within WGFD designated big game crucial winter range and elk calving areas. CSU (1): (a) Prior to surface disturbance within WGFD designated big game crucial winter range and elk calving areas a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of crucial big game winter ranges and elk calving area will not be impaired. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of crucial big game winter ranges and elk calving areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within big game crucial winter range or an elk calving area. This determination shall be based upon WGFD and BLM evaluation of the area.
WL-4018	CSU	Wildlife: crucial elk ranges	67,537 acres	Surface disturbance is prohibited or restricted within WGFD designated elk crucial winter range and calving areas. CSU (1): (a) Fluid mineral production and byproducts shall be piped out of elk crucial winter range and calving areas unless a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of elk crucial winter range and elk calving areas will not be impaired. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of elk crucial winter range and elk calving areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				in a location, or otherwise designed so that the action will not impair the function or suitability of the crucial habitat. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within elk crucial winter range or a calving area. This determination shall be based upon WGFD and BLM evaluation of the area.
WL-4021	CSU	Wildlife: crucial elk ranges	67,537 acres	Surface disturbance is prohibited or restricted within WGFD designated elk crucial winter range and calving areas. CSU (1): (a) Permanent above ground facilities will be located outside WGFD designated elk crucial winter range and calving areas unless a mitigation plan is submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that elk population and habitat use objectives can be met. On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of elk crucial winter range and elk calving areas. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will meet elk population and habitat use objectives. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within elk crucial winter range or a calving area. This determination shall be based upon WGFD and BLM evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
WL-4026	CSU	Wildlife: sharp-tailed grouse leks	3,601 acres	Surface disturbance is prohibited or restricted within 0.25 mile of the perimeter of occupied sharp-tailed grouse leks. CSU (1): (a) Prior to surface disturbance within 0.25 mile of the perimeter of occupied sharp-tailed grouse leks a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the function and suitability of sharp-tailed grouse breeding habitat will not be impaired (result in physical injury; a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or lek abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior). On the lands described below: CSU (2) as mapped by the WGFD. For the purpose of: CSU (3) ensuring the function and suitability of sharp-tailed grouse breeding habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not impair the function and suitability of sharp-tailed grouse breeding habitat. The determination may include consultation with the WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 0.25 mile of an occupied sharp-tailed grouse lek. This determination shall be based upon WGFD and BLM evaluation of the area.
WL-4026	TLS	Wildlife: sharp-tailed grouse nesting	191,257 acres	Surface-disturbing and disruptive activities are prohibited or restricted from April 1 to July 15 (WGFD 2009b) within 2 miles of the perimeter of occupied sharp-tailed grouse leks. On the lands described below: TLS (2) as mapped by the WGFD and evaluated by the BLM. For the purpose of: TLS (3) ensuring the function and suitability of sharp-tailed grouse nesting habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that associated lek sites are not active or the action will not impair (result in physical injury; a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior) the function

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				and suitability of sharp-tailed grouse nesting habitat. The determination may include consultation with the WGFD. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD and BLM evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 2 miles of an occupied sharp-tailed grouse lek. This determination shall be based upon WGFD mapping and/or BLM evaluation of the area.
WL-4028	CSU	Wildlife: raptor nests	1,195,815 acres	Surface disturbance is restricted within U.S. Fish and Wildlife Service (USFWS) recommended biological buffers (Appendix K (p. 1749)) of raptor nests. CSU (1) (a) Prior to surface disturbance within USFWS recommended biological buffers of raptor nests a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that nesting raptors will not be disturbed. Nesting raptors will not be agitated or bothered to a degree that causes or is likely to cause: ● physical injury, ● a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or ● nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. On the lands described below: CSU (2) as mapped or determined by WGFD, USFWS, or BLM from field evaluation. For the purpose of: CSU (3) ensuring raptor productivity. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include consultation with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: The BLM authorized officer determines that the entire lease area does not include biologic buffer zones for nesting raptors. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include consultation with the WGFD or USFWS.
WL-4030	TLS	Wildlife: raptor nesting	11,1962 acres February 1 to July 15 19,708 acres April 1 to July 31 79,644 acres March 1 to July 31	Surface-disturbing and disruptive activities are prohibited or restricted from February 1 to July 15 for golden eagle, barn owl, and great horned owl; from April 1 to July 31 for osprey, merlin, sharp-shinned hawk, kestrel, prairie falcon, northern harrier, Swainson's hawk, and Cooper's hawk; and from March 1 to July 31 for red-tailed hawk, short-eared owl, long-eared owl, and screech owl within USFWS recommended buffers of active raptor nests. (Appendix K (p. 1749)) On the lands described below: TLS (1) as mapped or determined by WGFD, USFWS, or BLM from field evaluation. For the purpose of: TLS (2) ensuring raptor nest productivity. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not disturb (likely to cause physical injury; a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior) nesting raptors. The determination may include consultation with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on monitoring results from similar actions on similar sites. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. The confirmation may include consultation with the WGFD or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area does not include seasonal buffer zones for raptor nests. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS Plant-4008	CSU	SS Plants: populations	243,929 acres	Surface disturbance is prohibited or restricted within special status plant species populations. CSU (1) (a) Prior to surface disturbance within special status plant species habitat flowering season survey(s) must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that special status plant species will not be harmed and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, Wyoming Natural Diversity Database, or BLM from field evaluation. For the purpose of: CSU (3) conserving special status plant species and the habitat on which they depend (BLM 2008 - 6840 manual). **Exception:** The BLM authorized officer may grant an exception if flowering season survey(s) determine that a special status species plant population is not present or it is determined that the action is sited in a location so that the action will not harm special status plant species. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. **Waiver:** Flowering season survey(s) determine that the entire lease area does not include populations or habitat of special status species plants. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.
SS Plant-4008	CSU	SS Plants: Ute ladies'-tresses orchid populations	0 acres	Surface disturbance is prohibited or restricted within 0.25 miles of Ute ladies'-tresses orchid populations. CSU (1) (a) Prior to surface disturbance within Ute ladies'-tresses orchid habitat flowering season survey(s) must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that Ute ladies'-tresses orchids will not be harmed and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, Wyoming Natural Diversity Database, or BLM from field evaluation.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				For the purpose of: CSU (3) conserving Ute ladies'-tresses orchids and the habitat on which they depend (BLM 2008 - 6840 manual). **Exception:** The BLM authorized officer may grant an exception if flowering season survey(s) determine that a Ute ladies'-tresses orchid population is not present or it is determined that the action is sited in a location so that the action will not harm special status plant species. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. **Waiver:** Flowering season survey(s) determine that the entire lease area does not include populations or habitat of Ute ladies'-tresses orchid. This determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM.
SS Fish -4008	NSO	SS Fish: occupied habitat	4,846 acres	No surface occupancy or use is allowed within 0.25 mile of any waters containing special status fish species. On the lands described below; NSO (1) as mapped or determined by the WGFD or BLM from field evaluation. For the purpose of: NSO (2) protecting special status fish populations and habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a local decline in special status species fish abundance or range. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based upon a WGFD or BLM evaluation. The stipulation may be modified based on monitoring results from similar actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 0.25 mile of any waters containing special status fish species. This determination shall be based upon WGFD mapping and field evaluation of the area.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4007	CSU	SS Wildlife: special status wildlife habitat	2,325,854	Surface disturbance is restricted within special status species wildlife habitat. CSU (1) (a) Prior to surface disturbance within special status species wildlife habitat an occupancy survey must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that special status wildlife species will not be harmed (any act which actually kills or injures wildlife including habitat modification or degradation that substantially impairs essential behavioral patterns) and that the habitat on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, WGFD, Wyoming Natural Diversity Database, or BLM from field evaluation. For the purpose of: CSU (3) conserving special status species wildlife and the habitat on which they depend (BLM 2008 - 6840 manual). **Exception:** The BLM authorized officer may grant an exception if an occupancy survey determines that special status wildlife species are not present or it is determined that the action is sited in a location so that the action will not harm special status wildlife species. Confirmation may include coordination with the WGFD and/or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area does not include special status species wildlife habitat. This determination shall be based upon field studies of the area by a qualified representative subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4009	CSU	SS Wildlife: prairie dog colonies and dependent species	54,439 acres	Surface disturbance is prohibited or restricted within active prairie dog colonies on BLM-administered surface. CSU (1) (a) Prior to surface disturbance within active prairie dog colonies on BLM-administered surface a special status species occupancy survey must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that special status wildlife species will not be harmed (any act which actually kills or injures wildlife including habitat modification or degradation that substantially impairs essential behavioral patterns) and that the prairie dog colony(ies) on which they depend will be conserved. On the lands described below: CSU (2) as mapped or determined by the USFWS, WGFD, Wyoming Natural Diversity Database, or BLM from field evaluation. For the purpose of: CSU (3) conserving special status species wildlife and the prairie dog colonies on which they depend (BLM 2008 - 6840 manual). **Exception:** The BLM authorized officer may grant an exception if it is determined that special status wildlife species are not present or it is determined that the action is sited in a location so that the action will not harm special status wildlife species. This determination shall be based upon evaluation by a qualified representative, subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area is not occupied by prairie dog dependent special status wildlife species. This determination shall be based upon field studies of the area by a qualified representative subject to confirmation from BLM. Confirmation may include coordination with the WGFD and/or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	NSO	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Occupied Greater Sage-Grouse leks inside designated Core Population Areas and Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks inside designated Core Population Areas and Connectivity Corridors. No surface occupancy or use is allowed within a six-tenths (0.6) mile radius of the perimeter of occupied Greater Sage-Grouse leks inside designated Core Population Areas and Connectivity Corridors, as mapped on the BFO GIS database. **Purpose**: To protect occupied Greater Sage-Grouse leks and associated seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse in proximity to leks, from habitat fragmentation and loss and Greater Sage-Grouse populations from disturbance inside designated Core Population Areas and Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Connectivity Corridor or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the Endangered Species Act (ESA). Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Greater Sage-Grouse Core Population Areas and Connectivity Corridors (Priority Habitat). This area encompasses BLM-administered surface within Greater Sage-Grouse Core Population Areas and Connectivity Corridors (Priority Habitat). All applicable surface disturbances (existing or future, and not limited to fluid mineral disturbances) must be restored, as described in the BFO RMP, to the approval of the BLM authorized officer **Purpose**: To restore functional Greater Sage-Grouse habitat to support core Greater Sage-Grouse populations. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the needs of the Greater Sage-Grouse. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be within a Greater Sage-Grouse Core Population Area or Connectivity Corridor or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. No disruptive activity is allowed during 6:00 p.m. – 8:00 a.m., March 1 – May 15, within a six tenths (0.6) mile radius of the perimeter of occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. **Purpose**: To seasonally protect occupied Greater Sage-Grouse leks from disruptive activity in designated Core Population Areas or Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Connectivity Corridor or are incapable of serving the long-term requirements of Greater Sage-Grouse breeding habitat and that these ranges no longer warrant consideration as components of Grater Sage-Grouse breeding habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Core Population Areas and Connectivity Corridors	Core Population Areas: 30,754 acres Connectivity Corridors: 7,359 acres	**Stipulation**: Occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. Noise levels may not exceed 10 dBA above ambient noise during 6:00 p.m. – 8:00 a.m., March 1 – May 15, within a six tenths (0.6) mile radius of the perimeter of occupied Greater Sage-Grouse leks in designated Core Population Areas or Connectivity Corridors. **Purpose**: To seasonally protect occupied Greater Sage-Grouse leks from disruptive activity in designated Core Population Areas or Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Connectivity Corridor or are incapable of serving the long-term requirements of Greater Sage-Grouse breeding habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse breeding habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse winter concentration areas that support nesting in Core Population Areas (Priority Habitat Area and general habitat)	Not mapped	**Stipulation**: Greater Sage-Grouse winter concentration areas. This area encompasses Greater Sage-Grouse winter concentration areas. No surface use is allowed during December 1 – March 14, within Greater Sage-grouse Winter concentration areas when supporting wintering Greater Sage-Grouse that attend leks within designated Core Population Areas. Purpose: To seasonally protect Greater Sage-Grouse winter concentration areas from disruptive activities. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not impair the function and suitability of the winter concentration area, or it is determined that the winter concentration area is not occupied by concentrated populations of Greater Sage-Grouse during the period of concern. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are incapable of serving the long-term requirements of Greater Sage-Grouse winter habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse winter habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Core Population Areas	519,444 acres	**Stipulation**: Greater Sage-Grouse designated Core Population Areas. This area encompasses Greater Sage-Grouse designated Core Population Areas. Surface occupancy or use will be restricted to no more than an average of one disturbance location per 640 acres using the Disturbance Density Calculation Tool (DDCT), and the cumulative value of all applicable surface disturbances, existing or future, must not exceed 5 percent of the DDCT area, as described in the DDCT Manual. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated Core Population Areas. The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on Federal, State, or private lands within designated Core Population Areas or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Purpose**: To protect Greater Sage-Grouse designated Core Population Areas from habitat fragmentation and loss. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. An exception to the stated limits may be granted when offsite mitigation is determined to provide an overall beneficial effect to Greater Sage-Grouse habitat and populations. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Core Population Area nesting habitat	440,114 acres	**Stipulation**: Greater Sage-Grouse nesting and early brood-rearing habitats inside designated Core Population Areas. This area encompasses Greater Sage-Grouse nesting and early brood-rearing habitats inside designated Core Population Areas. No surface use is allowed during March 15 – June 30, inside designated Core Population Areas. **Purpose**: To seasonally protect Greater Sage-Grouse nesting and early brood-rearing habitats from disruptive activities inside designated Core Population Areas. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Core Population Area or are incapable of serving the long-term requirements of Greater Sage-Grouse nesting habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse nesting habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	CSU	SS Wildlife: Greater Sage-Grouse Connectivity Corridors	150,006 acres	**Stipulation**: Greater Sage-Grouse Connectivity Corridors. This area encompasses Greater Sage-Grouse Connectivity Corridors. The cumulative value of all applicable surface disturbances (existing or future, and not limited to fluid mineral disturbances) must not exceed an average of 5 percent of the sagebrush habitat mapped on the BFO GIS database per 640 acres, as described in the DDCT Manual. This lease does not guarantee the lessee the right to occupy the surface of the lease for the purpose of producing oil and natural gas within Greater Sage-Grouse designated Connectivity Corridors. The surface occupancy restriction criteria identified in this stipulation may preclude surface occupancy and may be beyond the ability of the lessee to meet due to existing surface disturbance on Federal, State, or private lands within designated Connectivity Corridors or surface disturbance created by other land users. The BLM may require the lessee or operator to enter into a unit agreement or drilling easement to facilitate the equitable development of this and surrounding leases. **Purpose**: To protect Greater Sage-Grouse Connectivity Corridors from habitat fragmentation and loss. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. An exception to the stated limits may be granted when offsite mitigation is determined to provide an overall beneficial effect to Greater Sage-Grouse habitat and populations. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or surface occupancy criteria if an environmental record of review finds that a portion of the CSU area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the site is no longer considered in the land use plan to be a Greater Sage-Grouse Connectivity Corridor or Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	TLS	SS Wildlife: Greater Sage-Grouse Connectivity Corridor nesting habitat	131,849 acres	**Stipulation**: Greater Sage-Grouse nesting and early brood-rearing habitat within Connectivity Corridors. This area encompasses Greater Sage-Grouse nesting and early brood-rearing habitat within Connectivity Corridors. No surface use is allowed during March 15 – June 30, in nesting and early brood-rearing habitats (independent of habitat suitability) inside Connectivity Corridors, within four miles of an occupied lek. **Purpose**: To seasonally protect Greater Sage-Grouse nesting and early brood-rearing habitats (independent of habitat suitability) inside Connectivity Corridors from disruptive activities, within four miles of an occupied lek. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat,

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are no longer considered in the land use plan to be within a Greater Sage-Grouse designated Connectivity Corridor or are incapable of serving the long-term requirements of Greater Sage-Grouse nesting habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse nesting habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	NSO	SS Wildlife: general Greater Sage-Grouse breeding habitat	16,103 acres	**Stipulation**: Occupied Greater Sage-Grouse leks outside designated Core Population Areas and Connectivity Corridors. This area encompasses occupied Greater Sage-Grouse leks outside designated Core Population Areas and Connectivity Corridors. No surface occupancy or use is allowed within a one-quarter (0.25) mile radius of the perimeter of occupied Greater Sage-Grouse leks outside designated Core Population Areas and Connectivity Corridors, as mapped on the BFO Geographic Information System (GIS) database. **Purpose**: To protect occupied Greater Sage-Grouse leks and associated seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse in proximity to leks, from habitat fragmentation and loss and Greater Sage-Grouse populations from disturbance outside designated Core Population Areas and Connectivity Corridors. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of Greater Sage-Grouse. The BLM can and does grant exceptions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the area subject to the stipulation or the NSO criteria if an environmental record of review finds that a portion of the NSO area is nonessential, or it is identified through scientific research or monitoring that the existing criteria are inadequate

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				or overly protective for maintaining the function or utility of the site for the seasonal habitat, life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if Greater Sage-Grouse are no longer a BLM sensitive or special status species and are not listed by the USFWS as Threatened or Endangered under the ESA. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4024	TLS	SS Wildlife: general Greater Sage-Grouse nesting and early brood-rearing habitat	779,834 acres	**Stipulation**: Greater Sage-Grouse nesting and early brood-rearing habitat outside designated Core Population Areas and Connectivity Corridors. This area encompasses Greater Sage-Grouse nesting and early brood-rearing habitat outside designated Core Population Areas and Connectivity Corridors. No surface use is allowed during March 15 – June 30, in Greater Sage-Grouse nesting and early brood-rearing habitats outside designated Core Population Areas and Connectivity Corridors, within two miles of an occupied lek. **Purpose**: To seasonally protect Greater Sage-Grouse nesting and early brood-rearing habitats from disruptive activities outside designated Core Population Areas and Connectivity Corridors, within two miles of an occupied lek. **Exception**: The authorized officer may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, will not affect reproductive displays, nest attendance, egg or chick survival, or early brood-rearing success. Actions designed to enhance the long-term utility or availability of suitable Greater Sage-Grouse habitat may be exempted from this timing limitation. The BLM can and does grant exceptions to seasonal restrictions if the BLM, in coordination with the WGFD, determines that granting an exception would not adversely impact the population being protected. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Modification**: The authorized officer may modify the size and shape of the TLS area or the TLS criteria if an environmental record of review indicates the actual habitat suitability for seasonal Greater Sage-Grouse activities is greater or less than the stipulated area, or it is identified through scientific research or monitoring that the existing criteria are inadequate or overly protective for maintaining the function or utility of the site for the seasonal habitat,

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				life-history, or behavioral needs of the Greater Sage-Grouse, including (but not limited to) reproductive display, daytime loafing/staging activities, and nesting. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.) **Waiver**: This stipulation may be waived over the entire lease if, in coordination with the WGFD, it is determined that the described lands are incapable of serving the long-term requirements of Greater Sage-Grouse nesting habitat and that these ranges no longer warrant consideration as components of Greater Sage-Grouse nesting habitat. Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manuals 1624 and 3101.)
SS WL-4026	NSO	SS Wildlife: bald eagle nesting habitat	7,710 acres	No surface occupancy or use is allowed within 0.5 mile of bald eagle nests On the lands described below: NSO (1) as mapped or determined by WGFD, USFWS, or BLM. For the purpose of: NSO (2) ensuring productivity of bald eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not disturb (as defined by the Bald and Golden Eagle Protection Act) nesting bald eagles. Bald eagles will not be agitated or bothered to a degree that causes or is likely to cause: ● physical injury, or ● a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or ● nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results from similar actions on similar sites. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 0.5 mile of a bald eagle nest. Confirmation may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4026	TLS	SS Wildlife: bald eagle nesting	36,597 acres	Surface-disturbing and disruptive activities are prohibited or restricted from February 1 to August 15 within 1.0 mile of active bald eagle nests. On the lands described below: TLS (2) as mapped or determined by WGFD, USFWS, or BLM from field evaluation. For the purpose of: TLS (3) ensuring productivity of bald eagles. **Exception:** The BLM authorized officer may grant an exception if a staff review determines that the action will not disturb nesting bald eagles. This determination shall be based upon field study by a qualified representative, subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results from similar actions on similar sites. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 1.0 mile of a bald eagle nest. Confirmation may include coordination with the WGFD or USFWS.
SS WL-4028	NSO	SS Wildlife: bald and golden eagle winter roosts	54,439 acres	No surface occupancy or use is allowed within 0.5 mile of consistently used bald or golden eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. On the lands described below: NSO (2) as mapped or determined by WGFD, USFWS, or BLM. For the purpose of: NSO (3) protecting wintering bald and golden eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not harm roosting eagles. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results from similar actions on similar sites. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: The BLM authorized officer determines that the entire lease area is not within 0.5 mile of a consistently used eagle roost or riparian corridor.
SS WL-4028	CSU	SS Wildlife: bald and golden eagle winter roosting habitat	54,439 acres	Surface disturbance is restricted within 1.0 miles of consistently used bald or golden eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. CSU (1): (a) Prior to surface disturbance within 1.0 miles of consistently used bald and golden eagle winter roosts and riparian corridors a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that wintering eagles will not be disturbed (as defined by the Bald and Golden Eagle Protection Act). Bald or golden eagles will not be agitated or bothered to a degree that causes or is likely to cause: ● physical injury, or ● a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior. On the lands described below: CSU (2) as mapped or determined by WGFD, USFWS, or BLM. For the purpose of: CSU (3) protecting bald and golden eagle winter roosting habitat. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 1.0 mile of a consistently used eagle winter roost or riparian corridor.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4028	TLS	SS Wildlife: bald and golden eagle winter roosting habitat	54,439 acres	Surface-disturbing and disruptive activities are prohibited or restricted from November 1 to April 1 within 0.5 miles of consistently used eagle winter roosts and the following consistently used riparian corridors: Clear Creek, Crazy Woman Creek, Piney Creek, Powder River, and Tongue River. On the lands described below: TLS (2) as mapped or determined by WGFD, USFWS, or BLM. For the purpose of: TLS (3) protecting roosting eagles. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not result in a failure to meet the performance standards above. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results from similar actions on similar sites. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area is not within 1.0 miles of a consistently used bald or golden eagle winter roost or riparian corridor.
SS WL-4031	TLS	SS Wildlife: special status raptor nesting	211,756 acres	Surface-disturbing and disruptive activities are prohibited or restricted from March 1 to July 31 for ferruginous hawk and peregrine falcon; from April 15 to September 15 for burrowing owl; and from April 1 to August 31 for northern goshawk within USFWS recommended buffers (Appendix K (p. 1749)) of active raptor nests. On the lands described below: TLS (2) as mapped or determined by WGFD, USFWS, or BLM. For the purpose of: TLS (3) ensuring productivity of nesting special status raptors. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action will not disturb nesting special status raptors. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results from similar actions on similar sites. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				Waiver: The BLM authorized officer determines that the entire lease area is not within the USFWS recommended buffer of a sensitive species raptor nest. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.
SS WL-4032	NSO	SS Wildlife: special status raptor nests	211,756 acres	No surface occupancy or use is allowed within a species specific biologic buffer zone using USFWS recommendations (Appendix K (p. 1749)). On the lands described below: NSO (1) as mapped or determined by WGFD, USFWS, or BLM. For the purpose of: NSO (2) ensuring productivity of nesting special status raptors. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, or sited in a location, or a site-specific evaluation determines that nesting special status raptors will not be disturbed (agitated or bothered to a degree that causes or is likely to cause: physical injury; or a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.) The determination may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation including topography, visibility, disturbance and human activity levels, and other factors. The stipulation may be modified based on monitoring results from similar actions on similar sites. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area is not within the USFWS recommended buffer of a sensitive species raptor nest. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
SS WL-4034	CSU	SS Wildlife: amphibian, reptile and bat habitat	1,217,959 acres	Surface disturbance is restricted within 1,640 feet (500 meters) of perennial water, vernal pools, playas, wetlands, and south facing rock outcrops. CSU (1) (a) Prior to surface disturbance within 1,640 feet (500 meters) of perennial water, vernal pools, playas, wetlands, and south facing rock outcrops appropriate surveys must be conducted and a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that special status amphibian, reptile, and bat species will not be disturbed; not agitated or bothered to a degree that causes or is likely to cause: ● physical injury, ● a decrease in productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or ● site abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. On the lands described below: CSU (2) as mapped or determined by WGFD, USFWS, or BLM. For the purpose of: CSU (3) ensuring production of special status amphibian, reptile, and bat species. **Exception:** The BLM authorized officer may grant an exception if it is determined that the proposed action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to meet the performance standards above. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation and performance standards identified above may be modified based on monitoring results from similar actions on similar sites or revisions to national or state performance standards. The determination shall be based upon field studies of the area by a qualified representative and subject to confirmation from BLM. Confirmation may include coordination with the WGFD or USFWS. **Waiver:** The BLM authorized officer determines that the entire lease area does not include special status species amphibian, reptile, or bat habitat. This determination shall be based upon field studies of the area by a qualified representative and reviewed by BLM. The determination may include coordination with the WGFD or USFWS.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Cultural - 5006	NSO	Cultural: historic properties	15,382 acres	No surface occupancy or use is allowed within the following historic properties: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, contributing and unevaluated segments of the Bozeman Trail, all rock art sites, all rock shelter sites, all Native American burials. On the lands described below: NSO (2) as mapped or determined by State Historic Preservation Office (SHPO) or BLM. For the purpose of: NSO (3) protecting historic properties. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to protect the historic property. The Plan may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. The modification is subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Waiver:** The BLM authorized officer determines that the entire lease area does not contain historic properties, subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties.
Cultural - 5006	CSU	Cultural: historic property setting	613,601 acres	Surface disturbance is restricted within three miles of the following historic properties: Pumpkin Buttes, Cantonment Reno, Dull Knife Battle, Crazy Woman Battle, contributing and unevaluated segments of the Bozeman Trail, all rock art sites, all rock shelter sites, all Native American burials. CSU (1) (a) Prior to surface disturbance within three miles of the identified historic properties a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that the infrastructure will either not be visible or will result in a weak contrast rating. On the lands described below: CSU (2) as mapped or determined by SHPO or BLM. For the purpose of: CSU (3) ensuring the setting of historic properties. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				result in a more than a weak contrast rating. The Plan may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. The modification may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Waiver:** The BLM authorized officer determines that the entire lease area does not contribute to the setting of a historic property, the waiver may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties.
Cultural - 50011	NSO	Cultural: traditional cultural properties	15,382 acres	No surface occupancy or use is allowed on lands containing traditional cultural properties. On the lands described below: NSO (1) as mapped or determined by tribal consultation, SHPO, or BLM. For the purpose of: NSO (2) protecting traditional cultural properties. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to protect the traditional cultural property. The Plan may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. The modification may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Waiver:** The BLM authorized officer determines that the entire lease area does not contain traditional cultural properties, the waiver may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties.

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
Cultural - 5011	CSU	Cultural: traditional cultural property setting	613,601 acres	Surface disturbance is restricted within three miles of traditional cultural properties. CSU (1) (a) Prior to surface disturbance within three miles of traditional cultural properties a mitigation plan (Plan) must be submitted by the applicant. The Plan must be approved or approved with conditions by the BLM authorized officer prior to surface-disturbing activities. (b) The Plan must demonstrate proposed infrastructure is either not visible or will result in a weak contrast rating. On the lands described below: CSU (2) as mapped or determined by tribal consultation, SHPO, or BLM. For the purpose of: CSU (3) ensuring the setting of traditional cultural properties **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to ensure the setting of the traditional cultural property. The Plan may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. The modification may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties. **Waiver:** The BLM authorized officer determines that the entire lease area does not contribute to the setting of traditional cultural properties, the waiver may be subject to consultation with Wyoming SHPO, applicable tribes, and other interested parties.
Paleo - 5007	NSO	Paleontology: high quality or important resources	860 acres	No surface occupancy or use is allowed on lands containing paleontological resources of high quality or importance. On the lands described below: NSO (1) as mapped or determined by USGS or BLM. For the purpose of: NSO (2) protecting paleontological resources of high quality or importance. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to protect paleontological resources of high quality or importance. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area does not contain paleontological resources of high quality or importance.
VRM - 5005	CSU	Visual: Class II and Special Emphasis Areas	112,350 acres	Surface disturbance is restricted within Visual Resource Management (VRM) Class II areas. CSU (1) (a) Prior to surface disturbance within VRM Class II areas a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator may not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan or approved it with conditions. (b) The Plan must demonstrate to the authorized officer's satisfaction that the proposed infrastructure will maintain the existing character of the landscape (management actions may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the landscape.) On the lands described below: CSU (2) as mapped or determined by BLM. For the purpose of: CSU (3) ensuring the existing character of the landscape. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to maintain the existing character of the landscape. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within VRM Class II.
Rec - 6019	CSU	Recreation: Special Recreation Management Areas	9,504acres	Surface disturbance is restricted within the Special Recreation Management Areas (SRMA) available for leasing (Weston Hills). CSU (1) (a) Prior to surface disturbance within SRMAs available for leasing a mitigation plan (Plan) must be submitted to the BLM by the applicant as a component of the APD (BLM Form 3160-3) or Sundry Notice (BLM Form 3160-5) – Surface Use Plan of Operations. The operator shall not initiate surface-disturbing activities unless the BLM authorized officer has approved the Plan (with conditions, as appropriate). (b) The Plan must demonstrate to the authorized officer's satisfaction that the proposed action is consistent

Management Action	Stipulation Type	Protected Resource	Acreage Affected	Stipulation Description
				with the prescribed management for the SRMA. On the lands described below: CSU (2) as mapped or determined by BLM. For the purpose of: CSU (3) ensuring the recreational opportunities and setting of the SRMA. **Exception:** The BLM authorized officer may grant an exception if it is determined that the action is of a scale, sited in a location, or otherwise designed so that the action will not result in a failure to maintain the recreational opportunities and setting of the SRMA. **Modification:** The BLM authorized officer may modify the area subject to the stipulation based on local evaluation. The stipulation may be modified based on negative or positive monitoring results from similar proposed actions on similar sites. **Waiver:** The BLM authorized officer determines that the entire lease area is not within a SRMA available for leasing.

Mitigation

Mitigation is the specific means, measures, or practices that will reduce or eliminate effects to the affected resource or land use to an acceptable level. Mitigation can include the following (43 Code of Federal Regulations [CFR] 1508.20):

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impact by limiting the degree of magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitation, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

In demonstrating adequate mitigation it is beneficial to describe the merits of the proposed action and why it is preferable over other potential actions. The proposed mitigation should demonstrate that no other practicable alternatives exist. For example: describe why the proposed location and timing were chosen and why they were preferable over other potential locations and timing.

H.3. Processing Exceptions, Modifications, and Waivers

An exception, waiver, or modification must be based on one of two criteria. According to 43 CFR 3101.1-4, “A stipulation included in an oil and gas lease shall be subject to modification or waiver only if the authorized officer determines that the factors leading to its inclusion in the lease have changed sufficiently to make the protection provided by the stipulation no longer justified or if the proposed operations would not cause unacceptable impacts.” Waiver, exceptions, or modifications must be supported by appropriate environmental analysis and documentation, and subject to the same test used to initially justify the imposition of the stipulation.

The person requesting the exception, modification, or waiver is responsible to submit a written request including information that might assist the authorized official in making a decision. The authorized officer will review the information submitted in support of the request along with other pertinent information. Requests must be submitted to the BLM field office (Buffalo) in which the lease is located. Modification and waiver requests will be forwarded to the BLM-Wyoming Deputy State Director for Minerals and Lands along with the Buffalo Field Office's recommendation. Requests shall be subject to at least a 30 day public review if the authorized officer determines that a stipulation involves an issue of major concern to the public (43 CFR 3101.1–4).

The request is considered a unique action and is analyzed and documented individually for RMP and NEPA compliance. Processing will include coordination or consultation with the Wyoming Game and Fish Department (WGFD), U.S. Fish and Wildlife Service (USFWS), State Historic Preservation Office, or other agencies where appropriate. For example, requests will not be granted for stipulations designed to protect Threatened and Endangered species, unless the BLM consults with the USFWS and reinitiates consultation, if necessary. Consultation with other agencies require additional time and resources to process.

The request must include the lease number and effective date, the stipulation(s) the request is for, the change in circumstances that lead the lessee or operator to believe the request is appropriate, and the name and/or number of any applicable authorization(s) (i.e., application for permit to drill, sundry, right-of-way). A map is strongly recommended. The following information must be addressed, when applicable, in the written request:

1. **WHY** the public land user wants the request. For example with a timing limitation exception request, include the reason(s) why an action could not be completed within the original stipulation period, any evidence of why the action would not adversely affect the resource or species being protected, or any other information (additional mitigation measures or alternatives) that would help the BLM (and WGFD or USFWS) in reviewing the request.

2. **WHO** is filing the request. This must include the company name, the name of the contact person, and the address, telephone number, e-mail address (if available), and fax number of the contact person.

3. **WHAT** is being requested. For example with a timing limitation request, include a detailed description of the activity including types of equipment or vehicles required and the number of trips expected.

4. **WHERE** the activity would take place. This must include the legal description of the activity and a map clearly depicting these areas. Proponent prepared Geographic Information System layers meeting BLM requirements can expedite the processing.

5. **WHEN** the activity would occur and it's duration. This must include the start date, end date, and time of day/night when activities would occur.

Requests must be made in writing and hard copy delivered to the Buffalo Field Manager at the physical address of the office. When time is of the essence, the process may be initiated by fax or electronic delivery of a scanned copy but the original must be received by the Buffalo Field Office within three working days. No exception, waiver, or modification will be issued until the hard copy request is received.

An exception request must be initiated near the time of the proposed activity. As a general rule, the request should be made within two weeks of conducting the proposed activity. The unpredictability of weather, animal movement and condition, and so on precludes analysis of requests related to wildlife far in advance of the time periods in question. The BLM uses a set of criteria when considering an exception request. Professional judgment plays a key part in the BLM's decisions on whether to grant exceptions. There is no clear-cut formula.

The following example describes some of the factors considered by the BLM when determining whether a request for a big game winter range timing limitation exception should be granted.

Factors Considered

1. Resource Concern
   - Animal presence or absence
   - Additional or new resource concerns
   - Potential for increased wildlife accidents or poaching

2. Animal Conditions
   - Physical condition of individual animals (e.g., fat reserves)
   - Local animal population condition (animal density)
   - Potential for additive mortality
   - Likelihood of introduction or increased incidence of disease
   - Likelihood of decreased recruitment/natality

3. Climate/Weather
   - Snow conditions (depth, crusting, longevity)
   - Current and historic local precipitation patterns
   - Current and historical seasonal weather patterns
   - Recent and current wind-chill factors (indication of animals energy use)
   - Duration of condition
   - Short- and long-range forecasts

4. Habitat Condition and Availability
   - Water and forage condition (availability, quality, and quantity)
   - Competition (interspecific, intraspecific)
   - Animal use of available forage
   - Suitable and ample forage immediately available and accessible

5. Spatial Considerations
   - Migration/travel corridors
   - Winter range, foraging, calving or breeding
   - Topography (plains vs. mountains)
   - Topographic/geographic limitations (barriers)
   - Presence of thermal cover (e.g., protection from wind)
   - Proportion of range impacted
   - Juxtaposition and density of other activities/disturbances in the vicinity
   - Cumulative impacts

6. Timing
   - When proposed activity would occur in the stipulation period

- Kind and duration of potentially disruptive activity
- Likelihood of animals habituating to the proposed activity

A determination will be fully documented in the case file with an appropriate level of environmental review after asking not one, but a series of questions, such as:

- Would the BLM remain in compliance with laws and regulations?
- Is the proposal in conformance with the objectives of the RMP?
- What would be the level of harm to the protected resource, both locally and regionally?
- What would be the economic or public safety concerns if an active operation near completion was shut in to comply with a seasonal closure? (For example: economic, multi-stage fracturing not completed; safety, casing and cementing of fresh water zones not completed.)
- Are the impacts temporary, rather than long term?
- Is the resource being protected rare, or is it relatively common? Is it a special status species?
- Based on existing knowledge of a species and its use of an area, would impacts be confined to single or a small number of individuals, or would there be impacts on local or regional populations?
- Would impacts be allowed under existing law and policy?
- Is offsite mitigation an appropriate option? (For example, where individual or cumulative impacts cannot be effectively mitigated on site?)
- Can the impacts be reduced to an acceptable level through intensive use of environmental Best Management Practices?

Appeals

Decisions on exceptions, waivers, and modifications are subject to administrative review by the State Director and thereafter may be appealed to the Interior Board of Land Appeals (43 CFR Part 4).

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Appendix I. Soils Exception Criteria

Steep Slopes

Slope gradient is the difference in elevation between two points, expressed as a percentage of the difference between those points.

	<25% (Allow)		≥ 25%		>35%		>50%	
BLM-administered Surface	611,604 acres	78%	170,590 acres	22%	74,925 acres	10%	26,591 acres	3%
Federal Mineral (All Minerals)	4,329,193 acres	90%	474,083 acres	10%	168,115 acres	4%	47,072 acres	1%
Federal Fluid Mineral	2,973,373 acres	88%	412,145 acres	12%	152,394 acres	5%	47,411 acres	1%
Source: BLM 2012f BLM Bureau of Land Management								

Proposed surface-disturbing activities will be located to avoid slopes 25% and greater to the greatest extent possible. When surface disturbance cannot be avoided and is proposed on slopes of more than 25% the following criteria must be met:

1. Proponent must demonstrate a strong justification of purpose and need.
2. Evaluate alternatives through the National Environmental Policy Act (NEPA) process.
3. Engineered design prepared by a licensed professional engineer, licensed in the State of Wyoming will be required for construction, drainage control, and final contours proposed after rehabilitation.
4. Proponent must provide a Site Specific Stabilization and Reclamation Plan that clearly demonstrates effects from the proposed actions can be adequately mitigated.
5. Additional information may be required at the discretion of the authorized officer; for example but not limited to a geotechnical analysis, depending upon specific site characteristics.
6. The maximum allowable surface disturbance on slopes 25-35% should not exceed 0.50 acre.
7. The maximum allowable surface disturbance on slopes 35-50% should not exceed 0.25 acre.

For analysis purposes, if a Soil Map Unit (SMU) includes a named component having a severe erosion hazard rating, poor reclamation suitability, or limited reclamation potential areas, the entire SMU is rated as having restrictions. However, there may be areas within the SMU that have a slight or moderate rating. For example, the Samday-Shingle-Badland complex, 10 to 45 percent slopes SMU has a severe water erosion hazard rating. Slopes 22% and greater would have a severe erosion hazard but slopes less than 22% would have a slight or moderate rating. A SMU with a slight or moderate rating may also contain areas with a severe rating. There may be minor components identified during onsite investigations impacted by the proposed action not identified on the soil map that are highly erodible. See the *Soils* section in Chapter 4 for an explanation of how key soil feature hazard ratings are derived.

Highly Erodible Soils

Highly erodible soils are those soils which are susceptible to wind or water erosion in either their natural or disturbed state. Elements used to determine highly erodible soils are slope,

soil erodibility factor and wind erodibility group. Severe erosion hazards for each SMU were identified using the U.S. Department of Agriculture Natural Resources Conservation Service soil survey data.

	Non-Erosive (Allow)		Water/Wind Erosion (Avoid)	
BLM-administered Surface	566,632 acres	72%	215,496 acres	28%
Federal Mineral (All Minerals)	3,964,625 acres	83%	838,652 acres	17%
Federal Fluid Mineral	2,716,674 acres	80%	669,739 acres	20%
Source: BLM 2012f BLM Bureau of Land Management				

Proposed surface-disturbing activities will be located to avoid areas of highly erodible soils to the greatest extent possible. When proposals would impact highly erodible soils the following criteria must be met.

1. Proponent must demonstrate a strong justification of purpose and need.
2. Evaluate alternatives through the NEPA process.
3. Proponent must provide a Site Specific Stabilization and Reclamation Plan that clearly demonstrates effects from the proposed actions can be adequately mitigated.
4. Additional information may be required at the discretion of the authorized officer; for example but not limited to a geotechnical analysis, depending upon specific site characteristics.

Reclamation Suitability

Reclamation suitability is the inherent ability of the soil to recover from impacts; often referred to as soil resilience. Suitability factors include physical, chemical, and environmental properties to mitigate to assure successful reclamation. These limiting features include salinity, sodium content, clayey and sandy textures, droughty conditions, alkalinity and pH, low organic matter content, shallow depth to bedrock, stones and cobbles, and erosion potential. Criteria used to determine soil sensitivity to surface uses would continually be adapted as conditions change or new information or technology becomes available that enhances the understanding of these susceptible soils.

	Reclamation Suitability (Allow)		Reclamation Suitability Limited or Poor (Avoid)	
BLM-administered Surface	328,483 acres	42%	455,090 acres	58%
Federal Mineral	2,881,966 acres	60%	1,514,445 acres	40%
Federal Fluid Mineral	1,862,591 acres	55%	1,514,445 acres	45%
Source: BLM 2012f BLM Bureau of Land Management				

Proposed surface-disturbing activities will be located to avoid areas with poor reclamation suitability where possible. When soils with low reclamation suitability cannot be avoided, surface-disturbing activities may be permitted as follows:

1. Proponent submits an acceptable Site Specific Stabilization and Reclamation Plan that clearly demonstrates effects from the proposed actions can be adequately mitigated.

2. Additional information may be required at the discretion of the authorized officer; for example but not limited to timing restrictions and monitoring reports depending upon specific site characteristics.

Limited Reclamation Potential Areas

Limited Reclamation Potential (LRP) areas are areas possessing unique landscape characteristics that often make reclamation success impractical and/or unrealistic due to physical, biological, and/or chemical challenges. Areas within a SMU having LRP may be limited to a portion of the SMU. These areas would be identified during the onsite investigation and restrictions applied where needed. For example, the Samday-Shingle-Badland complex, 10 to 45% slope SMU contains 15% Badland component. Therefore, 15% of the acreage of the SMU would be restricted and the remaining acreage would not be restricted. The following table displays the average acreage that would be restricted for portions of SMU with LRP components in the Buffalo Field Office. There may be minor components within the impact area of a proposed action identified during onsite investigations that are not identified on the soil map. These LRP areas would have restrictions applied but are not included in the acreage table below.

	Average*			
	Non-LRP (Allow)		**LRP (Avoid)**	
BLM-administered Surface	563,1743 acres	72%	218,928 acres	28%
Federal Mineral	4,611,146 acres	96%	195,975 acres	4%
Federal Fluid Mineral	2,700,580 acres	80%	685,950 acres	20%

Source: BLM 2012f

BLM Bureau of Land Management
LRP Limited Reclamation Potential

*Acreage was determined by average of the percentage of LRP potentially within the SMU polygons.

Proposed surface-disturbing activities will be located to avoid miscellaneous areas such as badlands, rock outcrop, and areas susceptible to mass movement. Mineral exploration and development activities which inherently require involvement of such areas (specifically activities regarding locatable and salable minerals, and leasable minerals other than oil and gas) may occur. When proposals would impact these areas the following criteria must be met.

1. Proponent must demonstrate a strong justification of purpose and need.
2. Evaluate alternatives through the NEPA process.
3. Mitigation measures are proposed to minimize potential impacts.
4. Proponent will provide a Site Specific Stabilization and Reclamation Plan.
5. Additional information may be required at the discretion of the authorized officer; for example but not limited to a geotechnical analysis, depending upon specific site characteristics.

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Appendix J. Mitigation Guidelines for Surface-Disturbing and Disruptive Activities Wyoming Bureau of Land Management

J.1. Introduction

Wyoming Mitigation Guidelines are a compilation of practices employed by Bureau of Land Management (BLM) to mitigate impacts from surface disturbance. They apply to activities such as road or pipeline construction, range improvements, and permitted recreation activities. The guidelines are designed to protect resources such as soils and vegetation, wildlife habitat, and cultural or historic properties. The guidelines are presented as an appendix of the Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for easy reference as they apply to many resources and derive from many laws. All BLM RMPs have included these guidelines as appendices. Public comment on the guidelines, per se, has not been requested. The guidelines are not land use decisions; rather they are examples of mitigation measures that could be applied, as appropriate, based on site-specific National Environmental Policy Act (NEPA) analysis for individual proposals. Comment on the use and application of specific mitigation measures can be made during the NEPA process for individual proposals. Because mitigation measures change or are modified, based on new information, the guidelines are updated periodically for all field offices in Wyoming.

These guidelines are primarily for the purpose of attaining statewide consistency in how requirements are determined for avoiding and mitigating environmental impacts and resource and land use conflicts. Consistency in this sense does not mean that identical requirements would be applied for all similar types of land use activities that may cause similar types of impacts. Nor does it mean that the requirements or guidelines for a single land use activity would be identical in all areas.

There are two ways the mitigation guidelines are used in the RMP and EIS process: (1) as part of the planning criteria in developing the RMP alternatives; and (2) in the analytical processes of both developing the alternatives and analyzing the impacts of the alternatives. In the first case, an assumption is made that any one or more of the mitigations will be appropriately included as conditions of relevant actions being proposed or considered in each alternative. In the second case, the mitigations are used (1) to develop a baseline for measuring and comparing impacts among the alternatives; (2) to identify other actions and alternatives that should be considered; and (3) to help determine whether more stringent or less stringent mitigations should be considered.

The EIS for the RMP does not decide or dictate the exact wording or inclusion of these guidelines. Rather, the guidelines are used in the RMP and EIS process as a tool to help develop the RMP alternatives and to provide a baseline for comparative impact analysis in arriving at RMP decisions. These guidelines will be used in the same manner in analyzing activity plans and other site-specific proposals. These guidelines and their wording are matters of policy. As such, specific wording is subject to change primarily through administrative review, not through the RMP and EIS process. Any further changes that may be made in the continuing refinement of

these guidelines and any development of program-specific standard stipulations will be handled in another forum, including appropriate public involvement and input.

J.1.1. Purpose

The purposes of the "Wyoming BLM Mitigation Guidelines" are (1) to reserve, for the BLM, the right to modify the operations of all surface and other human presence disturbance activities as part of the statutory requirements for environmental protection; and (2) to inform a potential lessee, permittee, or operator of the requirements that must be met when using BLM-administered public lands. These guidelines have been written in a format that will allow for (1) their direct use as stipulations, and (2) the addition of specific or specialized mitigation following the submission of a detailed plan of development or other project proposal, and an environmental analysis.

Those resource activities or programs currently without a standardized set of permit or operation stipulations can use the mitigation guidelines as stipulations or as conditions of approval, or as a baseline for developing specific stipulations for a given activity or program.

Because use of the mitigation guidelines was integrated into the RMP EIS process and will be integrated into the site-specific environmental analysis process, the application of stipulations or mitigation requirements derived through the guidelines will provide more consistency with planning decisions and plan implementation than has occurred in the past. Application of the mitigation guidelines to all surface and other human presence disturbance activities concerning BLM-administered public lands and resources will provide more uniformity in mitigation than has occurred in the past.

J.2. Mitigation Guidelines

J.2.1. Surface Disturbance Mitigation Guideline

Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the authorized officer.

- Slopes in excess of 25%.
- Within important scenic areas (Class I and II Visual Resource Management Areas).
- Within 500 feet of surface water and/or riparian areas.
- Within either 0.25 mile or the visual horizon (whichever is closer) of historic trails.
- Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.

Guidance

The intent of the Surface Disturbance Mitigation Guideline is to inform interested parties (potential lessees, permittees, or operators) that when one or more of the five conditions exist, surface-disturbing activities will be prohibited unless or until a permittee or his designated representative and the surface management agency arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development.

Specific criteria (e.g., 500 feet from water) have been established based upon the best information available. However, such items as geographical areas and seasons must be delineated at the field level. Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, and applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

J.2.2. Wildlife Mitigation Guideline

When a proposed discretionary land use has potential for affecting wildlife or their habitat, mitigation will be considered. BLM will consult with the U.S. Fish and Wildlife Service (USFWS) on any proposals that may affect Endangered Species Act (ESA) listed, proposed, or candidate species.

Guidance

The Wildlife Mitigation Guideline is intended to provide two basic types of protection: seasonal restriction and prohibition of activities or surface use. Legal descriptions will ultimately be required when applying mitigation and should be measurable and legally definable. There are no minimum subdivision requirements at this time. The area delineated can and should be defined as necessary, based upon current biological data, prior to the time of processing an application and issuing the use authorization. The legal description must eventually become a part of the condition for approval of the permit, plan of development, and/or other use authorization.

Seasonal restrictions protect wildlife during sensitive times of the year such as during the winter when many species are stressed and the spring when most species are bearing and rearing young.

The prohibition of activity or surface use, is intended for protection of specific wildlife habitat areas or values within the use area that cannot be protected by using seasonal restrictions. These areas or values must be factors that limit life-cycle activities (e.g., Greater Sage-Grouse strutting grounds, known Threatened and Endangered species habitat). Frequently, prohibition areas are found within seasonal restriction areas.

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

J.2.3. Cultural Resource Mitigation Guideline

When a proposed discretionary land use has potential for affecting the characteristics which qualify a cultural property for the National Register of Historic Places (NRHP), mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 Code of Federal Regulation (CFR) 800 will be used in consultation with the Wyoming State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation to be required.

Guidance

The preferred strategy for treating potential adverse effects on cultural properties is "avoidance." If avoidance involves project relocation, the new project area may also require cultural resource inventory. If avoidance is imprudent or unfeasible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative measures.

Reports documenting results of cultural resource inventory, evaluation, and the establishment of mitigation alternatives (if necessary) shall be written according to standards contained in BLM Manuals, the cultural resource permit stipulations, and in other policy issued by the BLM. These reports must provide sufficient information for Section 106 consultation. Reports shall be reviewed for adequacy by the appropriate BLM cultural resource specialist. If cultural properties on, or eligible for, the NRHP are located within these areas of potential impact and cannot be avoided, the authorized officer shall consult with the SHPO in accordance with National Historic Preservation Act Section 106 and the procedures contained in 36 CFR 800.

Mitigation measures shall be implemented according to the mitigation plan approved by the BLM authorized officer. Such plans are usually prepared by the land use applicant according to BLM specifications. Mitigation plans will be reviewed as part of Section 106 consultation for NRHP eligible or listed properties. The extent and nature of recommended mitigation shall be commensurate with the significance of the cultural resource involved and the anticipated extent of damage. Reasonable costs for mitigation will be borne by the land use applicant. Mitigation must be cost effective and realistic. It must consider project requirements and limitations, input from concerned parties, and be BLM approved or BLM formulated.

Mitigation of paleontological and natural history sites will be treated on a project specific basis. Factors such as site significance, economics, safety, and project urgency must be taken into account when making a decision to mitigate. Authority to protect (through mitigation) such values is provided for in the Federal Land Policy and Management Act (FLPMA), Section 102(a)(8). When avoidance is not possible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative protection measures.

J.2.4. Special Resource Mitigation Guideline

To protect (resource value), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date to date) in (legal description).

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the authorized officer.

Example Resource Categories (select or identify category and specific resource value):

- Recreation areas
- Special natural history or paleontological features
- Special management areas
- Sections of major rivers
- Prior existing rights-of-way
- Occupied dwellings

- Other (specify)

Guidance

The Special Resource Mitigation Guideline is intended for use only in site-specific situations where one of the first three general mitigation guidelines will not adequately address the concern. The resource value, location, and specific restrictions must be clearly identified. A detailed plan addressing specific mitigation and special restrictions will be required prior to disturbance or development and will become a condition for approval of the permit, plan of development, or other use authorization.

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

J.2.5. No Surface Occupancy Guideline

No Surface Occupancy (NSO) will be allowed on the following described lands (legal description) because of (resource value).

Example Resource Categories (select or identify category and specific resource value):

- Recreation areas (e.g., campgrounds, historic trails, national monuments)
- Major reservoirs/dams
- Special management area (e.g., known Threatened or Endangered species habitat, areas suitable for consideration for wild and scenic rivers designation)
- Other (specify)

Guidance

The NSO Mitigation Guideline is intended for use only when other mitigation is determined insufficient to adequately protect the public interest and is the only alternative to “no development” or “no leasing.” The legal description and resource value of concern must be identified and be tied to an NSO land use planning decision.

Waiver of, or exception(s) to, the NSO requirement will be subject to the same test used to initially justify its imposition. If, upon evaluation of a site-specific proposal, it is found that less restrictive mitigation would adequately protect the public interest or value of concern, then a waiver or exception to the NSO requirement is possible. The record must show that because conditions or uses have changed, less restrictive requirements will protect the public interest. An environmental analysis must be conducted and documented (e.g., environmental assessment, EIS, etc., as necessary) in order to provide the basis for a waiver or exception to an NSO planning decision. Modification of the NSO requirement will pertain only to refinement or correction of the location(s) to which it applied. If the waiver, exception, or modification is found to be consistent with the intent of the planning decision, it may be granted. If found inconsistent with the intent of the planning decision, a plan amendment would be required before the waiver, exception, or modification could be granted.

When considering the "no development" or "no leasing" option, a rigorous test must be met and fully documented in the record. This test must be based upon stringent standards described in the land use planning document. Since rejection of all development rights is more severe than the most restrictive mitigation requirement, the record must show that consideration was given to development subject to reasonable mitigation, including "no surface occupancy." The record must also show that other mitigation was determined to be insufficient to adequately protect the public interest. A "no development" or "no leasing" decision should not be made solely because it appears that conventional methods of development would be unfeasible, especially where an NSO restriction may be acceptable to a potential permittee. In such cases, the potential permittee should have the opportunity to decide whether or not to go ahead with the proposal (or accept the use authorization), recognizing that an NSO restriction is involved.

Appendix K. Biological Resources Support Documents

K.1. Biological Resources of the Buffalo Planning Area

Table K.1. Common and Scientific Names of Plant and Wildlife Species Identified in the Buffalo Resource Management Plan and Environmental Impact Statement

Common Name	Scientific Name
Plants*	
Alder	*Alnus spp. Mill.*
Alfalfa	*Medicago sativa L.*
Alkali sacaton	*Sporobolus airoides (Torr.) Torr.*
Alpine poppy	*Papaver pygmaeum Rydb.*
American plum	*Prunus americana Marshall*
Antelope bitterbrush	*Purshia tridentata (Pursh) DC.*
Barley	*Hordeum spp. L.*
Basin big sagebrush	*Artemisia tridentata Nutt. ssp. tridentata*
Basin wildrye	*Leymus cinereus (Scribn. & Merr.) Á. Löve*
Beardtongue	*Penstemon spp. Schmidel*
Birch	*Betula spp. L.*
Bitterbrush	*Purshia DC. ex Poir.*
Black henbane	*Hyoscyamus niger L*
Black sagebrush	*Artemisia nova A. Nelson*
Blowout penstemon (beardtongue)	*Penstemon haydenii S. Watson*
Blue elderberry	*Sambucus nigra L. ssp. cerulea (Raf.) R. Bolli*
Blue grama	*Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths*
Bluebell	*Mertensia spp.Roth*
Bluebunch wheatgrass	*Pseudoroegneria spicata (Pursh) Á. Löve*
Boxelder	*Acer negundo L.*
Broad-leaved (broadlipped) twayblade	*Listera convallarioides (Sw.) Nutt. ex Elliott*
Buckwheat	*Eriogonum Michx.*
Buffalobur (nightshade)	*Solanum rostratum Dunal*
Buffalograss	*Bouteloua dactyloides (Nutt.) J.T. Columbus*
Canada thistle	*Cirsium arvense (L.) Scop.*
Cheatgrass	*Bromus tectorum L.*
Chokecherry	*Prunus virginiana L.*
Cocklebur	*Xanthium spp. L.*
Coiled-beaked (coiled) lousewort	*Pedicularis contorta Benth.*
Columbia needlegrass	*Achnatherum nelsonii (Scribn.) Barkworth*
Columbine	*Aquilegia spp. L.*
Common (lesser) burdock	*Arctium minus Bernh.*
Common crupina	*Crupina vulgaris Cass.*
Common mullein	*Verbascum thapsus L.*
Common snowberry	*Symphoricarpos albus (L.) S.F. Blake*
Common St. Johnswort	*Hypericum perforatum L.*
Common tansy	*Tanacetum vulgare L.*
Common yarrow	*Achillea millefolium L.*
Cottonwood	*Populus spp. L.*
Curl-leaf mountain mahogany	*Cercocarpus ledifolius Nutt.*
Curly dock	*Rumex crispus L.*

Common Name	Scientific Name
Currant	*Ribes spp. L.*
Cusick's (Nuttall's) alkaligrass	*Puccinellia nuttalliana (Schult.) Hitchc.*
Dalmatian toadflax	*Linaria dalmatica (L.) Mill. ssp. dalmatica*
Desert parsley	*Lomatium spp.*
Diffuse knapweed	*Centaurea diffusa Lam.*
Douglas-fir	*Pseudotsuga menziesii (Mirb.) Franco*
Dwarf (short) woolyheads	*Psilocarphus brevissimus Nutt.*
Dwarf mistletoe	*Arceuthobium M. Bieb.*
Dyer's woad	*Isatis tinctoria L*
Fall (Douglas') knotweed	*Polygonum douglasii Greene*
False agoseris	*Agoseris glauca (Pursh) Raf. var. laciniata*
Field bindweed	*Convolvulus arvensis L.*
Field horsetail	*Equisetum arvense L.*
Field pussytoes	*Antennaria neglecta Greene*
Fourwing saltbush	*Atriplex canescens (Pursh) Nutt.*
Fringed sage (prairie sagewort)	*Artemisia frigida Willd.*
Gardner's saltbush	*Atriplex gardneri (Moq.) D. Dietr.*
Goosefoot	*Chenopodium spp. L.*
Greasewood	*Sarcobatus vermiculatus (Hook.) Torr.*
Green ash	*Fraxinus pennsylvanica Marshall*
Green needlegrass	*Nassella viridula (Trin.) Barkworth*
(Hairy) tranquil goldenweed	*Pyrrocoma clementis Rydb.*
Hall's (plains rough) fescue	*Festuca hallii (Vasey) Piper*
Halogeton	*Halogeton glomeratus (M. Bieb.) C.A. Mey.*
Hawthorn	*Crataegus spp. L.*
Houndstongue (gypsyflower)	*Cynoglossum officinale L.*
Idaho fescue	*Festuca idahoensis Elmer*
Indian paintbrush	*Castilleja spp. Mutis ex L. f.*
Indian ricegrass	*Achnatherum hymenoides (Roem. & Schult.) Barkworth*
Japanese brome	*Bromus japonicus Thunb.*
Kentucky bluegrass	*Poa pratensis L.*
Kotzebue's grass of Parnassus	*Parnassia kotzebuei Cham. ex Spreng.*
Large (broadfruit) bur-reed	*Sparganium eurycarpum Engelm.*
Large (lesser) yellow lady's slipper	*Cypripedium parviflorum Salisb.*
Large-leaved (largeleaf) pondweed	*Potamogeton amplifolius Tuck.*
Larkspur	*Delphinium spp. L.*
Leafy (elk) thistle	*Cirsium foliosum (Hook.) DC.*
Leafy spurge	*Euphorbia esula L.*
Leafy wildparsley	*Musineon divaricatum (Pursh) Raf.*
Locoweed	*Oxytropis spp. DC.*
Longleaf (composite) dropseed	*Sporobolus compositus (Poir.) Merr.*
Lupine	*Lupinus spp. L.*
Medusahead	*Taeniatherum caput-medusae (L.) Nevski*
Milkvetch	*Astragalus spp. L.*
Moschatel (muskroot)	*Adoxa moschatellina L.*
Mountain big sagebrush	*Artemisia tridentata Nutt. ssp. vaseyana (Rydb.) Beetle*
Mountain lady's slipper	*Cypripedium montanum Douglas ex Lindl.*
Mountain mahogany (curl-leaf)	*Cercocarpus ledifolius Nutt.*
Musk (nodding plumeless) thistle	*Carduus nutans L.*
Muttongrass	*Poa fendleriana (Steud.) Vasey*
Needle and thread	*Hesperostipa comata (Trin. & Rupr.) Barkworth*
Northern (longleaf) arnica	*Arnica lonchophylla Greene*
Northern blackberry (dwarf raspberry)	*Rubus arcticus L. ssp. acaulis (Michx.) Focke*

Common Name	Scientific Name
Oxeye daisy	*Leucanthemum vulgare Lam.*
Perennial (broadleaved) pepperweed/giant whitetop	*Lepidium latifolium L.*
Perennial (field) sowthistle	*Sonchus arvensis L.*
Phlox	*Phlox spp. L.*
Plains pricklypear	*Opuntia polyacantha Haw.*
Plumeless (spiny plumeless) thistle	*Carduus acanthoides L.*
Porter's sagebrush (wormwood)	*Artemisia porteri Cronquist*
Prairie junegrass	*Koeleria macrantha (Ledeb.) Schult.*
Pretty (bigseed alfalfa) dodder	*Cuscuta indecora Choisy*
Puncturevine	*Tribulus terrestris L.*
Purple loosestrife	*Lythrum salicaria L.*
Quackgrass	*Elymus repens (L.) Gould*
Quaking aspen	*Populus tremuloides Michx.*
Ragwort	*Senecio L.*
Rubber rabbitbrush	*Ericameria nauseosa (Pall. ex Pursh) G.L. Nesom & Baird*
Russet (chamisso's) cottongrass	*Eriophorum chamissonis C.A. Mey.*
Saltgrass	*Distichlis spicata (L.) Greene*
Sand dropseed	*Sporobolus cryptandrus (Torr.) A. Gray*
Sandberg bluegrass	*Poa secunda J. Presl*
Sandwort	*Arenaria spp. L.*
Sartwell's sedge	*Carex sartwellii Dewey*
Saskatoon serviceberry	*Amelanchier alnifolia (Nutt.) Nutt. ex M. Roem.*
Scarlet globemallow	*Sphaeralcea coccinea (Nutt.) Rydb.*
Scotch (cotton) thistle	*Onopordum acanthium L.*
Sea purslane (verrucose seapurslane)	*Sesuvium verrucosum Raf.*
Shadscale saltbush	*Atriplex confertifolia (Torr. & Frém.) S. Watson*
Sheathed musineon (wildparsley)	*Musineon vaginatum Rydb.*
Short-leaf (shortleaved) sedge	*Carex misandra R. Br.*
Showy milkweed	*Asclepias speciosa Torr.*
Shrubby cinquefoil	*Dasiphora fruticosa (L.) Rydb.*
Silver sagebrush	*Artemisia cana Pursh*
Single-headed (pygmy) pussytoes	*Antennaria monocephala DC.*
Skeletonleaf bursage (ragweed)	*Ambrosia tomentosa Nutt.*
Skunkbush sumac	*Rhus trilobata Nutt.*
Slender bulrush	*Schoenoplectus heterochaetus (Chase) Soják*
Slim scurfpea	*Psoralidium tenuiflorum (Pursh) Rydb.*
Slimpod Venus' looking-glass	*Triodanis leptocarpa (Nutt.) Nieuwl.*
Small-flowered-fame flowere (sunbright)	*Phemeranthus parviflorus (Nutt.) Kiger*
Snowberry	*Symphoricarpos spp. Duham.*
Spike fescue	*Leucopoa kingii (S. Watson) W.A. Weber*
Spiny hopsage	*Grayia spinosa (Hook.) Moq.*
Spiny phlox	*Phlox hoodii Richardson*
Spotted knapweed	*Centaurea stoebe L. ssp. micranthos (Gugler) Hayek*
Squirreltail	*Elymus elymoides (Raf.) Swezey*
Sulphur-flower buckwheat	*Eriogonum umbellatum Torr.*
Sweetclover	*Melilotus officinalis (L.) Lam*
Tall larkspur	*Delphinium exaltatum Aiton*
Tamarisk	*Tamarix dioica Roxb. ex Roth*
Teal lovegrass	*Eragrostis hypnoides (Lam.) Britton, Sterns & Poggenb.*
Threadleaf sedge	*Carex filifolia Nutt.*
Three-flowered (three-hulled) rush	*Juncus triglumis L.*
Threetip sagebrush	*Artemisia tripartita Rydb.*

Common Name	Scientific Name
Ute ladies'-tresses	*Spiranthes diluvialis Sheviak*
Violet	*Viola L.*
Watson's goosefoot	*Chenopodium watsonii A. Nelson*
Western wheatgrass	*Pascopyrum smithii (Rydb.) Á. Löve*
White arctic whitlow-grass (Austrian draba)	*Draba fladnizensis Wulfen var. pattersonii (O.E. Schultz) Rollins*
Whitetop	*Cardaria draba (L.) Desv.*
Wild (American) licorice	*Glycyrrhiza lepidota Pursh*
Williams' wafer-parsnip (springparsley)	*Cymopterus williamsii R.L. Hartm. & Constance*
Willow	*Salix spp. L.*
Winterfat	*Krascheninnikovia lanata (Pursh) A. Meeuse & Smit*
Woodland horsetail	*Equisetum sylvaticum L.*
Woods' rose	*Rosa woodsii Lindl.*
Woolly (common) twinpod	*Physaria didymocarpa (Hook.) A. Gray var. lanata A. Nelson*
Wyoming big sagebrush	*Artemisia tridentata Nutt. ssp. wyomingensis Beetle & Young*
Yellow rabbitbrush	*Chrysothamnus viscidiflorus (Hook.) Nutt.*
Yellow toadflax (butter and eggs)	*Linaria vulgaris Mill.*
Zephyr (narcissus) windflower	*Anemone narcissiflora L. var. zephyra (A. Nelson) Dutton & Keener*
Gymnosperms	
Blue spruce	*Picea pungens Engelm.*
Douglas-fir	*Pseudotsuga menziesii (Mirb.) Franco*
Engelmann spruce	*Picea engelmannii Parry ex Engelm.*
Juniper	*Juniperus spp. L.*
Limber pine	*Pinus flexilis James*
Lodgepole pine	*Pinus contorta Douglas ex Loudon*
Ponderosa pine	*Pinus ponderosa Lawson & C. Lawson*
Subalpine fir	*Abies lasiocarpa (Hook.) Nutt.*
Ferns	
Fragile rockbrake	*Cryptogramma stelleri (S.G. Gmel.) Prantl*
Green (brightgreen) splenwort	*Asplenium trichomanes-ramosum L.*
Lance-leaved moonwort (lanceleaf grapefern)	*Botrychium lanceolatum (S.G. Gmel.) Angstr. var. lanceolatum*
Mingan moonwort	*Botrychium minganense Vict.*
Puzzling (peculiar) moonwort	*Botrychium paradoxum W.H. Wagner*
Rattlesnake fern	*Botrychium virginianum (L.) Sw.*
Upward-lobed (trianglelobe) moonwort	*Botrychium ascendens W.H. Wagner*
Fungi	
Blister rust	*Cronartium ribicola*
Fish	
Black bullhead	*Ameirus melas*
Brassy minnow	*Hybognathus hankinsoni*
Brook trout	*Salvelinus fontinalis*
Brown trout	*Salmo trutta*
Catfish	*Ictalurus spp.*
Channel catfish	*Ictalurus punctatus*
Common carp	*Cyprinus carpio*
Creek cub	*Semotilus atromaculatus*
Cutthroat trout	*Oncorhynchus clarki*
Fathead minnow	*Pimephales promelas*
Flathead chub	*Platygobio gracilis*

Common Name	Scientific Name
Green sunfish	*Lepomis cyanellus*
Green sunfish	*Lepomus cyanellus*
Largemouth bass	*Micropterus salmoides*
Longnose dace	*Rhinichthys cataractae*
Longnose sucker	*Catostomus catostomus*
Mountain sucker	*Catostomus platyrhynchus*
Pallid sturgeon	*Scaphirhynchus albus*
Northern plains killifish	*Fundulus kansae*
Plains minnow	*Hybognathus placitus*
Plains topminnow	*Fundulus sciadicus*
Rainbow trout	*Oncorhynchus mykiss*
River carpsucker	*Carpiodes carpio*
Rock bass	*Ambloplites rupestris*
Sand shiner	*Notropis stramineus*
Sauger	*Sander canadensis*
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Smallmouth bass	*Micropterus dolomieu*
Stonecat	*Noturus flavus*
Sturgeon chub	*Macrhybopsis gelida*
Walleye	*Sander vitreus*
Western silvery minnow	*Hybognathus argyritis*
White sucker	*Catostomus commersoni*
Yellowstone cutthroat trout	*Oncorhynchus clarki bouvieri*
Wildlife	
American marten	*Martes americana*
Badger	*Taxidea taxus*
Baird's sparrow	*Ammodramus bairdii*
Bald eagle	*Haliaeetus leucocephalus*
Beaver	*Castor canadensisis*
Beet leafhopper	*Circulifer tenellus*
Bighorn Mountain pika	*Ochotona princeps obscura*
Bighorn Mountain snowshoe hare	*Lepus americanus seclusus*
Black bear	*Ursus americanus*
Blackbilled cuckoo	*Coccyzus erythropthalmus*
Black-tailed prairie dog	*Cynomys ludovicianus*
Blue heron	*Ardea herodias*
Bobcat	*Lynx rufus*
Boreal chorus frog	*Pseudacris triseriata*
Boreal owl	*Aegolius funereus*
Brewer's sparrow	*Spizella breweri*
Bull snake	*Pituophis catenifer*
Burrowing owl	*Speotyto cunicularia*
Calliope hummingbird	*Stellula calliope*
Chukar partridge	*Alectoris chukar*
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*
Common loon	*Gavia immer*
Common merganser	*Mergus merganser*
Cormorant	*Phalacrocorax spp.*
Cottontail rabbit	*Sylvilagus spp.*
Coyote	*Canis latrans*
Eastern racer	*Coluber constrictor*
Elk	*Cervus elaphus*
Ferruginous hawk	*Buteo regalis*

Common Name	Scientific Name
Fisher	*Martes pennanti*
Fox squirrel	*Sciurus niger*
Fringed myotis	*Myotis thysanodes*
Garter snake	*Thamnophis sirtalis*
Golden eagle	*Aquila chrysaetos*
Gopher	*Gopherus spp.*
Gopher snake	*Pituophis catenifer*
Gray partridge	*Perdix perdix*
Gray squirrel	*Sciurus carolinensis*
Gray wolf	*Canis lupus*
Great horned owl	*Bubo virginianus*
Greater Sage-Grouse	*Centrocercus urophasianus*
Ground squirrel	*Spermophilus spp.*
Hayden's shrew	*Sorex haydeni*
Hispid pocket mouse	*Chaetodipus hispidus*
Hoary bat	*Lasiurus cinereus*
Horse	*Equus ferus caballus*
Hungarian partridge	*Perdix perdix*
Jackrabbit	*Lepus spp.*
Leopard frog	*Rana pipiens*
Long-eared owl	*Asio otus*
Marten	*Martes spp.*
Mink	*Mustela vison*
Moose	*Alces alces*
Mountain lion	*Puma concolor*
Mountain plover	*Charadrius montanus*
Mule deer	*Odocoileus hermionus*
Muskrat	*Ondata zibethicus*
North American wolverine	*Gulo gulo luscus*
Northern goshawk	*Accipiter gentilis*
Northern harrier	*Circus cyaneus*
Northern leopard frog	*Rana pipiens*
Peregrine falcon	*Falco peregrinus*
Piping plover	*Charadrius melodus*
Pheasant	*Phasianus colchicus*
Plains gartersnake	*Thamnophis radix*
Plains harvest mouse	*Reithrodontomys montanus*
Plains pocket gopher	*Geomys bursarius*
Porcupine	*Erethizon dorsatum*
Prairie falcon	*Falco mexicanus*
Prairie rattlesnake	*Crotalus viridis*
Pronghorn	*Antilocapra americana*
Pygmy nuthatch	*Sitta pygmaea*
Pygmy rabbit	*Brachylagus idahoensis*
Raccoon	*Procyon lotor*
Rail	*family Rallidae*
Red fox	*Vulpes vulpes*
Red squirrel	*Tamiasciurus hudsonicus*
Red-tailed hawk	*Buteo jamaicensis*
Ring-necked pheasant	*Phasianus colchicus*
Sage sparrow	*Amphispiza belli*
Sage thrasher	*Oreoscoptes montanus*
Sagebrush lizard	*Sceloporus graciosus*

Common Name	Scientific Name
Sagebrush vole	*Lemmiscus curtatus*
Short-eared owl	*Asio flammeus*
Snipe	*Gallinago spp.*
Snowshoe hare	*Lepus americanus*
Spotted bat	*Euderma maculatum*
Spotted frog	*Rana luteiventris*
Spotted skunk	*Spilogale gracilis*
Striped skunk	*Mephitis mephitis*
Swainson's hawk	*Buteo swainsoni*
Swift fox	*Vulpes velox*
Terrestrial gartersnake	*Thamnophis elegans*
Three-toed woodpecker	*Picoides dorsalis*
Tiger salamander	*Ambystoma tigrinum mavortium*
Townsend's big-eared bat	*Corynorhinus townsendii*
Trumpeter swan	*Cygnus buccinator*
Turkey	*Meleagris gallopavo*
Turkey vulture	*Cathartes aura*
Virginia's warbler	*Vermivora virginiae*
Vole	*Microtus spp.*
Water vole	*Arvicola amphibius*
Weasel	*Mustela spp.*
Western burrowing owl	*Athene cunicularia hypugea*
White-faced ibis	*Plegadis chihi*
White-tailed deer	*Odocoileus virginianus*
Wild turkey	*Meleagris gallopavo*
Williamson's sapsucker	*Sphyrapicus thyroideus*
Woodhouse's toad	*Bufo woodhousii*
Wyoming ground squirrel	*Spermophilus elegans*
Yellow-billed cuckoo	*Coccyzum americanus*
Yuma myotis	*Myotis yumanensis*
Invertebrates	
Mosquito	*Anopheles spp.*
Grasshopper	*suborder Caelifera; order Orthoptera*
Mussel	*various*
Crayfish	*various*
Mountain pine beetle	*Dendroctonus ponderosae*
Mormon cricket	*Anabrus simplex*
Alfalfa weevil	*Hypera postica gyllenhal*
*Names in parentheses are United States Department of Agriculture Plants Database common name. Source: BLM 2011c	

Table K.2. Special Status Plant Species Potentially Occurring in the Planning Area

Common Name	Habitat	Status
Ute ladies'-tresses orchid	Mesic to wet riparian meadows, marshes, and stream banks.	Threatened
Williams' wafer-parsnip	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides 6,000 to 8,300 feet.	BLM Sensitive Plant Species, WYNDD PSOC
Porter's sagebrush	Sparsely vegetated badlands of ashy or tufaceous mudstones and clay slopes.	BLM Sensitive Plant Species, WYNDD PSOC

Common Name	Habitat	Status
Limber pine	Mountains, associated with high elevation conifer species.	BLM Sensitive Plant Species
Alpine poppy	Open, rocky slopes with delayed snowmelt in the alpine zone.	WYNDD PSOC
Blue elderberry	Stream banks, riverside woodlands, and open areas in the forest understory.	WYNDD PSOC
Broad-leaved twayblade	Grows with moss and grasses in damp, often shady, spots with cool, moist growing conditions.	WYNDD PSOC
Coil-beaked lousewort	Ridge tops and meadows in the upper subalpine and alpine zones.	WYNDD PSOC
Cusick's alkali-grass	Moist riparian areas and alkaline seeps and draws.	WYNDD PSOC
Dwarf woolly-heads	Drying mud of ponds and other vernally wet soil in the valleys and on the plains.	WYNDD PSOC
Fall knotweed	Gravelly or sandy hills and plains.	WYNDD PSOC
False agoseris	Wetland riparian areas.	WYNDD PSOC
Field pussytoes	Sub-irrigated meadows within broad stream channels.	WYNDD PSOC
Fragile rockbrake	Sheltered calcareous cliff crevices and rock ledges, typically in coniferous forest or other boreal habitats.	WYNDD PSOC
Green spleenwort	Rock crevices in forest cover.	WYNDD PSOC
Hairy tranquil goldenweed	Sagebrush grasslands and montane meadows, often on limestone substrates.	WYNDD PSOC
Hall's fescue	Montane meadows, slopes, and edges of open coniferous woods and meadows. Usually on soils derived from calcareous parent material or volcanic soils.	WYNDD PSOC
Kotzebuei's grass-of-parnassus	Mesic to wet arctic and alpine habitats at high elevation.	WYNDD PSOPC
Lance-leaved moonwort	Mature as well as second-growth mesic northern hardwood forests in soil with a rich humus layer.	WYNDD PSOC
Large bur-reed	Continuous fringe with sedges, flags, and reeds along the sides of a river or stream.	WYNDD PSOC
Large yellow lady-slipper	Moist woods and bogs.	WYNDD PSOC
Large-leaved pondweed	Riparian wetland areas.	WYNDD PSOC
Leafy thistle	Moist soil, grasslands, meadows, edges, and openings in boreal forest, subalpine forests, and alpine slopes.	WYNDD PSOC
Longleaf dropseed	Open forests and grasslands on the plains.	WYNDD PSOC
Mingan moonwort	Dense shade, sparse understory, with an alluvium substrate.	WYNDD PSOC
Moschatel	Clay soils and shaded areas in fields and woodland areas.	WYNDD PSOC
Mountain lady-slipper	Dry or moist, open or lightly shaded, brushy or wooded valleys and slopes.	WYNDD PSOC

Common Name	Habitat	Status
Northern arnica	Open woods and slopes on sandy-gravel or limestone and shady, moist north-facing birch-hazelnut forests from 6,500 to 8,000 feet.	WYNDD PSOPC
Northern blackberry	Damp soils in sunny-edged woodlands.	WYNDD PSOC
Pretty dodder	Floodplains of creeks and streams.	WYNDD PSOC
Puzzling moonwort	Mesic to wet subalpine mountain meadows dominated by grasses, sedges, and in some cases, dense herbaceous cover.	WYNDD PSOC
Rattlesnake fern	Rich moist or dry woods, moist thickets, or higher spots in bogs.	WYNDD PSOC
Russet cotton-grass	Wet areas, preferably the acidic, nutrient-poor conditions of peatlands.	WYNDD PSOPC
Sartwell's sedge	Dense large stands, rich fens and swamps, and sometimes on the edges of ponds.	WYNDD PSOC
Sea purslane	Damp, sandy locations such as mangroves, beaches, dunes, salt flats, and marsh edges.	WYNDD PSOC
Sheathed musineon	This species is found on rocky slopes, and in meadows, aspen groves, and ponderosa pine communities.	WYNDD PSOC
Short-leaf sedge	Wet meadows, along stream banks, in willow thickets, and in stony or turfy places in the alpine and upper subalpine zones.	WYNDD PSOC
Single-head pussytoes	Wind-swept, open slopes and ridges in alpine or subalpine tundra. Areas dominated by forbs and bunchgrass with occasional patches of whitebark pine and Engelmann spruce.	WYNDD PSOC
Slender bulrush	Lake edges and wetlands.	WYNDD PSOC
Slim-pod Venus' looking-glass	Dry, sandy prairies, pastures, and disturbed areas.	WYNDD PSOC
Small-flowered fame flower	Bare sandy, acidic soils overlying rocks.	WYNDD PSOC
Teal love grass	Borders of streams and rivers, edge of ponds and lakes, or in sloughs.	WYNDD PSOC
Three-flower rush	Montane stream banks, bogs, and short willow and sedge meadows on wet to saturated soils, sometimes influenced by limestone.	WYNDD PSOC
Upward-lobe moonwort	Well-drained natural and artificially maintained habitats including alpine meadows, avalanche meadows, pastured forest meadows and grassy roadsides.	WYNDD PSOC
Watson goosefoot	Found in a variety of habitats from desert, cliffs, talus, and moist shaded areas under aspen, junipers, or pinyons, often in riparian habitats.	WYNDD PSOC
White arctic whitlow-grass	Found in talus and scree, on rocky slopes and flats, and in alpine meadows.	WYNDD PSOC

Common Name	Habitat	Status
Woodland horsetail	Lowland wet conifer forests and mixed upland, dry conifer, and deciduous forest habitats. Moist open woods, bogs, swamps, prairies, meadows, and stream banks.	WYNDD PSOC
Woolly twinpod	Extending from plains to montane zones.	WYNDD PSOC
Zephyr windflower	Big Horn Mountains from fellfields to alpine meadows, to tundra. Usually moist or swampy soil.	WYNDD PSOC
Source: BLM 2010e; Keinath et al. 2003; Heidel 2012 BLM Bureau of Land Management PSOC Plant Species of Concern PSOPC Plant Species of Potential Concern WYNDD Wyoming Natural Diversity Database		

Table K.3. Fish Species of Importance within the Planning Area

Common Name	Habitat	Status				
		Federal Threatened (T), Endangered (E) or Candidate (C) Species	BLM Sensitive Species	USFS Sensitive Species	WGFD *	TNC Primary (P) and Secondary (S) Target Species
Brassy Minnow	Weedy streams, clear creeks with sand and gravel bottoms, and occasionally in lakes.				SGCN NSS4	
Flathead chub	Turbid waters.			X	SGCN NSS4	S
Goldeye	Tolerant of widely fluctuating environmental conditions, such as turbidity, salinity, and water temperature.				SGCN NSS3	
Mountain whitefish	Prefers deep, fast water in large, clear cold rivers. Sometimes abundant in lakes.				SGCN NSS4	

Common Name	Habitat	Status				
		Federal Threatened (T), Endangered (E) or Candidate (C) Species	BLM Sensitive Species	USFS Sensitive Species	WGFD *	TNC Primary (P) and Secondary (S) Target Species
Pallid sturgeon	Moderate to swift river currents and turbid waterways, depths 3 to 24 feet, with sandy substrates.	E				P
Plains minnow	Large, turbid streams, slow water and side pool habitat.			X	SGCN NSS3	S
Sauger	Large rivers, but may also be found in reservoirs. Tolerant of turbid waters.				SGCN NSS3	
Shovelnose sturgeon	River bottoms, often in areas with swift current and sand or gravel bottom and turbid water.				SGCN NSS3	
Sturgeon chub	Turbid water with moderate to strong current over bottoms ranging from rocks and gravel to coarse sand.			X	SGCN NSS1	P
Western silvery minnow	Sluggish pools and backwaters, usually over mud or sand, of small to large rivers.				SGCN NSS2	

Common Name	Habitat	Status				
		Federal Threatened (T), Endangered (E) or Candidate (C) Species	BLM Sensitive Species	USFS Sensitive Species	WGFD *	TNC Primary (P) and Secondary (S) Target Species
Yellowstone cutthroat trout	Relatively clear, cold creeks, rivers, and lakes at temperatures between 4 and 15 degrees Celsius.		X	X	SGCN NSS2	

Source: WGFD 2010; BLM 2010e; Keinath et al. 2003; BLM 2003c

BLM Bureau of Land Management
NSS1 Native Species Status 1
NSS2 Native Species Status 2
NSS3 Native Species Status 3
NSS4 Native Species Status 4
SGCN Species of Greatest Conservation Need
TNC The Nature Conservancy
USFS United States Forest Service
WGFD Wyoming Game and Fish Department

Table K.4. Wildlife Species of Importance Potentially Occurring within the Planning Area

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Big Game										
Moose	Engelmann spruce, Douglas-fir and subalpine fir, and lodgepole pine forests plus associated habitats.				SGCN NSS4					
Upland Game										
Greater Sage-Grouse	Sagebrush habitats.	C	X	X	SGCN NSS2		I	X		S
Blue grouse	Coniferous forests, aspen, willow, mountain park-meadows, logged forests. Nests on the ground.						III	X		
Birds of Prey										
Bald eagle	Near large lakes and rivers in forested habitat where adequate prey and old, large-diameter cottonwood or conifer trees are available for nesting.		X	X	SGCN NSS2	X	I			P
Boreal owl	Mature, high elevation forests of Engelmann spruce, subalpine fir, and lodgepole pine interspersed mature aspen.				SGCN NSS3		II	X		

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Eastern screech owl	Open woodlands, deciduous forests, wooded urban areas, cottonwood-riparian. Nests in tree cavities or hallow stump.						II			
Ferruginous hawk	Arid and semiarid grassland regions with is open, level, or rolling prairies. Foothills or middle elevation plateaus largely devoid of trees, and cultivated shelterbelts or riparian corridors.		X	X	SGCN NSSU	X	I	X		
Flammulated owl	Montane forests, especially ponderosa pine.			X		X				
Golden eagle	Most habitats with open areas for foraging. Nests in a tree or on a cliff.					X	III			
Merlin	Open woodlands, savannah, grasslands, and shrub-steppe. Nest in large trees usually in old domed magpie nests, in open woodlands within a short distance of open sagebrush-grassland.				SGCN NSSU		II			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Northern goshawk	Mature, high-elevation forests of Engelmann spruce, subalpine fir, and lodgepole pine interspersed with mature aspen stands. Need a home range of over 2,500 acres.		X	X	SGCN NSSU		I			
Northern harrier	Open country, like grasslands, steppes, wetlands, meadows, cultivated areas, and tundra. Nests on the ground in thick grass, shrubbery, or other vegetation			X			III			
Peregrine falcon	Open habitats from open woodlands and forests to shrub-steppe, grasslands, marshes, and riparian habitats. Nests in cliffs.		X	X	SGCN NSS3	X	I			P
Prairie falcon	Cliffs in all habitats with open areas. Nests in a hole or on a ledge on a cliff or rock outcrop.					X	III			
Short-eared owl	Broad expanses of open habitat with dense, low vegetation, including prairies, grasslands, marshes, and open sagebrush shrublands. Dependent on the meadow vole, which comprises at least 90% of its diet.			X	SGCN NSS4	X	I	X		

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Swainson's hawk	Open grasslands, prairies, farmlands, and deserts that have some trees for nesting.				SGCN NSSU		I	X		
Western burrowing owl	Arid and semiarid environments, with well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground. It prefers open prairie, grassland, desert, and shrub-steppe habitats, and may also inhabit agricultural areas. Dependent on burrowing mammals, like prairie dogs and ground squirrels.		X	X	SGCN NSSU	X	I			S
Migratory Birds (excluding birds of prey)										
American avocet	Marshes, ponds, shorelines. Nests on the ground close to water among tufts of vegetation.						III			
American bittern	Marshes with open water in the center, gradual slopes, a band of emergent vegetation around the periphery, and idle grassland in the adjacent uplands.			X	SGCN NSS3	X	I			
American dipper	Swift mountain streams. Nests on a cliff face, behind a waterfall, or on a midstream rock.						II			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
American three-toed woodpecker	Coniferous forests, primarily above 8,900 feet. Must include unfragmented blocks of old-growth and an abundance of dying trees with occasional disturbances.			X	SGCN NSSU		II			
American white pelican	Rivers, streams, lakes, ponds, and marshes. Nests colonially on large freshwater lakes, and requires islands isolated from mammalian predators.						II			P
American wigeon	Marshes, lakes, mostly below 8,000 feet.								MH	
Baird's sparrow	Native mixed-grass and fescue prairie.		X			X	I	X		S
Barrow's goldeneye	Montane and subalpine lakes and rivers, beaver ponds, and small sloughs. Nests almost exclusively in tree cavities.				SGCN NSS3		IV			
Black-backed woodpecker	Lodgepole pine, Douglas-fir, Engelmann spruce-subalpine fir, especially those forests that have been burned. Nests in a cavity in a conifer.			X	SGCN NSSU		II			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Black-billed cuckoo	Deciduous and mixed coniferous/deciduous forests, open woodlands, especially cottonwood-riparian, urban areas. Nests against tree trunk, on a log, occasionally in vine tangles.			X		X	II			
Black-billed magpie	All habitats below 8,000 feet. Nest is large and conspicuous in a small tree or shrub.						IV			
Black-chinned hummingbird	Basin-prairie shrublands, riparian shrub. Nests on a small limb of a deciduous tree, often near or over a stream.						II			
Black-crowned night heron	Marshes, swamps, wooded streams, and shores of lakes and ponds. Nests in colonies in emergent vegetation or in shrubs near the edge of water.				SGCN NSS3					
Black-headed grosbeak	Aspen and riparian woodlands below 8,000 feet. Nests in a deciduous tree or shrub.						IV			
Black rosy-finch	Alpine grasslands, alpine moss-lichen-forb, barren ground, fallow agricultural areas. Nests on the ground or on a cliff.				SGCN NSSU	X	III			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Black tern	Biologically rich marshes and aquatic areas. Prefers marshes or marsh complexes greater than 50 acres. Nests in small, loose colonies, generally in areas of still water, with 25% to 75% of the surface covered by emergent vegetation, and well-interspersed with open water.			X	SGCN NSS3		I			
Black-throated gray warbler	Pine-juniper, woodland chaparral, mountain-foothills shrublands. Nests far out on a horizontal branch, usually in a conifer.						III			
Blue-winged teal	Marshes and lakes in association with most habitats below 8,000 feet. Nests on ground in good vegetative cover.								MH	
Bobolink	Grasslands; large expanses of grass or forb cover.				SGCN NSS4		II			
Brewer's sparrow	Northern Rocky Mountains including sagebrush and alpine meadows.		X	X	SGCN NSS4		I	X		

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Broad-tailed hummingbird	Riparian shrub; mountain-foothills grasslands; coniferous forests; wet-moist meadows within Douglas-fir, Engelmann spruce-subalpine fir, other coniferous or mixed forests, and aspen.						II			
Brown creeper	Coniferous forests, aspen, cottonwood-riparian. Nests in a cavity excavated in a rotten branch or stump, occasionally in a deserted woodpecker cavity.						II			
Bufflehead	Aspen; cottonwood-riparian; marshes; lakes and rivers associated with lodgepole pine, Douglas-fir, and other mixed coniferous forests. Nests in a cavity, usually in a dead tree.						IV			
Bullock's oriole	Cottonwood-riparian, cottonwood-dryland, rural developments, urban areas. Nests in deciduous trees; nests usually hung from a drooping branch.						III			
California gull	Large lakes, scavenges in most open habitats below 8,000 feet. Nests on sticks and dried weeds on the ground close to water.						IV			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Calliope hummingbird	Coniferous forests, woodland-chaparral, mountain foothills shrublands, riparian shrub, mountain park-meadows, alpine grasslands. Nests on a limb of a tree or on a conifer cone.						II			
Canvasback	Deep, open, permanent ponds, marshes and potholes. Breeding may occur in small lakes, deep-water marshes, sheltered bays of large freshwater and alkali lakes, permanent and semi-permanent ponds, sloughs, potholes, and shallow river impoundments.				SGCN NSS3		IV		MH	
Canyon wren	Cliffs in canyons and mountains; rock outcrops/rock piles in pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands. Nests in a crevice or cave on a bank or cliff.						III			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Cassin's finch	Coniferous forests up to timberline, including burns. Nests in a conifer, nest is usually placed near the end of a large limb.					X	IV			
Cassin's kingbird	Ponderosa pine savannah, pine-juniper, cottonwood-riparian, cottonwood-dryland, woodland-chaparral, basin-prairie and mountain-foothills shrublands. Nests on a horizontal branch near the trunk of a tree.						II			
Caspian tern	Marshes and aquatic areas; prefers open areas with sparse vegetation. Nests in small colonies on sandy or gravelly beaches along lakes, rivers, and marshes.				SGCN NSS3					
Chestnut-collared longspur	Shortgrass and open mixed-grass prairies. Prefers relatively mesic areas. Low, moist areas and wet-meadow zones around wetlands may provide suitable habitat.			X	SGCN NSS4	X	II			S
Chimney swift	Feeds in the air over many habitats below 7,500 feet, especially in urban areas. Nests in a hollow tree or chimney or other suitable human-built structure.						IV			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Cinnamon teal	Marshes and lakes in association with most habitats below 8,000 feet. Nests on the ground in a marsh or meadow.						IV			
Clark's grebe	Marshes and lakes, usually with extensive areas of open water and bordered by tall emergent vegetation. Nests in areas that provide large clumps of emergent vegetation interspersed with open water so that the vegetation blocks wave action.				SGCN NSS4					
Clark's nutcracker	Coniferous forests, aspen, cliffs in canyons or mountains, juniper-sagebrush, ponderosa pine-juniper. Nests on a horizontal limb of a mature conifer.						III			
Clay-colored sparrow	Ponderosa pine savannah, pine-juniper, aspen, cottonwood-riparian, mountain-foothills shrublands, sagebrush-grasslands, shelterbelts. Nests in a shrub or on the ground.						IV			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Common loon	Lakes at least 10 acres, secluded from humans, with clear water, and islands or protected shores for nesting between 6,000-8,000 feet.				SGCN NSS1		II			
Common poorwill	A variety of habitats below 8,000 feet including pine-juniper, woodland-chaparral, basin prairie and mountain-foothills shrublands, grasslands, agricultural areas. Nests on the ground.						III			
Dickcissel	Grasslands with taller grasses, forbs, or shrubs, but also uses alfalfa and hayfields.				SGCN NSS4		II	X		
Dusky flycatcher	Ponderosa pine savannah, pine-juniper, aspen, cottonwood-riparian, woodland-chaparral, riparian shrub. Nests in the crotch of a juniper or sagebrush, or near the base of a thorny shrub.						II			
Forester's tern	Freshwater marshes and marshy borders of ponds and lakes, and prefers large marsh complexes with vegetated nests sites near patches of open water.				SGCN NSS3		I			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Franklin's gull	Marshes and sloughs with sparse emergent vegetation. Nests in colonies in marshes no denser than 10 plants less than 1 meter tall per square meter, and usually near patches of open water.				SGCN NSS3		I			S
Golden-crowned kinglet	Coniferous forests, aspen-conifer. Nest is hung from branches near the trunk of a conifer.						II			
Grasshopper sparrow	Shortgrass prairies, mixed grasslands, meadows, open sagebrush-grasslands, and agricultural areas.			X	SGCN NSS4	X	II			
Green-tailed towhee	Mixed coniferous forests, woodland-chaparral, juniper-sagebrush, basin-prairie and mountain-foothills shrublands, riparian shrub.						IV			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Harlequin duck	Cold, shallow, rapid mountain streams away from concentrated human activities. Nests on ground along streams with less than 5% gradient, dense shrubs lining the banks, braided channels, swift currents, abundant aquatic insects, and good water quality.			X	SGCN NSS3		II			
Harris's sparrow	Deciduous forests, agricultural areas, urban areas.							X		
Lark bunting	Shortgrass and mixed-grass prairies, as well as disturbed grasslands, sagebrush grassland and shrub-steppe habitats, mountain-foothill shrublands, and agricultural areas.				SGCN NSS4		II			
Lark sparrow	Pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands, grasslands, agricultural areas. Nests in hollow depression on the ground.						II			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Lazuli bunting	Pine-juniper, woodland chaparral, mountain-foothills shrublands with aspen, cottonwood-riparian.						III			
Lesser scaup	Permanent, intermittently exposed, and semipermanent wetlands 2 acres in size or greater. Nest in uplands, usually close to water's edge.				SGCN NSS3				H	
Lewis' woodpecker	Ponderosa pine savannah, pine-juniper, other coniferous forests, aspen, cottonwood-riparian, below 8,500 feet. Nests in a cavity in a dead tree or live tree on in a pole.			X	SGCN NSSU	X	II	X		
Loggerhead shrike	Grasslands interspersed with scattered trees and shrubs that provide nesting and perching sites.		X	X		X	II			
Long-billed curlew	Plains, grasslands, and prairies. Nests on the ground in habitat that usually includes: grass less than 12 inches high; bare ground; shade; abundant invertebrate prey; and a minimum of suitable habitat.		X	X	SGCN NSS3	X	I	X		

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
MacGillivray's warbler	Aspen, cottonwood-riparian, riparian shrub, below 9,000 feet. Nests close to the ground in dense shrubs.						II			
Mallard	Marshes and lakes in association with most habitats below 9,000 feet. Nests on ground near water.								H	
Marbled godwit	Wet-moist meadow grasslands, marshes, aquatic areas, shorelines, irrigated native meadows.					X		X		
Marsh wren	Marshes. Nest is attached to reeds.						II			
McCown's longspur	Open, dry, sparsely vegetated areas. It prefers shortgrass prairie and basin-prairie shrubland habitats, and also inhabits plowed and stubble fields, grazed pastures, dry lakebeds, and other sparse, bare, dry ground.			X	SGCN NSS4	X	I	X		
Mountain bluebird	Most habitats with nesting cavities and open areas for foraging. Nests usually in a woodpecker cavity in a snag.						IV			
Mountain chickadee	Coniferous forest, aspen, juniper-sagebrush. Nests in a natural or woodpecker cavity in a tree or snag.						IV			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Mountain plover	Low, open habitats such as arid shortgrass, and mixed grass prairies dominated by blue grama and buffalograss with scattered clumps of cacti and forbs, and saltbush habitats of the shrub-steppe of central and western Wyoming.		X	X	SGCN NSSU	X	I	X		P
Northern bobwhite	Cottonwood-riparian, riparian shrub, agricultural areas. Nests on the ground.						IV			
Northern pintail	Marshes and lakes below 8,000 feet in elevation.				SGCN NSS3				H	
Northern rough-winged swallow	Adjacent to aquatic areas. Forages over a variety of habitats below 8,000 feet.						III			
Olive-sided flycatcher	Coniferous forests from 8,000 feet to timberline, aspen-riparian. Nests often high in a conifer on a horizontal branch.			X			II	X		
Ovenbird	Aspen, cottonwood-riparian. Nests on the leaf-covered forest floor.						III			
Pinyon jay	Ponderosa pine savannah, pine-juniper, woodland-chaparral, mountain-foothills shrublands. Nests in a juniper or pine, occasionally an oak.					X	IV	X		

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Plumbeous vireo	Douglas-fir, ponderosa pine savannah, ponderosa pine-Douglas-fir, other or mixed coniferous forests, aspen, cottonwood-riparian. Nests in a conifer, occasionally an oak.						II			
Pygmy nuthatch	Ponderosa pine forests, although it also occurs in other coniferous habitats. It prefers mature to old-growth stands that are fairly open with a component of vigorous trees of intermediate age.				SGCN NSSU		II			
Redhead	Permanently and semipermanently flooded palustrine wetlands. Also may inhabit cropland ponds, alkali lakes, sewage ponds, reservoirs, stream, and oxbows.				SGCN NSS3		IV		MH	
Red-headed woodpecker	Cottonwood-riparian, ponderosa pine savannah. Nests in a cavity in a barkless dead tree or a stub on a live tree.					X	III	X		
Red-naped sapsucker	Aspen and cottonwood-riparian from 5,000 to 9,000 feet. Also coniferous forests. Nests in cavity in a deciduous tree, often near water.						II			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Rock wren	Rock outcrops/rock piles in pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands, grasslands. Nests in a hole or crevice, often under or around rocks.						III			
Rufous hummingbird	Riparian shrub; mountain-foothills grasslands; coniferous forests; wet-moist meadows within lodgepole pine, Douglas-fir, other coniferous or mixed forests, aspen, and mountain-foothills shrublands.						II	X		
Sage sparrow	Sagebrush flats, alkaline flats with saltbush, and semi-desert shrublands in the lowlands.		X	X	SGCN NSS4	X	I			
Sage thrasher	Open, shrub-steppe country dominated by sagebrush or bitterbrush, with native grasses intermixed, generally avoiding cheatgrass-dominated landscapes.		X		SGCN NSS4	X	II			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Sandhill crane	Wet-moist meadowgrasslands, sedge meadows, irrigated native and introduced meadows, small grains, marshes. Nests on the ground.				SGCN NSS4		IV			
Say's phoebe	Basin-prairie shrublands, grasslands. Nests in a cliff or bank, occasionally under an eave or bridge.						III			
Snowy egret	Grassy marshes, reservoirs, lakes, ponds, and wet meadows. Nests in mixed colonies in emergent vegetation or in shrubs on islands.				SGCN NSS3					
Townsend's solitaire	Coniferous forests, aspen. Nests often amid tree roots or other shelter on the ground.						II			
Trumpeter swan	Foraging grounds during migration include wetlands, lakes and reservoirs.		X	X	SGCN NSS2		I			
Upland sandpiper	Open grasslands, including prairies, meadows, pastures, hayfields, alfalfa fields, and highway rights-of-way.				SGCN NSSU	X	I			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Veery	Aspen, cottonwood-riparian, coniferous forests, below 9,000 feet. Nests on the ground or in a shrub.						III			
Vesper sparrow	Basin-prairie and mountain-foothills shrublands, grasslands, and agricultural areas.						II			
Virginia's warbler	Pinyon-juniper, woodland chaparral. Nests on the ground, usually hidden by vegetation.						III			
Warbling vireo	Deciduous and coniferous forests, urban areas.						IV			
Western bluebird	Pine-juniper, juniper woodlands, associated with edges. Often nests in a woodpecker cavity in a snag.						II			
Western grebe	Marshes and lakes, usually with extensive areas of open water and bordered by tall emergent vegetation. Nests in areas that provide large clumps of emergent vegetation interspersed with open water so that the vegetation blocks wave action.						III			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Western tanager	Coniferous and deciduous forests. Usually nests in a conifer, in a fork or on a horizontal branch, well out from the trunk.						IV			
Whimbrel	Marshes, ponds, lakes, shorelines.							X		
White-faced ibis	Shallow lake waters, muddy ground of wet meadows, marshes, ponds, lakes, rivers, flooded fields, and estuaries.		X		SGCN NSS3					
White-throated swift	Aerially feeds over most habitats with cliffs below 9,000 feet. Nests deep in a crack or crevice of a rock wall.						II	X		
Willet	Wet-moist meadow grasslands, marshes, irrigated native meadows, shorelines. Nest on the ground, commonly on exposed beach or shore.						III			
Williamson's sapsucker	Coniferous forests, especially those that have burned. Also aspen. Nests in cavity in and aspen, pine, or fir.						II			

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Willow flycatcher	Riparian obligate: Uses willow or alder thickets along streams, especially where streams are bordered by open stands of cottonwoods.				SGCN NSS4	X	II	X		
Wilson's phalarope	Marshes, lakes, and shorelines. Nests on damp ground near water.						I	X		
Wilson's warbler	Riparian shrub from 7,000 to 10,500 feet. Usually nests on the ground, often in a vine tangle.						II			
Wood duck	Cottonwood-riparian, marshes, lakes, rivers. Nests in a tree cavity.			X			IV	X		
Yellow-billed cuckoo	Riparian obligate: Prefers extensive areas of dense thickets and mature deciduous forests near water, and requires low, dense, shrubby vegetation for nest sites.		X	X	SGCN NSSU		II			
Mammals										

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Big brown bat	Man-made and natural roosts, including tree cavities, rock crevices, caves, abandoned mines and bridges in a wide variety of habitats and elevations, including cottonwood riparian woodlands, sagebrush-steppe, juniper woodlands, conifer forests, and aspen woodlands.				SGCN NSS4					
Black-footed ferret	Shortgrass and midgrass prairies in close association with prairie dog colonies.	E			SGCN NSS1					
Black-tailed prairie dog	Dry, flat, open, shortgrass and mixed-grass grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle.		X	X						P
Bobcat	Habitat varies widely from forests and mountainous areas to semi-deserts and brush land.									S

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Dwarf shrew	Rocky areas such as talus slopes in a variety of habitats, from alpine tundra through subalpine forests and rock slides, and, at lower elevations, from montane forests and foothills to arid shortgrass prairie.				SGCN NSS3					
Fisher	Extensive coniferous forests (mature to late successional) with a high degree of continuous overhead cover.				SGCN NSSU					
Fringed myotis	Hot desert scrubland, grassland, xeric woodland, sagegrass steppe, mesic oldgrowth forest, and multiaged sub-alpine coniferous and mixed deciduous forest. Xeric woodlands (oak and pinyon juniper).		X		SGCN NSS3					
Hayden's shrew	Grasslands, prairies, marshes, riparian areas, and wet meadow. Nests under logs or rocks or in crevices.				SGCN NSS4					
Hispid pocket mouse	Rocky or gravelly areas with heavy soils in dry grassland habitats.				SGCN NSS3					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Least weasel	Burrows made by a vole or mole in rolling gentle ridges dominated by sagebrush and grasses that are divided by riparian habitats of willows and cottonwoods.				SGCN NSSU					
Little brown myotis	Coniferous forest, riparian areas, woodlots, shelterbelts, and urban areas. Roosts in buildings, tree cavities, loose tree bark, bridges, rock crevices, caves, and abandoned mines.				SGCN NSS4					
Long-eared myotis	Coniferous forests in mountain areas. Roosts in small colonies in caves, buildings, and under tree bark.		X		SGCN NSS3					
Long-legged myotis	Open, mature forests with standing dead trees. Roosts in tree cavities, buildings, rock crevices, caves, abandoned mines, and under loose bark.				SGCN NSS3					
Marten	Mature and old-growth conifer and mixed stands. Dens in tree cavities, rotten logs, and underground.			X						
Mountain lion	Typically found in remote areas that have dense cover and rocky, rugged terrain.									S

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
North American wolverine	Subalpine coniferous forests, especially dense, continuous stands in remote mountain areas, and alpine habitats.			X						
Northern flying squirrel	Coniferous, deciduous, mixed, and riparian forests and woodlands, often most abundant near wetlands or streams.				SGCN NSS4					
Northern myotis	Wooded riparian zones in badlands and prairies to higher elevation conifer and deciduous woodlands. Roosts in crevices and cavities of trees, under loose bark, and occasionally in buildings.				SGCN NSS3					
Northern river otter	Permanent riverine, aquatic, and riparian areas. Dens in hollow logs, beaver lodges, burrows dug by other animals, log or rock piles, or dense thickets near water.			X	SGCN NSSU					
Olive-backed pocket mouse	Variety of arid and semiarid upland habitats, primarily sparsely vegetated grasslands and sagebrush-grasslands.				SGCN NSS4					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Pallid bat	Low desert shrublands, juniper woodlands, and grasslands, and occasionally cottonwood-riparian zones. Roosts in rock crevices, buildings, rock piles, tree cavities, shallow caves, and abandoned mines.				SGCN NSS3					
Preble's shrew	The habitat needs are poorly known. Collected in arid and semiarid sagebrush-grasslands and openings on subalpine coniferous forests dominated by sagebrush. Also known to occur near creeks and bogs bordered by willow or riparian shrub, in wet areas in open conifer stands, and areas covered by marsh grasses.				SGCN NSS3					
Silky pocket mouse	Variety of arid, and sometimes barren, habitats. Prefers thin low grasses and a minimum of bare soil.				SGCN NSS3					
Spotted bat	Prominent rock features in extreme, low desert habitats to high elevation forests.		X	X	SGCN NSS3					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Swift fox	Grasslands, plains, and foothills in shortgrass prairies and deserts.		X	X	SGCN NSS4					P
Townsend's big-eared bat	Mines, caves, and structures in woodlands and forests to elevations above 9,500 feet.		X	X	SGCN NSS2					S
Vagrant shrew	Riparian shrub, moist meadow grasslands, bogs, and riparian or marsh habitats with moist soil within a variety of habitat types from sagebrush-grasslands and mixed shrubland to conifer forest.				SGCN NSS4					
Water vole	Moist subalpine and alpine meadows of willows, grasses, and forbs atop deep soils.			X	SGCN NSS3					
Western small-footed myotis	Arid, rocky areas within a variety of habitats. Roosts in crevices, overhangs, cliffs, under rocks, caves, buildings, bridges, or under loose bark and/or abandoned mines.				SGCN NSS4					
Reptiles and Amphibians										
Columbia spotted frog	Sub-alpine forests grasslands and sagebrush habitats at elevations from 1,700 feet to 6,400 feet.		X	X	SGCN NSS3					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Eastern yellow-bellied racer	Scarp woodlands of the plains and foothill zones, and woodland communities, usually close to streams or rocky outcrops with cover nearby.									S
Great plains toad	Grasslands, sand hills and agricultural areas below 6,000 feet in elevation.				SGCN NSSU					
Greater short-horned lizard	Grassland and sagebrush habitats.				SGCN NSS4					S
Northern leopard frog	Permanent ponds, swamps, marshes, and slow-moving streams throughout forest, open, and urban areas. Water bodies with abundant aquatic vegetation.		X	X	SGCN NSSU4					
Pale milksnake	Grasslands, sandhills, and scarp woodlands below 6,000 feet in elevation.				SGCN NSS3					
Plains gartersnake	Residential areas, dry grasslands, and sandhills near small streams, sloughs, marshes, and ponds.				SGCN NSSU					
Plains hog-nosed snake	Grasslands and sandhills. Burrows in loose soils.				SGCN NSSU					
Plains spadefoot	Grasslands and sagebrush communities in the plains zone below 6,000 feet in elevation.				SGCN NSSU					

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species
Western painted turtle	Swampy habitats, small lakes, ponds, and muddy streams below 6,000 feet in elevation in the plains zone.				SGCN NSS4					
Western spiny softshell turtle	Permanent lakes, ponds, and large streams below 6,000 feet in elevation in the plains.				SGCN NSS4					
Wood frog	Beaver ponds, slowly moving streams, small lakes, wet meadows and willow thickets in the montane zone, usually around 9,000 feet in elevation.			X	SGCN NSS2					

Source: WGFD 2010; BLM 2010e; Keinath et al. 2003; BLM 2003c

[1] Occurrence in the planning area is vague or unsubstantiated, according to WYNDD.

Note: Canada lynx is listed as Threatened under the ESA. Although WYNDD considers the Canada lynx a species of concern in Johnson and Sheridan Counties, the USFWS has not designated critical habitat within the planning area, and impacts to this species are therefore not considered in management decisions.

BLM Bureau of Land Management
C Candidate
E Endangered
ESA Endangered Species Act
H High
MH Moderately High
NAWMP North American Waterfowl Management Plan
NSS1 Native Species Status 1
NSS2 Native Species Status 2
NSS3 Native Species Status 3
NSS4 Native Species Status 4
NSSU Native Species Status Unknown

Common Name	Habitat	Status								
		Federal T, E, P, or C Species	BLM Sensitive Species	USFS Sensitive Species	WGFD	USFWS Birds of Conservation Concern	PIF Priority Bird Species Level (I – IV)	Audubon Watchlist (2002) Species	NAWMP Priority Species	TNC Primary and Secondary Target Species

P Proposed
PIF Partners in Flight
SGCN Species of Greatest Conservation Need
T Threatened
TNC The Nature Conservancy
USFS United States Forest Service
USFWS United States Fish and Wildlife Service
WGFD Wyoming Game and Fish Department
WYNDD Wyoming Natural Diversity Database

K.2. Raptor Management

Protections for Raptors

Raptors, or birds of prey, and the majority of other birds in the United States are protected by the Migratory Bird Treaty Act (MBTA), 16 United States Code (U.S.C.) 703. A complete list of migratory bird species can be found in the Code of Federal Regulations (CFR) at 50 CFR 10.13. Eagles are also protected by the Bald and Golden Eagle Protection Act, 16 U.S.C. 668 (Eagle Act).

The MBTA protects migratory birds, eggs and nests from possession, sale, purchase, barter, transport, import, export, and take. The regulatory definition of take, defined in 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect a migratory bird. Activities that result in the unpermitted take (e.g., result in death, possession, collection, or wounding) of migratory birds or their eggs are illegal and fully prosecutable under the MBTA. Removal or destruction of active nests (i.e., nests that contain eggs or young), or causing abandonment of an active nest, could constitute a violation of the MBTA, the Eagle Act, or both statutes. Removal of any active migratory bird nest or any structure that contains an active nest (e.g., tree) where such removal results in take is prohibited. Therefore, if nesting migratory birds are present on or near a project area, project timing is an important consideration during project planning. As discussed below, the Eagle Act provides additional protections for bald and golden eagles and their nests. For additional information concerning nests and protections under the MBTA, please see the U.S. Fish and Wildlife Service's (USFWS) Migratory Bird Permit Memorandum, MBMP-2.

The USFWS Wyoming Ecological Services Field Office works to raise public awareness about the possible occurrence of birds in proposed project areas and the risk of violating the MBTA, while also providing guidance to minimize the likelihood that take will occur. We encourage you to coordinate with our office before conducting actions that could lead to the take of a migratory bird, their young, eggs, or active nests (e.g., construction or other activity in the vicinity of a nest that could result in a take). If nest manipulation is proposed for a project in Wyoming, the project proponent should also contact the USFWS's Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued. Permits generally are not issued for an active nest of any migratory bird species, unless removal of the nest is necessary for human health and safety. If a permit cannot be issued, the project may need to be modified to ensure take of migratory birds, their young or eggs will not occur.

For infrastructure (or facilities) that have potential to cause direct avian mortality (e.g., wind turbines, guyed towers, airports, wastewater disposal facilities, transmission lines), we recommend locating structures away from high avian-use areas such as those used for nesting, foraging, roosting or migrating, and the travel zones between high-use areas. If the wildlife survey data available for the proposed project area and vicinity do not provide the detail needed to identify normal bird habitat use and movements, we recommend collecting that information prior to determining locations for any infrastructure that may create an increased potential for avian mortalities. We also recommend contacting the USFWS Wyoming Ecological Services Office for project-specific recommendations.

Additional Protections for Eagles

The Eagle Act protections include provisions not included in the MBTA, such as the protection of unoccupied nests and a prohibition on disturbing eagles. Specifically, the Eagle Act prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald

or golden eagle or their body parts, nests, chicks or eggs, which includes collection, possession, molestation, disturbance, or killing. The term "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3 and see also 72 Federal Register [FR] 31132).

The Eagle Act includes limited exceptions to its prohibitions through a permitting process. The USFWS has issued regulations concerning the permit procedures for exceptions to the Eagle Act's prohibitions (74 FR 46836), including permits to take golden eagle nests which interfere with resource development or recovery operations (50 CFR 22.25). The regulations identify the conditions under which a permit may be issued (i.e., status of eagles, need for action), application requirements, and other issues (e.g., mitigation, monitoring) necessary in order for a permit to be issued.

For additional recommendations specific to Bald Eagles please see our Bald Eagle information web page (http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/BaldEagle.html).

Recommended Steps for Addressing Raptors in Project Planning

Using the following steps in early project planning, agencies and proponents can more easily minimize impacts to raptors, streamline planning and permitting processes, and incorporate measures into an adaptive management program:

1. Coordinate with appropriate USFWS offices, Wyoming Game and Fish Department (WGFD), Tribal governments, and land-management agencies at the earliest stage of project planning.
2. Identify species and distribution of raptors occurring within the project area by searching existing data sources (e.g., WGFD, federal land-management agencies) and by conducting onsite surveys.
3. Plan and schedule short-term and long-term project disturbances and human-related activities to avoid raptor nesting and roosting areas, particularly during crucial breeding and wintering periods
4. Determine location and distribution of important raptor habitat, nests, roost sites, migration zones and, if feasible, available prey base in the project impact area.
5. Document the type, extent, timing, and duration of raptor activity in important use areas to establish a baseline of raptor activity.
6. Ascertain the type, extent, timing, and duration of development or human activities proposed to occur, and the extent to which this differs from baseline conditions.
7. Consider cumulative effects to raptors from proposed projects when added to past, present, and reasonably foreseeable actions. Ensure that project mitigation adequately addresses cumulative effects to raptors.
8. Minimize loss of raptor habitats and avoid long-term habitat degradation. Mitigate for unavoidable losses of high-valued raptor habitats, including (but not limited to) nesting, roosting, migration, and foraging areas.
9. Monitor and document the status of raptor populations and, if feasible, their prey base post project completion, and evaluate the success of mitigation efforts.
10. Document meaningful data and evaluations in a format that can be readily shared and incorporated into wildlife databases (contact the USFWS Wyoming Ecological Services Office for details).

Protection of nesting, wintering (including communal roost sites), and foraging activities is considered essential to conserving raptors. In order to promote the conservation of migratory bird populations and their habitats, federal agencies should implement those strategies directed by Executive Order (EO) 13186, "Responsibilities of Federal Agencies To Protect Migratory Birds" (66 FR 3853).

Recommended Seasonal and Spatial Buffers to Protect Nesting Raptors

Because many raptors are particularly sensitive to disturbance (that may result in take) during the breeding season, we recommend implementing spatial and seasonal buffer zones to protect individual nest sites/territories (Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 1796)). The buffers serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees. The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there is little or no forested or topographical separation, distance alone must serve as the buffer. Adequate nesting buffers will help ensure activities do not take breeding birds, their young or eggs. For optimal conservation benefit, we recommend that no temporary or permanent surface occupancy occur within species-specific spatial buffer zones. For some activities with very substantial auditory impacts (e.g., seismic exploration and blasting) or visual impacts (e.g., tall drilling rig), a larger buffer than listed in Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 1796) may be necessary, please contact the USFWS Wyoming Ecological Services Office for project specific recommendations on adequate buffers.

As discussed above, for infrastructure that may create an increased potential for raptor mortalities, the spatial buffers listed in Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 1796) may not be sufficient to reduce the incidence of raptor mortalities (for example, if a wind turbine is placed outside a nest disturbance buffer, but inadvertently still within areas of normal daily or migratory bird movements); therefore, please contact the USFWS Wyoming Ecological Services Office for project specific recommendations on adequate buffers.

Buffer recommendations may be modified on a site-specific or project-specific basis based on field observations and local conditions. The sensitivity of raptors to disturbance may be dependent on local topography, density of vegetation, and intensity of activities. Additionally, individual birds may be habituated to varying levels of disturbance and human-induced impacts. Modification of protective buffer recommendations may be considered where biologically supported and developed in coordination with the USFWS Wyoming Ecological Services Field Office.

Because raptor nests are often initially not identified to species (e.g., preliminary aerial surveys in winter), we first recommend a generic raptor nest seasonal buffer guideline of January 15th – August 15th. Similarly, for spatial nesting buffers, until the nesting species has been confirmed, we recommend applying a 1-mile spatial buffer around the nest. Once the raptor species is confirmed, we then make species-specific and site-specific recommendations on seasonal and spatial buffers (Table K.5, "Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors" (p. 1796)).

Activities should not occur within the spatial/seasonal buffer of any nest (occupied or unoccupied) when raptors are in the process of courtship and nest site selection. Long-term land-use activities

and human-use activities should not occur within the species-specific spatial buffer of occupied nests. Short-term land use and human-use activities proposed to occur within the spatial buffer of an occupied nest should only proceed during the seasonal buffer after coordination with the USFWS, state, and tribal wildlife resources management agencies, and/or land-management agency biologists. If, after coordination, it is determined that due to human or environmental safety or otherwise unavoidable factors, activities require temporary incursions within the spatial and seasonal buffers, those activities should be planned to minimize impacts and monitored to determine whether impacts to birds occurred. Mitigation for habitat loss or degradation should be identified and planned in coordination with applicable agencies.

Please contact the USFWS Wyoming Ecological Services Field Office if you have any questions regarding the status of the bald eagle, permit requirements, or if you require technical assistance regarding the MBTA, Eagle Act, or the above recommendations. The recommended spatial and seasonal buffers are voluntary (unless made a condition of permit or license) and are not regulatory, and they do not supersede provisions of the MBTA, Eagle Act, (Migratory Bird Permit Memorandum (MBMP-2), and Endangered Species Act (ESA) (16 U.S.C 1531 et seq.). Assessing legal compliance with the MBTA or the Eagle Act and the implementing regulations is ultimately the authority and responsibility of the USFWS law enforcement personnel. Our recommendations also do not supersede federal, state, local, or tribal regulations or permit conditions that may be more restrictive.

Table K.5. Wyoming Ecological Services Field Office's Recommended Spatial and Seasonal Buffers for Breeding Raptors

Common Name	Spatial buffer (miles)	Seasonal buffer
Raptors of Conservation Concern (see below for more information)		
Golden Eagle	0.50	January 15 - July 31
Ferruginous Hawk	1.00	March 15 - July 31
Swainson's Hawk	0.25	April 1 - August 31
Bald Eagle	see Bald Eagle information web page[1]	
Prairie Falcon	0.50	March 1 - August 15
Peregrine Falcon	0.50	March 1 - August 15
Short-eared Owl	0.25	March 15- August 1
Burrowing Owl	0.25	April 1 – September 15
Northern Goshawk	0.50	April 1 - August 15
Additional Wyoming Raptors		
Osprey	0.25	April 1 - August 31
Cooper's Hawk	0.25	March 15 – August 31
Sharp-shinned Hawk	0.25	March 15 – August 31
Red-tailed Hawk	0.25	February 1 – August 15
Rough-legged Hawk (winter resident only)	----	----
Northern Harrier	0.25	April 1 - August 15
Merlin	0.50	April 1 - August 15
American Kestrel	0.125	April 1 – August 15
Common Barn Owl	0.125	February 1 – September 15
Northern Saw-whet Owl	0.25	March 1 - August 31
Boreal Owl	0.25	February 1 – July 31
Long-eared Owl	0.25	February 1 – August 15
Great Horned Owl	0.125	December 1 – September 30
Northern Pygmy-Owl	0.25	April 1 – August 1
Eastern Screech-owl	0.125	March 1 – August 15
Western Screech-owl	0.125	March 1 – August 15

Common Name	Spatial buffer (miles)	Seasonal buffer
Great Gray Owl	0.25	March 15 – August 31
[1] http://www.fws.gov/wyominges/Pages/Species/Species_SpeciesConcern/BaldEagle.html		

Raptors of Conservation Concern

The USFWS Birds of Conservation Concern (2008) report identifies "species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing" under the ESA (16 U.S.C 1531 et seq.). This report is intended to stimulate coordinated and proactive conservation actions among federal, state, and private partners. The Wyoming Partners in Flight Wyoming Bird Conservation Plan identifies priority bird species and habitats, and establishes objectives for bird populations and habitats in Wyoming. This plan also recommends conservation actions to accomplish the population and habitat objectives.

We encourage project planners to develop and implement protective measures for the Birds of Conservation Concern as well as other high-priority species identified in the Wyoming Bird Conservation Plan. For additional information on the Birds of Conservation Concern that occur in Wyoming, please see our Birds of Conservation Concern web page.

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Appendix L. Lands Identified for Disposal Through Exchange or Sale

The Buffalo Field Office Resource Management Plan (RMP) revision project specifically identifies areas available for consideration for disposal by employing the "isolated, difficult or expensive to manage, or needed-for community expansion" disposal criteria in the Federal Land Policy and Management Act (FLPMA). The areas below were identified during the RMP revision process as meeting the FLPMA disposal criteria. Inclusion in this table does not constitute a decision that the land will be disposed. Before taking any disposal action, consideration will be given to each individual tract and will include public involvement.

As stated elsewhere in the RMP, the preferred method of disposal or acquisition of lands is through land exchanges. Proposals for disposal of lands not identified in this table will be considered if they are consistent with the objectives of the approved RMP and may require a land use plan amendment.

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Range 68 West		
T. 56 ½ N., R. 68 W.		
Sec. 31: Lots 2-4	No	Yes
Range 69 West		
T. 45 N., R. 69 W.		
Sec. 3: Lots 11, 18	Yes	Yes
Sec. 10: Lots 2-4	Yes	Yes
Sec. 11: Lot 1-4	Yes	Yes
Sec. 12: Lots 2-8	Yes	Yes
Sec. 14: Lot 4	Yes	Yes
Sec. 15: Lot 12	Yes	Yes
Sec. 22: Lots 1, 2, 5	Yes	Yes
Sec. 23: Lots 3-6, 10-13	Yes	Yes
Sec. 25: Lot 6	Yes	Yes
Sec. 26: Lots 11-14	Yes	Yes
Sec. 27: Lots 2, 4-6, 9, 10	Yes	Yes
Sec. 28: Lots 1, 6-9, 14, 15	Yes	Yes
Sec. 34: Lot 2, 3, 7, 10, 16	Yes	Yes
Sec. 35: Lots 1-4, 7-10	Yes	Yes
T. 46 N., R. 69 W.		
Sec. 2: Lots 5-19	Yes	Yes
Sec. 3: Lot 16	Yes	Yes
Sec. 34: Lot 1	Yes	Yes
T. 47 N., R. 69 W.		
Sec. 11: Lot 2	Yes	Yes
Sec. 20: Lot 1	Yes	Yes
Sec. 21: Lot 1	Yes	Yes
T. 48 N., R. 69 W.		
Sec. 6: Lots 10-13, 17-20	Yes	Yes
Sec. 11: Lots 1, 2	Yes	Yes
Sec. 18: Lots 6, 7	Yes	Yes
Sec. 19: Lots 7-9, 15, 16	Yes	Yes
T. 49 N., R. 69 W.		
Sec. 20: Lot 1	Yes	Yes
Sec. 22: Lot 5	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 31: Lots 11, 14, 19	Yes	Yes
T. 50 N., R. 69 W.		
Sec. 5: Lot 6	Yes	Yes
T. 51 N., R. 69 W.		
Sec. 2: Lots 5, 6, 9, 10, 13	Yes	Yes
Sec. 22: Lot 12	Yes	Yes
Sec. 23: Lot 5	Yes	Yes
T. 52 N., R. 69 W.		
Sec. 15: Lots 9, 10	Yes	Yes
Sec. 20: Lot 12	Yes	Yes
Sec. 22: Lots 1, 2, 5, 6	Yes	Yes
Sec. 27: Lot 1, 2, 4, 5, 11-14	Yes	Yes
T. 53 N., R. 69 W.		
Sec. 10: Lot 5	Yes	Yes
Sec. 13: Lot 7	Yes	Yes
Sec. 15: Lots 9, 16	Yes	Yes
Sec. 18: Lots 5, 10, 11 14	Yes	Yes
Sec. 22: Lots 3-6	Yes	Yes
Sec. 30: Lots 6, 7	Yes	Yes
T. 56 N., R. 69 W.		
Sec. 1: SWSW	Yes	Yes
Sec. 12: NWNW	Yes	Yes
Sec. 13: Lots 2-4, NWNE, W2SW	Yes	Yes
Sec. 14: Lots 4-6, S2NE	Yes	Yes
Sec. 15: Lots 1, 3, 4	Yes	Yes
Sec. 19: S2SE	Yes	Yes
Sec. 29: W2NW, NWSW	Yes	Yes
Sec. 30: Lots 6-10, 15-18, 20, NWNE, NESE	Yes	Yes
Sec. 31: Lots 5, 12, 14	Yes	Yes
Sec. 32: SWNE	Yes	Yes
Sec. 35: Lot 6	Yes	Yes
T. 56 ½ N., R. 69 W.		
Sec. 35: Lot 1	No	Yes
T. 57 N., R. 69 W.		
Sec. 17: Lot 4	Yes	Yes
Sec. 28: Lot 6	Yes	Yes
T. 58 N., R. 69 W.		
Sec. 30: Lots 9, 10	Yes	Yes
Range 70 West		
T. 45 N., R. 70 W.		
Sec. 29: Lot 12	Yes	Yes
Sec. 30: Lot 16	Yes	Yes
T. 46 N., R. 70 W.		
Sec. 3: Lots 14, 15;	Yes	Yes
Sec. 4: Lots 5, 7-10, 14	Yes	Yes
Sec. 5: Lots 5, 6, 11-14, 19, 20	Yes	Yes
Sec. 6: Lots 18, 19, 21	Yes	Yes
Sec. 8: Lots 1, 8	Yes	Yes
Sec. 9: Lots 5,7,10, 12	Yes	Yes
Sec. 10: Lots 1, 5, 11, 12	Yes	Yes
Sec. 11: Lots 4, 7, 8	Yes	Yes
Sec. 13: Lot 13	Yes	Yes
Sec. 14: Lots 10, 15, 16	Yes	Yes
Sec. 15: Lots 5, 6	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 20: Lots 1, 8, 9	Yes	Yes
Sec. 21: Lots 11, 12, 14	Yes	Yes
Sec. 22: Lots 5, 12	Yes	Yes
Sec. 23: Lots 2, 5, 8, 11-13	Yes	Yes
Sec. 24: Lots 4, 5	Yes	Yes
Sec. 26: Lot 12	Yes	Yes
Sec. 27: Lot 5	Yes	Yes
Sec. 31: Lots 6, 18	Yes	Yes
Sec. 32: Lots 1, 2, 11	Yes	Yes
Sec. 34: Lots 1, 2	Yes	Yes
T. 47 N., R. 70 W.,		
Sec. 21: Lots 1, 8	Yes	Yes
Sec. 22: Lots 1,3-6	Yes	Yes
Sec. 33: Lot 14	Yes	Yes
T. 48 N., R. 70 W.,		
Sec. 1: Lots 7-10	Yes	Yes
Sec. 2: Lots 5	Yes	Yes
Sec. 3: Lots 13, 19, 20	Yes	Yes
Sec. 12: Lots 1-3, 6	Yes	Yes
Sec. 13: Lots 1, 2, 7-9	Yes	Yes
Sec. 22: Lot 3	No	Yes
Sec. 24: Lots 1, 8, 9, 15	Yes	Yes
Sec. 25: Lots 1, 2, 7, 8	Yes	Yes
Sec. 29: Lot 16	Yes	Yes
T. 49 N., R. 70 W.,		
Sec. 27: Lot 3	Yes	Yes
Sec. 33: Lots 1, 8, 13	Yes	Yes
T. 50 N., R. 70 W.,		
Sec. 4: Lot 6	Yes	Yes
Sec. 15: Lot 4	Yes	Yes
Sec. 19: Lot 15	Yes	Yes
Sec. 30: Lot 15	No	Yes
Sec. 34: Lots 3, 4	Yes	Yes
T. 51 N., R. 70 W.,		
Sec. 4: Lot 7	Yes	Yes
Sec. 7: Lot 10	Yes	Yes
Sec. 10: Lot 3	Yes	Yes
Sec. 18: Lots 5, 11	Yes	Yes
T. 52 N., R. 70 W.,		
Sec. 4: Lot 11	Yes	Yes
Sec. 28: Lot 1	Yes	Yes
Sec. 32: Lots 1, 4	Yes	Yes
Sec. 33: Lot 3	Yes	Yes
Sec. 35: Lot 7	Yes	Yes
T. 53 N., R. 70 W.,		
Sec. 2: Lot 9	Yes	Yes
Sec. 15: Lots 14, 15	Yes	Yes
Sec. 22: Lot 2	Yes	Yes
Sec. 23: Lots 4, 5	Yes	Yes
T. 56 N., R. 70 W.,		
Sec. 6: Lots 25, 29, 30	Yes	Yes
Sec. 7: Lots 5-10, 13, 14	Yes	Yes
Sec. 9: NW	Yes	Yes
Sec. 18: Lot 10	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 19: Lots 5-11	Yes	Yes
Sec. 20: SWSE	Yes	Yes
Sec. 24: Lots 4, 7	Yes	Yes
Sec. 25: Lots 2-5, 7, 8, 11, 12	Yes	Yes
Sec. 26: N2NE, NWSW	Yes	Yes
Sec. 29: N2NE	Yes	Yes
Sec. 30: Lots 5-10, NWSE	Yes	Yes
Sec. 33: S2NW	Yes	Yes
Sec. 35: Lots 1, 2	Yes	Yes
T. 57 N., R. 70 W.,		
Sec. 6: Lot 12	Yes	Yes
Sec. 19: SESE	Yes	Yes
Sec. 20: S2SW	Yes	Yes
Sec. 22: SESE	Yes	Yes
Sec. 25: SWNE, S2SW, SE	Yes	Yes
Sec. 26: NESW	Yes	Yes
Sec. 29: NENW, N2SW, NWSE	Yes	Yes
Sec. 30: Lots 5, 6, SWNE, SENW, NESW, NWSE	Yes	Yes
Sec. 31: Lot 7, NWNE	Yes	Yes
Sec. 32: N2NW	Yes	Yes
Sec. 33: S2NE, NENW	Yes	Yes
Sec. 36: Lots 1, 2	No	Yes
Sec. 36: N2NE, NENW	Yes	Yes
T. 58 N., R. 70 W.,		
Sec. 25: Lot 6	Yes	Yes
Sec. 27: SWSE	Yes	Yes
Sec. 31: Lots 6, 12	Yes	Yes
Sec. 32: Lot 4	Yes	Yes
Sec. 34: S2NE, NENW	Yes	Yes
Range 71 West		
T. 44 N., R. 71 W.,		
Sec. 30: Lots 17, 18	Yes	Yes
T. 45 N., R. 71 W.,		
Sec. 3: Lot 14	Yes	Yes
Sec. 4: Lots 5, 12	Yes	Yes
T. 46 N., R. 71 W.,		
Sec. 1: Lot 11	Yes	Yes
Sec. 2: Lot 13	Yes	Yes
Sec. 4: Lot 19, 20	Yes	Yes
Sec. 9: Lots 1, 2, 4-7	Yes	Yes
Sec. 10: Lots 3-5, 8- 10	Yes	Yes
Sec. 11: Lot 4	Yes	Yes
Sec. 15: Lots 1, 2	Yes	Yes
T. 47 N., R. 71 W.,		
Sec. 29: Lot 7	Yes	Yes
T. 49 N., R. 71 W.,		
Sec. 8: Lot 9	Yes	Yes
Sec. 9: Lots 8, 10	Yes	Yes
T. 50 N., R. 71 W.,		
Sec. 4: Lot 5	Yes	Yes
T. 51 N., R. 71 W.,		
Sec. 35: Lot 7	Yes	Yes
T. 52 N., R. 71 W.,		
Sec. 25: Lot 5	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 30: Lots 5, 12	Yes	Yes
T. 53 N., R. 71 W.,		
Sec. 15: Lots 2, 7	Yes	Yes
Sec. 21: Lot 1	Yes	Yes
Sec. 28: Lot 1, W2NW	Yes	Yes
Sec. 29: Lots 1, 8, 9	Yes	Yes
T. 54 N., R. 71 W.,		
Sec. 10; Lot 4	Yes	Yes
Sec. 17: Lots 9, 10	Yes	Yes
T. 55 N., R. 71 W.,		
Sec. 1: Lot 7	Yes	Yes
Sec. 2: Lots 10, 11, 14, 15, 19, 20	Yes	Yes
Sec. 8: Lot 1	Yes	Yes
Sec. 24: Lots 3, 5, 6, 9	Yes	Yes
Sec. 25: Lot 11	Yes	Yes
Sec. 28: Lot 3	Yes	Yes
T. 56 N., R. 71 W.,		
Sec. 6: Lot 10	Yes	Yes
Sec. 12: E2NE	Yes	Yes
Sec. 13: SESW;	Yes	Yes
Sec. 24: Lot 1, E2W2, W2SE	Yes	Yes
Sec. 25: Lot 1, W2NE, E2NW	Yes	Yes
Sec. 29: NWNW	Yes	Yes
T. 57 N., R. 71 W.		
Sec. 1: Lots 5,	Yes	Yes
Sec. 1: Lots 6, 9	No	Yes
Sec. 3: Lot 8	Yes	Yes
Sec. 4: Lot 8, SWNW	Yes	Yes
Sec. 5: ALL	Yes	Yes
Sec. 8: N2NW	Yes	Yes
Sec. 10: SWSE	Yes	Yes
Sec. 13: Lot 3	Yes	Yes
Sec. 27: E2SE	Yes	Yes
Sec. 31: SESE	Yes	Yes
Sec. 34: SENW	Yes	Yes
Sec. 35: Track 46D	Yes	Yes
Range 72 West		
T. 44 N., R. 72 W.,		
Sec. 7: Lots 13, 14, 19, 20	Yes	Yes
Sec. 18: Lots 5, 11, 12	Yes	Yes
Sec. 19: Lot 5	Yes	Yes
T. 45 N., R. 72 W.,		
Sec. 15: Lot 10	Yes	Yes
Sec. 18: Lot 6	Yes	Yes
Sec. 23: Lot 12	Yes	Yes
T. 46 N., R. 72 W.,		
Sec. 14: Lot 10	Yes	Yes
Sec. 25: Lots 5, 6, 7	Yes	Yes
Sec. 26: Lot 6	Yes	Yes
Sec. 31: Lot 20	Yes	Yes
T. 47 N., R. 72 W.,		
Sec. 2: Lots 8, 9	Yes	Yes
Sec. 3: Lot 10	Yes	Yes
Sec. 7: Lots 16, 17	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
T. 48 N., R. 72 W.,		
Sec. 14: Lot 13	Yes	Yes
Sec. 15: Lot 13	Yes	Yes
Sec. 22: Lot 6	Yes	Yes
T. 49 N., R. 72 W.,		
Sec. 12: Lot 11	Yes	Yes
T. 50 N., R. 72 W.,		
Sec. 1: Lot 5	Yes	Yes
Sec. 7: Lots 13, 20	Yes	Yes
T. 51 N., R. 72 W.,		
Sec. 11: Lot 4	Yes	Yes
T. 53 N., R. 72 W.,		
Sec. 6: Lot 8	Yes	Yes
Sec. 7: Lot 5-7	Yes	Yes
T. 54 N., R. 72 W.,		
Sec. 3: Lots 6-11, 14-19	Yes	Yes
Sec. 8: Lots 1-8, 10-16	Yes	Yes
Sec. 11: Lots 9-13	Yes	Yes
T. 55 N., R. 72 W.,		
Sec. 6: Lots 15-17	Yes	Yes
Sec. 7: Lots 11, 12, 14, 19	Yes	Yes
Sec. 8: Lots 3, 4	Yes	Yes
Sec. 9: Lots 8-11	Yes	Yes
Sec. 10: Lot 8	Yes	Yes
Sec. 11: Lot 4	Yes	Yes
Sec. 12: Lots 2, 7, 10, 15	Yes	Yes
Sec. 17: Lots 1-3	Yes	Yes
Sec. 18: Lots 9, 10	Yes	Yes
Sec. 19: Lot 10	Yes	Yes
Sec. 21: Lots 2, 13	Yes	Yes
Sec. 22: Lot 3	Yes	Yes
Sec. 28: Lot 4	Yes	Yes
Sec. 29: Lots 5-9	Yes	Yes
Sec. 30: Lots 9, 13, 15, 16	Yes	Yes
Sec. 31: Lots 12-14	Yes	Yes
Sec. 33: Lots 3-5, 7, 8	Yes	Yes
Sec. 34: Lots 6-8	Yes	Yes
T. 56 N., R. 72 W.,		
Sec. 3: Lots 17, 19	No	Yes
Sec. 5: Lot 17	Yes	Yes
Sec. 6: Lots 16, 17, 22, 23	Yes	Yes
Sec. 8: Lot 1	Yes	Yes
Sec. 19; Lots 8, 11-14	Yes	Yes
Sec. 23: SESE	Yes	Yes
Sec. 24: N2SE, SESE	Yes	Yes
Sec. 25: NWNW, SENW	Yes	Yes
T. 57 N., R. 72 W.,		
Sec. 7: Lots 6, 7	Yes	Yes
Sec. 15: SESE	Yes	Yes
Sec. 16: Lot 5	Yes	Yes
Sec. 18: Lot 8, E2SE	Yes	Yes
Sec. 19: N2NE, SENE	Yes	Yes
Sec. 20: N2NW, SENW	Yes	Yes
Sec. 21: Lot 3	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 22: Lot 3	Yes	Yes
Sec. 26: NWSW	Yes	Yes
Sec. 29: Lot 2, SWSW, E2SW	Yes	Yes
Sec. 30: Lot 10, SESE	Yes	Yes
Sec. 31: Lots 5-7	Yes	Yes
Sec. 32: Lot 1, NENW	Yes	Yes
Sec. 33: Lots 3, 4	Yes	Yes
Sec. 34: Lot 2, E2SW	Yes	Yes
T. 58 N., R. 72 W.,		
Sec. 19: Lot 11	Yes	Yes
Sec. 30: Lot 5	Yes	Yes
Range 73 West		
T. 44 N., R. 73 W.,		
Sec. 6: Lot 17	Yes	Yes
Sec. 14: Lots 1-3, 6-13, 15	Yes	Yes
T. 45 N., R. 73 W.,		
Sec. 2: Lot 18	Yes	Yes
Sec. 33: Lot 15	Yes	Yes
T. 51 N., R. 73 W.,		
Sec. 3: Lots 9-11	Yes	Yes
Sec. 4: Lots 11, 12, 15	Yes	Yes
Sec. 5: Lots 11-14, 19	Yes	Yes
Sec. 6: Lot 16	Yes	Yes
Sec. 9: Lot 7	Yes	Yes
Sec. 30: Lot 13	Yes	Yes
T. 52 N., R. 73 W.,		
Sec. 29: Lot 14	Yes	Yes
Sec. 33: Lots 13-16	Yes	Yes
T. 53 N., R. 73 W.,		
Sec. 3: Lot 19	Yes	Yes
Sec. 9: Lots 9, 16	Yes	Yes
Sec. 12: Lot 2	Yes	Yes
Sec. 13: Lots 2-4	Yes	Yes
Sec. 14: Lot 3	Yes	Yes
Sec. 15: Lots 2, 3	Yes	Yes
T. 54 N., R. 73 W.,		
Sec. 2: Lot 10	Yes	Yes
Sec. 10: Lots 3, 4	Yes	Yes
Sec. 13: Lots 1-14	Yes	Yes
Sec. 15: Lot 4	Yes	Yes
Sec. 17: Lot 5	Yes	Yes
Sec. 24: Lots 3, 4, 13, 14	Yes	Yes
Sec. 33: Lots 2-4, 7, 9, 10	Yes	Yes
Sec. 35: Lots 9, 10, 15, 16	Yes	Yes
T. 55 N., R. 73 W.,		
Sec. 1: Lot 5	Yes	Yes
Sec. 2: Lot 5-7, Tracts 42A, 42B, 42C, 42D	Yes	Yes
Sec. 11: Tract 42D	Yes	Yes
Sec. 12: Lots 3, 7	Yes	Yes
Sec. 13: Lot 6	Yes	Yes
Sec. 14: Lot 1	Yes	Yes
Sec. 23: Lot 2	Yes	Yes
T. 56 N., R. 73 W.,		
Sec. 5: Lots 5	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 8: Lots 1, 15	Yes	Yes
Sec. 12: Lots 1	Yes	Yes
Sec. 15: Lots 12, 13	Yes	Yes
Sec. 17: Lots 3, 6, 7	Yes	Yes
Sec. 21: Lots 2, 7, 10	Yes	Yes
Sec. 22: Lots 3, 6	Yes	Yes
Sec. 27: Lot 16	Yes	Yes
Sec. 35: Lot 1, NWNW, S2NW, SESW	Yes	Yes
T. 57 N., R. 73 W.,		
Sec. 3: Lot 8, SWNW	Yes	Yes
Sec. 4: SENE	Yes	Yes
Sec. 7: Lot 8	Yes	Yes
Sec. 9: E2SW	Yes	Yes
Sec. 18: Lot 5	Yes	Yes
Sec. 22: NW, N2SW	Yes	Yes
Sec. 25: SENW	Yes	Yes
Sec. 28: NESW	Yes	Yes
Sec. 32: Lot 12	Yes	Yes
T. 58 N., R. 73 W.,		
Sec. 21: Lots 6, NWSW, S2SE	Yes	Yes
Sec. 22: Lot 3	Yes	Yes
Sec. 27: Lot 1, NWNE, W2NW	Yes	Yes
Sec. 28: NWNW	Yes	Yes
Sec. 31: Lots 5, 6	Yes	Yes
Sec. 32: NWNE, N2NW	Yes	Yes
Range 74 West		
T. 42 N., R. 74 W.,		
Sec. 22: Lot 10	Yes	Yes
T. 46 N., R. 74 W.,		
Sec. 10: Lots 2, 7, 10	Yes	Yes
Sec. 11: Lot 16	Yes	Yes
T. 47 N., R. 74 W.,		
Sec. 26: Lot 9	Yes	Yes
T. 48 N., R. 74 W.,		
Sec. 3: Lots 16, 17	Yes	Yes
Sec. 4: Lots 13-15, 18-20	Yes	Yes
Sec. 9: Lots 1-3, 6-8	Yes	Yes
Sec. 10: Lots 2, 4, 5	Yes	Yes
T. 50 N., R. 74 W.,		
Sec. 10: Lots 4, 5, 11, 12, 14	Yes	Yes
Sec. 15: Lot 3	Yes	Yes
Sec. 20: Lot 8	Yes	Yes
Sec. 21: Lot 13	Yes	Yes
Sec. 22: Lot 8	Yes	Yes
Sec. 23: Lots 3, 14	Yes	Yes
Sec. 27: Lot 4	Yes	Yes
T. 51 N., R. 74 W.,		
Sec. 3: Lots 7, 8, 10	Yes	Yes
Sec. 4: Lot 20	Yes	Yes
Sec. 5: Lot 17	Yes	Yes
Sec. 7: Lots 8, 9, 11, 12	Yes	Yes
Sec. 9: Lot 3	Yes	Yes
Sec. 18: Lots 6, 7	Yes	Yes
Sec. 27: Lots 1, 2	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 28: Lots 3, 7	Yes	Yes
Sec. 34: Lot 8	Yes	Yes
T. 52 N., R 74 W.,		
Sec. 4: Lots 16, 17	Yes	Yes
Sec. 18: Lots 17, 18	Yes	Yes
T. 53 N., R. 74 W.,		
Sec. 6: Lots 15	Yes	Yes
Sec. 7: Lot 8	Yes	Yes
Sec. 8: Lot 15, SENW	Yes	Yes
Sec. 9: Lot 14	Yes	Yes
Sec. 10: Lots 3, 4	Yes	Yes
Sec. 11: Lots 1, 2, 7-9	Yes	Yes
Sec. 12: Lots 1, 7-10	Yes	Yes
Sec. 13: Lots 2-4	Yes	Yes
Sec. 15: Lots 5, 6, 11-13	Yes	Yes
Sec. 17: Lots 1, 8	Yes	Yes
Sec. 22: Lot 1	Yes	Yes
Sec. 26: Lots 1, 2	Yes	Yes
T. 54 N., R. 74 W.,		
Sec. 4: Lot 7	Yes	Yes
Sec. 5: Lot 20	Yes	Yes
Sec. 9: Lot 16	Yes	Yes
Sec. 15: Lots 15, 16	Yes	Yes
Sec. 17: Lot 10	Yes	Yes
Sec. 19: Lot 5	Yes	Yes
Sec. 20: Lots 1-4	Yes	Yes
Sec. 21: Lots 11-14	Yes	Yes
T. 55 N., R. 74 W.,		
Sec. 4: Lot 5	Yes	Yes
Sec. 5: Lots 6, 11, NWSW	Yes	Yes
Sec. 16: Lot 5	Yes	Yes
Sec. 20: NWSE	Yes	Yes
Sec. 21: Lot 1	Yes	Yes
Sec. 27: NESW	Yes	Yes
T. 56 N., R. 74 W.,		
Sec. 3: Lot 19	Yes	Yes
Sec. 6: Lots 14-17, 22, 23	Yes	Yes
Sec. 7: Lots 6, 11	Yes	Yes
Sec. 9: Lots 3, 4	Yes	Yes
Sec. 10: Lot 2	Yes	Yes
Sec. 11: Lot 8	Yes	Yes
Sec. 12: Lot 1	Yes	Yes
Sec. 13: Lot 9	Yes	Yes
Sec. 17: Lots 4, 6	Yes	Yes
Sec. 18: Lots 5, 20	Yes	Yes
Sec. 19: Lots 6, 11	Yes	Yes
Sec. 20: Lots 3, 4, 6, 7, 9, 10, 13, 16	Yes	Yes
Sec. 23: Lot 9	Yes	Yes
Sec. 29: Lot 1, 8	Yes	Yes
Sec. 33: Lots 9, 10	Yes	Yes
T. 57 N., R. 74 W.,		
Sec. 4: SWNW	Yes	Yes
Sec. 5: Lot 13, SESE	Yes	Yes
Sec. 7: E2NW	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 8: Lot 1	Yes	Yes
Sec. 14: S2NW, NWSW	Yes	Yes
Sec. 15: NE, NESE	Yes	Yes
Sec. 17: Lots 1, 2, NWNW	Yes	Yes
Sec. 18: NENE	Yes	Yes
Sec. 23: Lot 2, SENW	Yes	Yes
Sec. 27: Lots 6, 7	Yes	Yes
Sec. 31: Lots 7, 8, 14	Yes	Yes
Sec. 32: Lots 9-12	Yes	Yes
Sec. 34: Lots 1,2, NENE	Yes	Yes
Sec. 35: SWNW	Yes	Yes
T. 58 N., R. 74 W.,		
Sec. 26: W2SE	Yes	Yes
Sec. 29: Lot 8	Yes	Yes
Sec. 30: Lot 13	Yes	Yes
Sec. 32: SWNE	Yes	Yes
Range 75 West		
T. 43 N., R. 75 W.,		
Sec. 3: SENW	Yes	Yes
T. 47 N., R. 75 W.,		
Sec. 2: Lots 5, 6, 11-20	Yes	Yes
Sec. 3: Lots 6-8	Yes	Yes
Sec. 5: Lots 7, 8	Yes	Yes
Sec. 7: Lots 9, 10, 13-20	Yes	Yes
Sec. 8: Lot 3	Yes	Yes
Sec. 12: Lots 3-6, 13	Yes	Yes
Sec. 13: Lot 14	Yes	Yes
Sec. 21: Lot 13	Yes	Yes
Sec. 23: Lots 3, 6	Yes	Yes
T. 48 N., R. 75 W.,		
Sec. 4: Lots 8, 9	Yes	Yes
Sec. 5: Lots 7, 8	Yes	Yes
Sec. 33: Lots 9-16	Yes	Yes
Sec. 34: Lots 12, 13, SWSW	Yes	Yes
T. 49 N., R. 75 W.,		
Sec. 4: E2SE	Yes	Yes
Sec. 5: Lots 3, 4, S2NW, N2S2	Yes	Yes
Sec. 6: Lots 1, 2, S2NE, SE	Yes	Yes
Sec. 9: E2E2	Yes	Yes
Sec. 10: W2SW	Yes	Yes
Sec. 31: NWSE, N2SE	Yes	Yes
Sec. 32: SENE	Yes	Yes
T. 50 N., R. 75 W.,		
Sec. 5: Lots 13, 20	Yes	Yes
Sec. 6: Lots 14, 15	Yes	Yes
Sec. 9: Lots 3, 7, 15, 16	Yes	Yes
Sec. 15: Lots 5, 12	Yes	Yes
Sec. 31: Lots 9, 10	Yes	Yes
T. 51 N., R. 75 W.,		
Sec. 1: Lots 5, 12, 13	No	Yes
Sec. 2: Lot 5	No	Yes
Sec. 7: Lots 18, 19	Yes	Yes
Sec. 10: Lot 14	Yes	Yes
Sec. 11: Lots 2, 5, 12	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 13: Lot 13	Yes	Yes
Sec. 14: Lots 14	Yes	Yes
Sec. 15: Lot 11, 12	No	Yes
Sec. 19: Lots 11, 19	Yes	Yes
Sec. 20: Lot 7	Yes	Yes
Sec. 22: Lots 1, 8, 11, 13, 14	Yes	Yes
Sec. 24: Lots 2-4	Yes	Yes
Sec. 25: Lots 1-2, 13-15	Yes	Yes
Sec. 26: Lot 8	Yes	Yes
Sec. 27: Lots 2, 3, 6, 7	Yes	Yes
Sec. 32: Lots 9, 16	Yes	Yes
Sec. 33: Lots 1, 8, 9, 12, 13, 16	Yes	Yes
Sec. 34: Lots 2-4, 6, 7, 10, 11, 14, 15	Yes	Yes
Sec. 35: Lots 3, 8, 9	Yes	Yes
T. 52 N., R. 75 W.,		
Sec. 6: Lots 11, 17	Yes	Yes
Sec. 13: Lots 7,9,10, 15, 16	Yes	Yes
Sec. 21: Lot 12	Yes	Yes
Sec. 24: Lots 1, 2, 7-10	Yes	Yes
Sec. 26: Lot 6	Yes	Yes
Sec. 28: Lots 3, 4	Yes	Yes
Sec. 33: Lots 1-3	Yes	Yes
Sec. 34: Lots 5-7, 9-12	Yes	Yes
Sec. 35: Lot 10	Yes	Yes
T. 53 N., R. 75 W.,		
Sec. 5: Lot 12	Yes	Yes
Sec. 12: Lots 2, 8	Yes	Yes
Sec. 19: Lots 6, 7,10,11,16, NESW	Yes	Yes
T. 54 N., R. 75 W.,		
Sec. 7: Lot 16	Yes	Yes
Sec. 18: Lot 8	Yes	Yes
Sec. 22: Lots 10, 11, 14, 15	Yes	Yes
T. 55 N., R. 75 W.,		
Sec. 5: Lot 10	Yes	Yes
Sec. 6: Lot 16	Yes	Yes
Sec. 7: Lots 6, 11	Yes	Yes
Sec. 15: Lots 9-12	Yes	Yes
Sec. 21: Lots 2, 3	Yes	Yes
Sec. 26: Lots 2, 3	Yes	Yes
Sec. 31: Lot 5	Yes	Yes
Sec. 34: Lot 14	Yes	Yes
T. 56 N., R. 75 W.,		
Sec. 2: Lots 5, 6	Yes	Yes
Sec. 4: Lots 7, 11-13, 20	Yes	Yes
Sec. 7: Lots 8-10, 16, 17	Yes	Yes
Sec. 8: Lot 5	Yes	Yes
Sec. 15: Lots 15, 16	Yes	Yes
Sec. 27: Lot 4	Yes	Yes
T. 57 N., 75 W.,		
Sec. 3: SENE, SWNW	Yes	Yes
Sec. 4: Lot 6, SENE, SESE	Yes	Yes
Sec. 5: Lot 10, SENE	Yes	Yes
Sec. 8: SWNE	Yes	Yes
Sec. 9: NESE	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 10: SESW, SWSE	Yes	Yes
Sec. 12: N2SW	Yes	Yes
Sec. 15: NW, NESW	Yes	Yes
Sec. 17: Lots 1, 3	Yes	Yes
Sec. 19: Lot 5	Yes	Yes
Sec. 25: S2NW	Yes	Yes
Sec. 26: SENW	Yes	Yes
Sec. 28: Lot 8	Yes	Yes
Sec. 33: Lot 5, 8, 13, 14, E2NW	Yes	Yes
Sec. 35: Lot 9	Yes	Yes
T. 58 N., R. 75 W.,		
Sec. 21: Lots 6-8, NWSW	Yes	Yes
Sec. 22: Lots 5, 6, N2SE, SESE	Yes	Yes
Sec. 23: Lot 8, W2SW	Yes	Yes
Sec. 26: SENE, NWNW, E2SW, SE	Yes	Yes
Sec. 33: NWNE, S2NE, NENW, E2SW, W2SE, NENSE	Yes	Yes
Sec. 34: S2NE, SWNW, W2SW, SE	Yes	Yes
Sec. 35: Lot 1, SWSW	Yes	Yes
Range 76 West		
T. 41 N., R. 76 W.,		
Sec. 6: Lots 5-7	Yes	Yes
Sec. 24: ALL	Yes	Yes
Sec. 25: NENE	Yes	Yes
Sec. 29: E2NE	Yes	Yes
T. 42 N., R. 76 W.,		
Sec. 19: Lots 5-8	Yes	Yes
Sec. 20: SESE	Yes	Yes
Sec. 21: SWNW, NWSW	Yes	Yes
Sec. 29: NENE	Yes	Yes
Sec. 31: Lot 5	Yes	Yes
T. 43 N., R. 76 W.,		
Sec. 30: SENE	Yes	Yes
T. 46 N., R. 76 W.,		
Sec. 12: Lots 14, 15	Yes	Yes
Sec. 13: Lots 2, 3, 6	Yes	Yes
Sec. 14: Lots 4,5, 12	Yes	Yes
Sec. 15: Lot 13	Yes	Yes
Sec. 23: Lots 3, 4, 11	Yes	Yes
T. 47 N., R. 76 W.,		
Sec. 1: Lot 18	Yes	Yes
Sec. 35: Lot 13	Yes	Yes
T. 48 N., R. 76 W.,		
Sec. 1: Lot 18	Yes	Yes
Sec. 2: Lot 11	Yes	Yes
Sec. 3: Lot 5	Yes	Yes
Sec. 10: Lot 10	Yes	Yes
Sec. 12: Lots 6, 7	Yes	Yes
T. 49 N., R. 76 W.,		
Sec. 1: SENW, NESW	Yes	Yes
Sec. 14: NWSE	Yes	Yes
Sec. 23: SWNE, SENW, NESW, W2SE,	Yes	Yes
Sec. 26: NWSE	Yes	Yes
Sec. 34: SESE	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
T. 50 N., R. 76 W.,		
Sec. 6: Lots 12, 23	No	Yes
Sec. 13: Lots 7, 8	No	Yes
Sec. 22: Lots 3-8	Yes	Yes
Sec. 26: Lot 7	Yes	Yes
Sec. 33: Lot 10	Yes	Yes
Sec. 34: Lots 12, 13	No	Yes
T. 51 N., R. 76 W.,		
Sec. 5: Lots 9, 10	Yes	Yes
Sec. 6: Lots 8, 9, 15	Yes	Yes
Sec. 20: Lots 3-6, 11-14	Yes	Yes
Sec. 31: Lots 19, 20	No	Yes
Sec. 32: Lots 1, 8	No	Yes
T. 52 N., R. 76 W.,		
Sec. 1: Lots 17	No	Yes
Sec. 2: Lots 7, 10, 19, 20	Yes	Yes
Sec. 11: Lots 1, 15, 16	Yes	Yes
Sec. 12: Lots 11, 14	Yes	Yes
Sec. 31: Lot 18	Yes	Yes
T. 53 N., R. 76 W.,		
Sec. 2: Lot 9	Yes	Yes
Sec. 10: Lots 7-10, 15, 16	Yes	Yes
Sec. 14: Lot 11	Yes	Yes
Sec. 15: Lots 1, 2	Yes	Yes
Sec. 24: Lots 15, 16	Yes	Yes
Sec. 27: Lot 3	Yes	Yes
Sec. 31: Lots 9, 10	Yes	Yes
T. 54 N., R. 76 W.,		
Sec. 1: Lot 20	Yes	Yes
Sec. 9: Lots 9, 10, 15, 16	Yes	Yes
Sec. 12: Lots 9, 10, 14, NESE	Yes	Yes
Sec. 17: Lots 9, 16	Yes	Yes
Sec. 20: Lot 7	Yes	Yes
Sec. 31: Lots 13, 14, 20	Yes	Yes
T. 55 N., R. 76 W.,		
Sec. 7: Lots 17, 18	Yes	Yes
Sec. 17: Lot 12	Yes	Yes
Sec. 18: Lots 5, 6, 11, 14, 20	Yes	Yes
Sec. 19: Lot 16	Yes	Yes
Sec. 20: Lot 11	Yes	Yes
Sec. 25: Lot 13	Yes	Yes
Sec. 26 Lots 3, 6	Yes	Yes
Sec. 29: Lots 4, 5	Yes	Yes
Sec. 35: Lots 1-3	Yes	Yes
T. 56 N., R. 76 W.,		
Sec. 1: Lots 19, 20	Yes	Yes
Sec. 11: Lots 1, 7, 8, 10	Yes	Yes
Sec. 12: Lots 1-8	Yes	Yes
Sec. 13: Lots 4, 5, 12, 13	Yes	Yes
Sec. 14: Lots 1, 8, 10, 11, 14	Yes	Yes
Sec. 15: Lots 3, 4, 8	Yes	Yes
Sec. 21: Lots 8, 10	Yes	Yes
Sec. 23: Lots 1, 7-10, 14, 15	Yes	Yes
Sec. 31: Lot 13	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 32: Lot 13	Yes	Yes
T. 57 N., R. 76 W.,		
Sec. 19: Lots 11, 14	Yes	Yes
Sec. 31: Lot 9	Yes	Yes
T. 58 N., R. 76 W.,		
Sec. 28: Lot 4	Yes	Yes
Sec. 32: Lot 1, 3	Yes	Yes
Sec. 36: Lots 1, 3- 8	Yes	Yes
Range 77 West		
T. 41 N., R. 77 W.,		
Sec. 2: S2SE	Yes	Yes
Sec. 4: SWNW	Yes	Yes
Sec. 11: N2NE	Yes	Yes
Sec. 13: SWSW	Yes	Yes
Sec. 14: SWNE, S2	Yes	Yes
Sec. 24: SESW	Yes	Yes
T. 42 N., R. 77 W.,		
Sec. 2: W2SE;	Yes	Yes
Sec. 12: E2SE;	Yes	Yes
Sec. 13: E2E2;	Yes	Yes
Sec. 14: W2SW;	Yes	Yes
Sec. 22: E2SE, SE;	Yes	Yes
Sec. 23: W2;	Yes	Yes
Sec. 24: Lots 1-4,	Yes	Yes
Sec. 27: S2;	Yes	Yes
Sec. 32: SENE;	Yes	Yes
Sec. 34: N2;	Yes	Yes
T. 43 N., R. 77 W.,		
Sec. 23: SENE, NESE	Yes	Yes
Sec. 24: SWNW, NWSW	Yes	Yes
Sec. 26: W2SW, SESW	Yes	Yes
Sec. 27: NESE	Yes	Yes
Sec. 34: N2SW	Yes	Yes
T. 44 N., R. 77 W.,		
Sec. 19: Lot 13	Yes	Yes
Sec. 30: Lots 11, 13-16	Yes	Yes
Sec. 33: Lot 12	Yes	Yes
Sec. 34: Lots 7, 8	Yes	Yes
Sec. 35: Lots 13, 14	Yes	Yes
T. 45 N., R. 77 W.,		
Sec. 4: Lot 21	Yes	Yes
Sec. 5: Lot 18	Yes	Yes
Sec. 6: Lot 19	Yes	Yes
Sec. 7: Lots 6-20	Yes	Yes
Sec. 8: Lots 10, 13-15	Yes	Yes
Sec. 18: Lots, 7-10	Yes	Yes
Sec. 23: Lots 1, 8	Yes	Yes
T. 47 N., R. 77 W.,		
Sec. 13: Lots 7-10	Yes	Yes
Sec. 35: Lots 3, 4, 8;	Yes	Yes
T. 48 N., R. 77 W.,		
Sec. 20: Lot 3	Yes	Yes
Sec. 30: Lots 8, 14, 16	Yes	Yes
T. 49 N., R. 77 W.,		

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 22: SWSW	Yes	Yes
T. 50 N., R. 77 W.		
Sec. 5: Lot 6	Yes	Yes
Sec. 7: Lot 5-8	No	Yes
Sec. 8: Lots 1, 3	No	Yes
Sec. 9: Lot 5, SWSE	No	Yes
Sec. 10: Lot 1	No	Yes
Sec. 11: Lot 2, W2NW	No	Yes
Sec. 16: Lot 3	No	Yes
Sec. 17: Lot 3	No	Yes
Sec. 21: Lots 2, 6	No	Yes
Sec. 27: Lot 2	No	Yes
Sec. 34: Lot 5, NESW	No	Yes
T. 51 N., R.77 W.,		
Sec. 12: NWNW	Yes	Yes
Sec. 29: Lots 4, 6	Yes	Yes
Sec. 30: Lots 5, 10	Yes	Yes
Sec. 32: SWNW;	Yes	Yes
T. 52 N., R.77 W.,		
Sec. 1: Lots 5-8, 11-14	Yes	Yes
Sec. 4: Lots 5-12, SWSW	Yes	Yes
Sec. 5: Lots 5, 6, 11, 12, 14	Yes	Yes
Sec. 6: Lots 15, 16, NESE	Yes	Yes
Sec. 8: NWNE	Yes	Yes
Sec. 16: Lot 1	No	Yes
Sec. 21: Lots 6, 7:	Yes	Yes
Sec. 26: Lots 8, 9, 10	No	Yes
T. 53 N., R. 77 W.,		
Sec. 7: Lot 11	Yes	Yes
Sec. 8: Lots 1-3	Yes	Yes
Sec. 17: Lot 4	Yes	Yes
Sec. 26: Lot 5	Yes	Yes
Sec. 28: S2NW	Yes	Yes
Sec. 29: W2SE	Yes	Yes
T. 54 N., R. 77 W.,		
Sec. 27: NWNW	Yes	Yes
Sec. 32: NW, N2SW	Yes	Yes
T. 55 N., R. 77 W.,		
Sec. 4: SWNE	Yes	Yes
Sec. 6: Lots 8	Yes	Yes
Sec. 9: Lots 1, 2, SWNE	Yes	Yes
Sec. 12: SWSE	Yes	Yes
Sec. 13: Lot 1, W2SE	Yes	Yes
Sec. 14: Lots 2, 4, 5	Yes	Yes
Sec. 15: Lots 10, 11	Yes	Yes
Sec. 20: E2E2	Yes	Yes
Sec. 21: SWNW, NWSW	Yes	Yes
Sec. 23: Lot 1, SENW, NESW, NWSE	Yes	Yes
Sec. 25: W2SW, SESW, SWSE	Yes	Yes
Sec. 28: NWNW	Yes	Yes
Sec. 29: E2NE	Yes	Yes
Sec. 32: NWNE, S2NE, N2SE	Yes	Yes
Sec. 33: Lots 3, 4, NWSW	Yes	Yes
Sec. 35: Lot 2, NWNE	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
T. 56 N., R. 77 W.,		
Sec. 4: Lot 19	Yes	Yes
Sec. 8: Lots 1, 4, NWSE	Yes	Yes
Sec. 16: Lots 1, 2	Yes	Yes
Sec. 18: Lots 5-9	Yes	Yes
Sec. 19: Lot 8, SESE	Yes	Yes
Sec. 26: Lot 3, NWSW	Yes	Yes
Sec. 29: Lots 1, 4	Yes	Yes
Sec. 30: Lot 5	Yes	Yes
Sec. 31: Lot 8	Yes	Yes
Sec. 32: NWNE	Yes	Yes
Sec. 34: SWSE	Yes	Yes
Sec. 35: Lot 7	Yes	Yes
Sec. 36: Lots 1, 2	Yes	Yes
T. 57 N., R. 77 W.,		
Sec. 7: Lots 6, Tract 41E	Yes	Yes
Sec. 11: N2NE, NENW, SENE, NESE	Yes	Yes
Sec. 12: Lots 3, 4, S2, W2SE	Yes	Yes
Sec. 13: NENW	Yes	Yes
Sec. 16: Lots 1	Yes	Yes
Sec. 17: Lots 6, 7	Yes	Yes
Sec. 18: Lot 8	Yes	Yes
Sec. 19: SENW, SESW	Yes	Yes
Sec. 21: Lot 1	Yes	Yes
Sec. 35: Lot 3, NWSE	Yes	Yes
T. 58 N., R. 77 W.,		
Sec. 19: NWSE	Yes	Yes
Sec. 21: Lots 6-8	Yes	Yes
Sec. 21: Lots 9,10	No	Yes
Sec. 22: Lots 14	Yes	Yes
Sec. 26: Lot 4	No	Yes
Sec. 27: Lot 1	No	Yes
Sec. 28: W2SW	Yes	Yes
Sec. 29: NWNE, NENW	Yes	Yes
Range 78 West		
T. 42 N., R. 78 W.,		
Sec. 2: SW	Yes	Yes
Sec. 3: SE	Yes	Yes
Sec. 4: S2NW, N2SW, SESW	Yes	Yes
Sec. 5: SENE	Yes	Yes
Sec. 8: NWNW	Yes	Yes
Sec. 13: SW	Yes	Yes
Sec. 17: S2NE, SENW, NESE	Yes	Yes
Sec. 18: Lot 3, NESW	Yes	Yes
Sec. 19: SENE	Yes	Yes
T. 43 N., R. 78 W.,		
Sec. 12: W2	Yes	Yes
Sec. 20: SWSE	Yes	Yes
Sec. 28: ALL	Yes	Yes
Sec. 29: NWNE, NESE	Yes	Yes
Sec. 30: Lots 1, 2, NE, E2NW	Yes	Yes
Sec. 31: Lots 3, 4, E2SW	Yes	Yes
Sec. 32: W2NW	Yes	Yes
T. 44 N., R. 78 W.,		

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 3: Lot 17	Yes	Yes
Sec. 4: Lot 19	Yes	Yes
Sec. 9: Lot 3	Yes	Yes
Sec. 23: Lot 6	Yes	Yes
Sec. 25: Lots 2-4, 8, 9, 14, 15	Yes	Yes
Sec. 30: Lot 7	Yes	Yes
T. 45 N., R. 78 W.,		
Sec. 1: NESW, S2SW	Yes	Yes
Sec. 5: Lot 1, SENE	Yes	Yes
Sec. 9: SWSE	Yes	Yes
Sec. 12: SENE	Yes	Yes
Sec. 26: SESW	Yes	Yes
T. 47 N., R. 78 W.,		
Sec. 6: Lots 10, 13	Yes	Yes
Sec. 19: Lots 6, 11	Yes	Yes
T. 48 N., R. 78 W.,		
Sec. 10: Lots 1, 2, 7, 8	Yes	Yes
T. 50 N., R. 78 W.,		
Sec. 19: Lots 15, 16	No	Yes
T. 51 N., R. 78 W.,		
Sec. 10: Lots 9, 12, 16	No	Yes
Sec. 29: Lot 7-10	Yes	Yes
T. 52 N., R. 78 W.,		
Sec. 1: Lot 8	Yes	Yes
Sec. 2: Lot 5	Yes	Yes
Sec. 17: SENW	Yes	Yes
Sec. 18: Lots 7, 9, NE, NESE	Yes	Yes
Sec. 20: Lot 1	Yes	Yes
Sec. 33: Lot 4	Yes	Yes
T. 53 N., R. 78 W.,		
Sec. 1: Lots 5-10, S2NW	Yes	Yes
Sec. 2: Lots 5-8, S2N2, E2SE	Yes	Yes
Sec. 3: Lot 7	Yes	Yes
Sec. 15: Lot 1	Yes	Yes
Sec. 22: W2E2	Yes	Yes
Sec. 25: Lot 3, NWSE	Yes	Yes
Sec. 27: N2	Yes	Yes
Sec. 28: NE, E2SE	Yes	Yes
Sec. 32: E2NE, SWNE	Yes	Yes
Sec. 33: Lot 1, E2NE, NESE	Yes	Yes
Sec. 35: NESE	Yes	Yes
T. 54 N., R. 78 W.,		
Sec. 2: Lots 7-9, 11	Yes	Yes
Sec. 3: Lots 5-7, 10-20	Yes	Yes
Sec. 4: Lots 13, 20	Yes	Yes
Sec. 6: Lots 19, 20, 24, 25	Yes	Yes
Sec. 7: Lots 17, 18, 23, 32	Yes	Yes
Sec. 8: Lot 5	Yes	Yes
Sec. 10: Lots 6, 11, 14	Yes	Yes
Sec. 15: Lots 1, 2	Yes	Yes
Sec. 20: Lots 1, 2, 8	Yes	Yes
Sec. 22: Lots 11-14	Yes	Yes
Sec. 24: Lot 7	Yes	Yes
Sec. 29: Lots 3-6, 11-14	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 30: Lots 13, 14, 21-24, 31, 32	Yes	Yes
Sec. 33: Lot 4	Yes	Yes
Sec. 35: Lot 16	Yes	Yes
T. 55 N., R. 78 W.,		
Sec. 1: Lots 8,	Yes	Yes
Sec. 9: Lots 4-6	Yes	Yes
Sec. 10: Lot 5	Yes	Yes
Sec. 15: Lot 1	No	Yes
Sec. 16: Lot 1	No	Yes
Sec. 17: Lots 5, 6	Yes	Yes
Sec. 22: Lot 4	Yes	Yes
Sec. 23: Lot 1,2	No	Yes
Sec. 27: Lot 2, SESE	Yes	Yes
Sec. 29: Lot 4	Yes	Yes
Sec. 30: Lots 5, 6	Yes	Yes
Sec. 31: Lots 7-8, 13-24	Yes	Yes
Sec. 31: Lots 9	No	
Sec. 32: Lot 3	Yes	Yes
Sec. 32: Lot 2	No	
Sec. 34: NWSE	Yes	Yes
T. 56 N., R 78 W.,		
Sec. 3: Lot 15	Yes	Yes
Sec. 25: E2NE	Yes	Yes
T. 57 N., R. 78 W.,		
Sec. 2: Lot 2, SWNE	Yes	Yes
Sec. 3: Lot 3	Yes	Yes
Sec. 4: SENE	Yes	Yes
Sec. 5: SENW, NWSW	Yes	Yes
Sec. 7: SENE	Yes	Yes
Sec. 12: W2NW	Yes	Yes
Sec. 13: SWNE	Yes	Yes
Sec. 23: SENW	Yes	Yes
Sec. 24: NESE	Yes	Yes
T. 58 N., R. 78 W.,		
Sec. 23: Lots 1, 2	Yes	Yes
Sec. 26: NESE	Yes	Yes
Sec. 27: NENE	Yes	Yes
Sec. 30: Lot 1	Yes	Yes
Sec. 31: SWNE	Yes	Yes
Sec. 33: N2SW, SESW, NWSE, S2SE	Yes	Yes
Sec. 34: S2SW	Yes	Yes
Sec. 35: S2SE	Yes	Yes
Range 79 West		
T. 42 N., R. 79 W.,		
Sec. 25: W2NW, SENW	Yes	Yes
Sec. 26: N2NE, NENW	Yes	Yes
Sec. 27: N2NW	Yes	Yes
Sec. 28: NENE	Yes	Yes
T. 43 N., R. 79 W.,		
Sec. 19: Lot 4, SESW, NESE	Yes	Yes
Sec. 20: S2NE, SWNW, NWSW	Yes	Yes
Sec. 21: S2NW, S2SW	Yes	Yes
Sec. 23: NENW	Yes	Yes
Sec. 25: SW	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 27: S2SW, NESW, SE	Yes	Yes
Sec. 30: Lot 1, NENW	Yes	Yes
T. 44 N., R. 79 W.,		
Sec. 4: Lots 1, 2	Yes	Yes
Sec. 6: Lots 4-7	Yes	Yes
Sec. 24: N2NW	Yes	Yes
T. 45 N., R. 79 W.,		
Sec. 3: SW, W2SE, SESE	Yes	Yes
Sec. 4: SENW	Yes	Yes
Sec. 12: SWNE	Yes	Yes
Sec. 30: NE	Yes	Yes
T. 46 N., R. 79 W.,		
Sec. 3: Lots 1, 2, S2NE, SE	Yes	Yes
Sec. 11: NE	Yes	Yes
T. 47 N., R. 79 W.,		
Sec. 4: Lots 19, 20	Yes	Yes
Sec. 9: Lots 1, 2, 7-10, 15, 16	Yes	Yes
Sec. 10: Lot 4	Yes	Yes
Sec. 22: Lots 15, 16	Yes	Yes
T. 48 N., R. 79 W.,		
Sec. 5: Lots 15-18, SW	Yes	Yes
Sec. 6: Lots 16, 22, 23	Yes	Yes
Sec. 7: Lots 5-13, 20	Yes	Yes
Sec. 10: Lots 13, 15, SESW	Yes	Yes
Sec. 14: Lots 3, 4, 6, 7, 9-11	Yes	Yes
Sec. 15: Lots 1, 5, 11	Yes	Yes
T. 49 N., R. 79 W.,		
Sec. 17: Lots 12-15	Yes	Yes
Sec. 20: Lots 2-5, 12, 13	Yes	Yes
Sec. 24: Lots 10, 15	Yes	Yes
Sec. 26: Lots 3-5, 12	Yes	Yes
Sec. 27: Lot 13	Yes	Yes
Sec. 29: Lots 3-11, 14-16	Yes	Yes
Sec. 30: Lots 8, 17	Yes	Yes
Sec. 35: Lot 8	Yes	Yes
T. 50 N., R. 79 W.,		
Sec. 17: SESW	Yes	Yes
Sec. 20: SESE	Yes	Yes
Sec. 22: Lot 13	Yes	Yes
Sec. 27: Lots 4, 11, 12, SWNW	Yes	Yes
T. 52 N., R. 79 W.,		
Sec. 1: Lots 9-11	Yes	Yes
Sec. 3: Lot 5-7	No	Yes
Sec. 5: Lots 6, 9, 10	Yes	Yes
Sec. 7: Lot 7, Tracts 43A, 43B	Yes	Yes
Sec. 10: Lot 2, 4, 7, SWSW	No	Yes
Sec. 14: Lot 5	Yes	Yes
Sec. 17: Tracts 43C, 43H	Yes	Yes
Sec. 18: Lots 3, 4	No	Yes
Sec. 19: Lots 5, 6	Yes	Yes
Sec. 22: W2NE, NWSE	Yes	Yes
Sec. 31: S2NENE	No	Yes
Sec. 35: Lots 1, 2	Yes	Yes
T. 53 N., R. 79 W.,		

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 11: NESE	Yes	Yes
Sec. 17: Lot 7	Yes	Yes
Sec. 19: Lot 21, SWSE	Yes	Yes
Sec. 20: Lot 1, Tracts 55A, 55B, 55C, 55D, 55G, 55H	Yes	Yes
Sec. 21: Lots 2-6, Tract 55E, portion of 55E, SENE, NESW, W2SE	Yes	Yes
Sec. 28: NWSW, portion of Tract 55F	Yes	Yes
Sec. 29: Portions of tracts 55H, 55G, 55F	Yes	Yes
Sec. 30: Tract 57I	Yes	Yes
Sec. 32: Lot 1	No	Yes
Sec. 34: Tract 67, SENW	Yes	Yes
T. 54 N., R. 79 W.,		
Sec. 2: Lots 14, 15	Yes	Yes
Sec. 3: Lot 5	Yes	Yes
Sec. 10: Lot 1;	Yes	Yes
Sec. 25: Lot 13	Yes	Yes
T. 55 N., R. 79 W.,		
Sec. 6: Lot 9	Yes	Yes
Sec. 13: Lot 13	Yes	Yes
Sec. 14: Lots 9-11	Yes	Yes
Sec. 15: Lots 7, 8	Yes	Yes
Sec. 17: Lot 4	Yes	Yes
Sec. 18: Lots 5, 6, 12	Yes	Yes
Sec. 19: Lots 5, 11-14	Yes	Yes
Sec. 20: Lots 3-6, 9, 11-16	Yes	Yes
Sec. 21: Lot 13	Yes	Yes
Sec. 26: Lot 5	Yes	Yes
Sec. 27: Lots 1, 2, 8	Yes	Yes
Sec. 32: Lot 4	Yes	Yes
Sec. 33: Lots 8, 9	Yes	Yes
Sec. 34: Lot 2	Yes	Yes
T. 56 N., R. 79 W.,		
Sec. 1: Lots 5-12	Yes	Yes
Sec. 2: Lots 5-7, 10-12, 14, 15	Yes	Yes
Sec. 4: Lots 5-17, N2SW, SESW	Yes	Yes
Sec. 5: NWSE	Yes	Yes
Sec. 6: Lots 8, 9	Yes	Yes
Sec. 13: TRACT 51B	Yes	Yes
Sec. 17: Lot 1	Yes	Yes
Sec. 23: Lot 1	Yes	Yes
Sec. 26: Lots 1, 2	Yes	Yes
T. 57 N., R. 79 W.,		
Sec. 5: SENE, NWSW	Yes	Yes
Sec. 6: Lot 1	Yes	Yes
Sec. 7: NWNE	Yes	Yes
Sec. 7: SENE	No	Yes
Sec. 8: SENW, SW	Yes	Yes
Sec. 11: SENW	Yes	Yes
Sec. 18: Lots 3, 4, SESW, NESE	Yes	Yes
Sec. 19: Lot 1, NWNE, NENW	Yes	Yes
Sec. 22: SENW	Yes	Yes
Sec. 26: W2NW	Yes	Yes
Sec. 27: SWNE, SWSW, NWSE, SESE	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 28: SW, W2SE, SESE	Yes	Yes
Sec. 30: Lot 4, NESW, S2SE	Yes	Yes
Sec. 31: Lots 1-4, NE, SENW, E2SW, SE	Yes	Yes
Sec. 33: N2, SW	Yes	Yes
Sec. 34: NENW, W2NW, SESE	Yes	Yes
Sec. 35: S2SW, NESE	Yes	Yes
T. 58 N., R. 79 W.,		
Sec. 18: Lot 2	Yes	Yes
Sec. 19: Lot 4, E2NE	Yes	Yes
Sec. 20: E2NE	Yes	Yes
Sec. 25: SE	Yes	Yes
Sec. 31: Lots 1, 4, E2SE	Yes	Yes
Sec. 34: NESW	Yes	Yes
Range 80 West		
T. 41 N., R. 80 W.,		
Sec. 17: NENE, NWNW	Yes	Yes
Sec. 21: E2NW, SESE	Yes	Yes
Sec. 22: E2SW	Yes	Yes
T. 42 N., R. 80 W.,		
Sec. 17: S2SW, SWSE	Yes	Yes
Sec. 18: SESE	Yes	Yes
Sec. 20: NESW, NESE	Yes	Yes
Sec. 21: NWSW	Yes	Yes
Sec. 29: SESW	Yes	Yes
T. 43 N., R, 80 W.,		
Sec. 7: E2NE, NESE	Yes	Yes
Sec. 8: N2, N2S2	Yes	Yes
Sec. 11: E2SE	Yes	Yes
Sec. 14: NWNE	Yes	Yes
Sec. 17: SWSE	Yes	Yes
Sec. 18: Lots 1, 2, SESE	Yes	Yes
Sec. 19: E2NE	Yes	Yes
T. 45 N., R. 80 W.,		
Sec. 5: SENW, E2SW, W2SE	Yes	Yes
Sec. 7: Lot 1, SESE	Yes	Yes
T. 48 N., R. 80 W.,		
Sec. 10: NENE	Yes	Yes
Sec. 21: SENW	Yes	Yes
Sec. 23: Lots 13, 14	Yes	Yes
Sec. 26: Lots 3-6, 11-14	Yes	Yes
T. 49 N., R. 80 W.,		
Sec. 2: SENW	Yes	Yes
T. 50 N., R. 80 W.,		
Sec. 2: Lots 9, 10, NESE	Yes	Yes
Sec. 10: E2	Yes	Yes
Sec. 15: W2E2	Yes	Yes
Sec. 28: NENE, W2NE	Yes	Yes
Sec. 34: W2E2, E2NW	Yes	Yes
T. 51 N., R. 80 W.,		
Sec. 4: Lots 7, 10	Yes	Yes
Sec. 5: Lots 5, 6, 7	Yes	Yes
Sec. 7: Lots 5, 6	Yes	Yes
Sec. 8: Lots 1-3, NWNE	Yes	Yes
Sec. 12: Lots 2, 3	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 28: Lot 1	Yes	Yes
T. 52 N., R. 80 W.,		
Sec. 1: Lot 12, SWSE	Yes	Yes
Sec. 9: Tract 48A	Yes	Yes
Sec. 10: Tract 48A	Yes	Yes
Sec. 12: Lots 5, 8	Yes	Yes
Sec. 14: Lot 1	Yes	Yes
Sec. 15: Lot 1	Yes	Yes
Sec. 23: Lot 1	Yes	Yes
Sec. 29: Lot 6, N2SW, SESW	Yes	Yes
Sec. 32: Tracts 91E, 91F, 91G	Yes	Yes
Sec. 33: Lot 1	Yes	Yes
T. 53 N., R. 80 W.,		
Sec. 4: N2SE	Yes	Yes
T. 54 N., R. 80 W.,		
Sec. 10: NWNE	Yes	Yes
Sec. 11: SWNW	Yes	Yes
T. 55 N., R. 80 W.,		
Sec. 3: SWSW	Yes	Yes
Sec. 10: SESW	Yes	Yes
Sec. 23: NESE	Yes	Yes
Sec. 24: SWSW	Yes	Yes
Sec. 26: NESW	Yes	Yes
T. 56 N., R. 80 W.,		
Sec. 31: Lot 6	Yes	Yes
T. 57 N., R. 80 W.,		
Sec. 3: Lot 2	Yes	Yes
Sec. 11: N2NE, SENE	Yes	Yes
Sec. 12: N2, SE	Yes	Yes
Sec. 25: SWNE, S2NW	Yes	Yes
T. 58 N., R. 80 W.,		
Sec. 13: Lots 1, 2	Yes	Yes
Sec. 14: Lot 1	Yes	Yes
Sec. 21: NENW	Yes	Yes
Range 81 West		
T. 42 N., R. 81 W.,		
Sec. 11: NESW	Yes	Yes
T. 43 N., R. 81 W.,		
Sec. 5: NWSE	Yes	Yes
Sec. 14: SESE	Yes	Yes
Sec. 19: Lot 2, SWNE, SENW	Yes	Yes
Sec. 23: SESE	Yes	Yes
T. 44 N., R. 81 W.,		
Sec. 9: SESW, SWSE	Yes	Yes
Sec. 14: W2SW	Yes	Yes
Sec. 15: SWNW	Yes	Yes
Sec. 17: NW, NESW	Yes	Yes
Sec. 18: Lots 3, 4, E2NE	Yes	Yes
Sec. 20: SESW	Yes	Yes
Sec. 21: SENE	Yes	Yes
Sec. 22: NE, N2NW, E2SE	Yes	Yes
Sec. 23: W2W2	Yes	Yes
Sec. 25: W2W2, NESW	Yes	Yes
Sec. 26: E2	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 29: E2NW, NWSE	Yes	Yes
Sec. 31: E2NE	Yes	Yes
Sec. 32: W2NW	Yes	Yes
Sec. 33: SESW	Yes	Yes
T. 45 N., R. 81 W.,		
Sec. 3: S2NW, NWSW	Yes	Yes
Sec. 7: Lot 1	Yes	Yes
Sec. 21: SWSW	Yes	Yes
Sec. 28: SE	Yes	Yes
Sec. 29: SWSE	Yes	Yes
Sec. 33: SENE	Yes	Yes
T. 46 N., R. 81 W.,		
Sec. 4: Lot 2	Yes	Yes
T. 47 N., R. 81 W.,		
Sec. 7: Lot 1, NWNE, NENW	Yes	Yes
Sec. 8: NWNW	Yes	Yes
Sec. 25: NWSE	Yes	Yes
T. 48 N., R. 81 W.,		
Sec. 18: Lot 4	Yes	Yes
Sec. 19: Lots 1-4	Yes	Yes
Sec. 30: Lot 1, 2	Yes	Yes
Sec. 31: SENE, W2SE	Yes	Yes
T. 50 N., R. 81 W.,		
Sec. 27: W2SW	Yes	Yes
Sec. 28: E2SE	Yes	Yes
Sec. 33: NENE	Yes	Yes
Sec. 34: N2NW	Yes	Yes
T. 52 N., R. 81 W.,		
Sec. 7: SWSE	Yes	Yes
Sec. 18: Lot 2	Yes	Yes
Sec. 33: E2NE	Yes	Yes
T. 53 N., R. 81 W.,		
Sec. 35: SESE	Yes	Yes
T. 55 N., R. 81 W.,		
Sec. 1: SWSE	Yes	Yes
Sec. 8: NWSW;	Yes	Yes
Sec. 10: SENW, NESW, NWSE	Yes	Yes
Sec. 11: SWNW, NWSW	Yes	Yes
Sec. 15: SENW	Yes	Yes
Sec. 26: Lots 1-5	Yes	Yes
T. 56 N., R. 81 W.,		
Sec. 20: NWSE	Yes	Yes
Sec. 23: NENW	Yes	Yes
Sec. 27: SWSW	Yes	Yes
Sec. 31: Lot 2, SENE	Yes	Yes
T. 57 N., R. 81 W.,		
Sec. 29: W2NW	Yes	Yes
Sec. 32: NWSW	Yes	Yes
Range 82 West		
T. 41 N., R. 82 W.,		
Sec. 1: Lot 4, SENE, E2SE	No	Yes
Sec. 12: NESE	No	Yes
Sec. 19: SENE, S2SE	Yes	Yes
Sec. 21: SWNW	No	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 22: NENE	No	Yes
Sec. 29: W2NE, NW	Yes	Yes
Sec. 30: E2NE	Yes	Yes
T. 42 N., R. 82 W.,		
Sec. 6: Lots 1-3, SENW, NESW, N2SE, SESE	Yes	Yes
Sec. 7: Lot 1	Yes	Yes
Sec. 8: NE, E2NW	Yes	Yes
Sec. 18: W2E2	Yes	Yes
Sec. 19: Lots 2-4, E2NW, E2SW, W2SE, NESE	Yes	Yes
T. 43 N., R. 82 W.,		
Sec. 2: Lot 4	Yes	Yes
Sec. 3: SWNW, NWSW	Yes	Yes
Sec. 4: Lots 1, 2, N2SE, SWSE	Yes	Yes
Sec. 9: SESE	No	Yes
Sec. 14: E2SW	Yes	Yes
Sec. 15: SESW	Yes	Yes
Sec. 18: Lots 3, 4, E2SW	Yes	Yes
Sec. 22: N2NE, E2NW	Yes	Yes
Sec. 23: N2N2, SWNW, SESE	Yes	Yes
Sec. 26: NE, E2NW	Yes	Yes
Sec. 28: SENE	No	Yes
Sec. 31: E2SW, NWSSE, E2SE	Yes	Yes
T. 44 N., R. 82 W.,		
Sec. 2: SWSW	Yes	Yes
Sec. 3: SESW, S2SE	Yes	Yes
Sec. 7: S2SE	Yes	Yes
Sec. 8: W2NE, NWSE	Yes	Yes
Sec. 9: W2NE, N2SE	Yes	Yes
Sec. 11: NWNW	Yes	Yes
Sec. 17: N2NE, SENE	Yes	Yes
Sec. 18: NENE	Yes	Yes
Sec. 19: Lot 2, SENW	Yes	Yes
Sec. 30: NWSE	Yes	Yes
Sec. 34: S2NE, SENW, NESW, N2SE	Yes	Yes
Sec. 35: SWNW, W2SW	Yes	Yes
T. 45 N., R. 82 W.,		
Sec. 2: N2SW, W2SE	Yes	Yes
Sec. 13: NENE	Yes	Yes
Sec. 23: NWNW	Yes	Yes
Sec. 25: NENE	Yes	Yes
T. 46 N., R. 82 W.,		
Sec. 4: SWSE	Yes	Yes
T. 47 N., R. 82 W.,		
Sec. 31: NESE	Yes	Yes
T. 48 N., R. 82 W.,		
Sec. 9: NWSW	Yes	Yes
Sec. 18: NWSE	Yes	Yes
Sec. 20: NENW	Yes	Yes
Sec. 29: SWNW	Yes	Yes
Sec. 32: SESE	Yes	Yes
T. 49 N., R. 82 W.,		
Sec. 31: Lot 4	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
T. 50 N., R 82 W.,		
Sec. 30: NWNE	Yes	Yes
T. 52 N., R. 82 W.,		
Sec. 2: Lots 3, 4, N2SW	Yes	Yes
Sec. 3: Lot 1	Yes	Yes
T. 53 N., R. 82 W.,		
Sec. 13: NENE	Yes	Yes
Sec. 17: SESW, SWSE	Yes	Yes
Sec. 18: NESE	Yes	Yes
Sec. 33: NWNE, NESW	Yes	Yes
Sec. 35: SWSW	Yes	Yes
T. 56 N., R. 82 W.,		
Sec. 11: SWSE	Yes	Yes
Sec. 27: SWNW, NWSE	Yes	Yes
Sec. 28: E2NE, NESE	Yes	Yes
Sec. 31: SENE, E2SE	Yes	Yes
T. 57 N., R. 82 W.,		
Sec. 7: SWSE	Yes	Yes
Sec. 20: W2SE	Yes	Yes
Sec. 30: S2NE	Yes	Yes
T. 58 N., R. 82 W.,		
Sec. 21: SENE	Yes	Yes
Range 83 West		
T. 42 N., R. 83 W.,		
Sec. 2: S2NE, SENW, NESW	Yes	Yes
Sec. 11: S2SWNW, NWSENW, NENWSW, N2SWSW, SWSWSW	Yes	Yes
Sec. 12: N2SE	Yes	Yes
Sec. 14: NWNWNW, S2NWNW	Yes	Yes
Sec. 20: SESW	Yes	Yes
Sec. 25: W2NE	Yes	Yes
Sec. 29: NWNE	Yes	Yes
T. 43 N., R. 83 W.,		
Sec. 3: Lots 5, 6	Yes	Yes
Sec. 4: Lots 7-8, 11, SESE	Yes	Yes
Sec. 9: Lots 1, 4, Tract 44 I, NENE	Yes	Yes
Sec. 10: Lots 1, 2	Yes	Yes
Sec. 11: Lots 1-5	Yes	Yes
Sec. 12: Lot 1	Yes	Yes
Sec. 13: Lots 1, 2, 5, 6	Yes	Yes
Sec. 14: Lots 1-5, E2NE, NWNE	Yes	Yes
Sec. 24: Lot 1	Yes	Yes
Sec. 26: Lots 6, 7	Yes	Yes
Sec. 27: Lots 3, 4	Yes	Yes
Sec. 35: Lot 4	Yes	Yes
T. 44 N., R. 83 W.,		
Sec. 2: Lot 5	Yes	Yes
Sec. 3: W2SW	Yes	Yes
Sec. 6: Lot 16	Yes	Yes
Sec. 12: SESE	Yes	Yes
Sec. 13: SESE	Yes	Yes
Sec. 23: NWNE, NENW, SESE	Yes	Yes
Sec. 24: SWNE, SENW, SW, W2SE	Yes	Yes
Sec. 25: E2NE, N2NW	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 26: NENE	Yes	Yes
Sec. 33: SE	Yes	Yes
Sec. 34: E2NW, SWNW, SW	Yes	Yes
T. 45 N., R. 83 W.,		
Sec. 5: Lot 8	Yes	Yes
Sec. 7: Lots 8, 9	Yes	Yes
Sec. 8: Lot 2, 5	Yes	Yes
Sec. 9: Lot 9	Yes	Yes
Sec. 10: W2NE	Yes	Yes
Sec. 11: SWSE	Yes	Yes
Sec. 16: Tract 67, Lots 1, 2	Yes	Yes
Sec. 17: Lots 1-6, NWSW	Yes	Yes
Sec. 18: Lots 5, 6, 9	Yes	Yes
Sec. 20: Lot 2	Yes	Yes
Sec. 21: Lots 1, 2	Yes	Yes
T. 47 N., R. 83 W.,		
Sec. 26: NESW	No	Yes
Sec. 27: W2NE, S2NW	No	Yes
T. 48 N., R. 83 W.,		
Sec. 1: SWSW	Yes	Yes
T. 49 N., R. 83 W.,		
Sec. 1: SWNW	Yes	Yes
Sec. 2: Lots 1, 2	Yes	Yes
T. 50 N., R. 83 W.,		
Sec. 22: SENW	Yes	Yes
Sec. 27: SENW, NESW	Yes	Yes
T. 55 N., R. 83 W.,		
Sec. 4: Lot 3	Yes	Yes
T. 56 N., R. 83 W.,		
Sec. 12: W2E2	Yes	Yes
T. 57 N., R. 83 W.,		
Sec. 10: SENE	Yes	Yes
Sec. 13: SWSW	Yes	Yes
Sec. 14: SESE;	Yes	Yes
Sec. 24: NWNW	Yes	Yes
T. 58 N., R. 83 W.,		
Sec. 24: Lot 2	Yes	Yes
Sec. 25: W2SE	Yes	Yes
Range 84 West		
T. 57 N., R. 84 W.,		
Sec. 5: Lot 3, SESW, SWSE	Yes	Yes
Sec. 6: Lot 5	Yes	Yes
Sec. 9: SENW	Yes	Yes
T. 58 N., R. 84 W.,		
Sec. 17: Lot 1	Yes	Yes
Sec. 18: Lot 1	Yes	Yes
Sec. 20: N2NE	Yes	Yes
Sec. 21: NWNW	Yes	Yes
Range 85 West		
T. 42 N., R. 85 W.,		
Sec. 4: Lots 3, 4, SWNE, S2NW, SW, SESE	Yes	Yes
Sec. 5: Lots 1-3, S2NE	Yes	Yes
Sec. 18: N2NE	Yes	Yes
T. 43 N., R. 85 W.,		

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 4: SWNE, NWSE	Yes	Yes
Sec. 5: Lots 1, 2	Yes	Yes
Sec. 8: N2NE, SENE	Yes	Yes
Sec. 17: W2NW, N2SW	Yes	Yes
Sec. 20: NWNE	Yes	Yes
Sec. 22: SWSW	Yes	Yes
Sec. 27: NWNE, NWNW	Yes	Yes
Sec. 35: N2SW	Yes	Yes
T. 44 N., R. 85 W.,		
Sec. 32: SESE	Yes	Yes
Sec. 33: N2SW	Yes	Yes
T. 45 N., R. 85 W.,		
Sec. 3: S2SW, SWSE	Yes	Yes
Sec. 4: SE, S2SE;	Yes	Yes
Sec. 5: SESE;	Yes	Yes
Sec. 6: Lot 6, NESW	Yes	Yes
Sec. 7: SESE	Yes	Yes
Sec. 9: NENE	Yes	Yes
Sec. 10: NENW	Yes	Yes
Sec. 12: W2SE	Yes	Yes
Sec. 15: NWNE, SENE, W2SW, E2SE	Yes	Yes
Sec. 18: Lots 1, 2, N2NE, NENW	Yes	Yes
Sec. 19: SENE, E2SE	Yes	Yes
Sec. 20: NWNW	Yes	Yes
Sec. 23: NESE	Yes	Yes
Sec. 24: NWSW	Yes	Yes
Sec. 30: E2NE	Yes	Yes
Sec. 34: SENE;	Yes	Yes
Sec. 35: W2SW	Yes	Yes
T. 46 N., R. 85 W.,		
Sec. 5: SWNE, SENW	Yes	Yes
Sec. 6: Lot 2	Yes	Yes
T. 47 N., R. 85 W.,		
Sec. 19: Lots 3, 4	Yes	Yes
T. 53 N., R. 85 W.,		
Sec. 12: Lots 1-8, SENE, N2SW, SESW, N2SE, SWSE	Yes	Yes
T. 54 N., R. 85 W.,		
Sec. 27: NWNE, W2NW, NWSW, S2S2	Yes	Yes
T. 56 N., R. 85 W.,		
Sec. 8: N2NE	Yes	Yes
T. 58 N., R. 85 W.,		
Sec. 22: SWNE	Yes	Yes
Sec. 26: S2SW	Yes	Yes
Sec. 27: S2SE	Yes	Yes
Sec. 29: SENE	Yes	Yes
Range 86 West		
T. 55 N., R. 86 W.,		
Sec. 27: SW	Yes	Yes
Sec. 34: N2N2, SENE, SENW, NESW	Yes	Yes
T. 58 N., R. 86 W.,		
Sec. 13: Lots 1, 2	Yes	Yes
Sec. 14: Lot 4	Yes	Yes
Sec. 15: Lot 1	Yes	Yes

Legal Description	Alternative A (1985 RMP)	Alternatives B, C, D
Sec. 22: NENE, SE	Yes	Yes
Sec. 23: W2SW	Yes	Yes
Sec. 26: W2SW	No	Yes
Sec. 27: SWNE, NWSE	Yes	Yes
Sec. 34: SWSW	Yes	Yes
Range 87 West		
T. 56 N., R. 87 W.,		
Sec. 5: Lots 5-7, 9-11	Yes	Yes
Sec. 23: S2S2	Yes	Yes
Sec. 25: S2SW	Yes	Yes
Sec. 36: ALL	Yes	Yes
T. 57 N., R. 87 W.,		
Sec. 19: Lots 1, 3, 4, E2SW, SE	Yes	Yes
Sec. 20: S2SW	Yes	Yes
Sec. 29: SW	Yes	Yes
Range 88 West		
T. 57 N., R. 88 W.,		
Sec. 14: Lot 1	Yes	Yes
Sec. 15: Lots 5, 6, S2SW	Yes	Yes
Sec. 16: Lot 3	Yes	Yes
Range 89 West		
T. 58 N., R. 89 W.,		
Sec. 20: NWNW	Yes	Yes

Appendix M. Technical Support Document for Air Quality

M.1. Introduction

This technical support document summarizes the data, methodologies, and approaches followed in the analysis of air resources impacts that are included in Chapter 4 of the Buffalo Draft Resource Management Plan and Environmental Impact Statement (Draft RMP and EIS). The analysis of impacts primarily involved the estimation of emissions from the various resource activities occurring in the planning area for the base year (2005) and for the alternatives in the future years (2015 and 2024).

M.2. Study Area

The study area for this analysis (Map 1) is the Buffalo planning area and the analysis includes consideration of cumulative emission sources and potential impacts to Class I areas within 150 kilometers of the area, as mandated by the Prevention of Significant Deterioration (PSD) program under the 1970 Clean Air Act (CAA). Although there are no Class I areas within the Buffalo planning area boundary or within the 150-kilometer range, this study included three Class I areas (Wind Cave National Park, Northern Cheyenne Indian Reservation, and Badlands Wilderness Area) that are within 150 kilometers.

M.3. Pollutants Addressed in the Analysis

The basic framework for controlling air pollutants in the United States is mandated by the CAA and its amendments, Environmental Protection Agency (EPA) regulations, including the 1999 Regional Haze Regulations, and state and local air quality regulations. The CAA addresses criteria air pollutants, state and national ambient air quality standards for criteria air pollutants, and the PSD program. The Regional Haze Regulations address visibility impairment. EPA regulations address ambient air quality standards for criteria pollutants, emission control technology, air quality monitoring, and State Implementation Plan development (which may include air quality modeling), and air quality related value (AQRV) analyses related to regional haze.

Air pollutants addressed in this study include criteria pollutants, hazardous air pollutants (HAPs), sulfur and nitrogen compounds (which could cause visibility impairment or atmospheric deposition impacts), and greenhouse gases (GHGs). These pollutants were included in this analysis because of the following: (1) they were identified as compounds that had potential to be emitted by management actions and activities, (2) adequate operational and activity data were available to estimate emissions, and (3) current emission factors were available to quantify emissions.

Criteria Pollutants

Criteria pollutants are those for which national standards of concentration have been established. Ambient air concentrations of these constituents greater than the standards represent a risk to human health. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur

dioxide (SO_2), ozone (O_3), particulate matter (PM_{10}, $PM_{2.5}$), and lead, each of which is listed below.

Carbon Monoxide. CO is an odorless, colorless gas formed during any combustion process, such as operation of engines, fireplaces, and furnaces. High concentrations of CO affect the oxygen-carrying capacity of the blood and can lead to unconsciousness and asphyxiation. Wildfires are natural sources of CO.

Nitrogen Dioxide. NO_2 is a red-brown gas formed during the operation of internal combustion engines or other burning processes. Such processes emit a mixture of nitrogen gases, collectively called nitrogen oxides (NO_X). NO_X can contribute to brown cloud conditions and can convert to ammonium nitrate particles and nitric acid, which can cause visibility impairment and acid rain. Bacterial action in soil can be a natural source of nitrogen compounds.

Sulfur Dioxide. SO_2 forms during combustion from trace levels of sulfur in coal or diesel fuel. It can convert to ammonium sulfate and sulfuric acid, which can cause visibility impairment and acid rain. Volcanoes are natural sources of SO_2. Anthropogenic sources include refineries and power plants.

Ozone. O_3 is a gas that generally is not emitted directly into the atmosphere, but is formed from NO_X and volatile reactive organic compound (VOC) emissions. As stated above, internal combustion engines are the main source of NO_X. VOCs, such as terpenes, are very reactive. Sources of VOCs include, but are not limited to, paint, varnish, and types of vegetation. The faint acrid smell common after thunderstorms is caused by ozone formation caused by lightning. Ozone is a strong oxidizing chemical that can burn lungs and eyes, as well as damage plants.

Particulate Matter. Particulate matter (e.g., soil particles, hair, pollen) are essentially small particles suspended in the air that settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle:

- PM_{10} particles, particles with diameters of less than 10 micrometers, are small enough to be inhaled and can cause adverse health impacts.
- $PM_{2.5}$ particles, particles with diameters of less than 2.5 micrometers, are so small that they can be drawn deeply into the lungs and cause serious health problems. Particles of this size also are the main cause of visibility impairment.

Lead. Before the widespread use of unleaded fuel in automobiles, lead particles were emitted from automobile tailpipes. Lead is not considered in this analysis because emissions of lead from projected activities would be negligible.

Hazardous Air Pollutants

Although HAPs, including N-hexane, ethylbenzene, toluene, xylene, formaldehyde, and benzene, do not have ambient air quality standards, the EPA has issued reference concentrations for evaluating the inhalation risk for cancerous and noncancerous health impacts, known as reference concentrations for chronic inhalation. The EIS associated with the Buffalo RMP is a National Environmental Policy Act (NEPA) document and not a regulatory document, but the Record of Decision is binding and a "public record" (see 40 Code of Federal Regulations [CFR] 1505.2). In addition, there are regulatory issues that should be taken into account in preparing this Draft RMP and EIS and ensuing project-specific EISs. Actual regulation of HAPs is achieved through compliance with the applicable maximum achievable control technology (MACT) standards and not through ambient air quality standards. Regulatory agencies implement control through

Section 112 programs, specifically Section 112(g) case-by-case MACT determinations based on 40 CFR Part 63, Subpart B, and Section 112(d) MACT emission standards.

HAP emissions are associated with industrial activities, such as oil and gas operations, refineries, paint shops, dry cleaning facilities, and woodworking shops. Because this analysis is qualitative, no specific analyses of either short- or long-term HAP impacts are made.

Atmospheric Deposition Constituents

Sulfur and nitrogen compounds that can be deposited in terrestrial and aquatic ecosystems include nitric acid, nitrate, ammonium, and sulfate. Nitric acid and nitrate are not emitted directly into the air, but form in the atmosphere from industrial and automotive emissions of NO_X. Sulfate is formed in the atmosphere from industrial emission of SO_2. Deposition of nitric acid, nitrate, and sulfate can adversely impact plant growth, soil chemistry, lichens, aquatic environments, and petroglyphs. Ammonium is primarily associated with feedlots and agricultural fertilization. Ammonium deposits can affect terrestrial and aquatic vegetation.

Greenhouse Gases

GHGs are pollutants that are effective in preventing heat from escaping the earth's atmosphere and have been attributed to altering components of the earth's climate. These include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Other identified GHGs, including hydroflourocarbons, perflourocarbons, and sulfur hexafluoride were not included in the analysis because proposed activities are not sources of these pollutants and emissions are expected to be insignificant or zero.

M.4. Thresholds of Significance

Criteria Pollutants

National Ambient Air Quality Standards (NAAQS) and Wyoming Ambient Air Quality Standards (WAAQS) are health-based standards that identify maximum limits for criteria air pollutant concentrations at all locations to which the public has access. The NAAQS and WAAQS are legally enforceable standards. Concentrations that are above the NAAQS and WAAQS represent a risk to human health and by law, require public safeguards be implemented. State standards must be at least as protective of human health as federal standards, and may be more restrictive than the federal standards as allowed by the CAA. The EPA has developed standards for each pollutant for a specific averaging time. Short averaging times (1, 8, and 24 hours) address short-term exposure, while the annual standards address long-term exposure.

Chapter 3 of the Draft RMP and EIS presented the national primary air quality standards and the Wyoming primary air quality standards. Analyses of proposed alternatives for project-specific EISs compare cumulative concentrations of air pollutants to the NAAQS and WAAQS. The Bureau of Land Management (BLM) cannot authorize any activity that would not conform to all applicable local, state, tribal, and federal air quality laws, regulations, and standards.

Prevention of Significant Deterioration

The goal of the PSD program is to ensure that air quality in areas with clean air does not significantly deteriorate, while a margin for future industrial growth is maintained. Under the PSD program, each area in the United States is classified by the air quality in that region according to the following system:

PSD Class I Areas. Areas with pristine air quality, such as wilderness areas, national parks, and some Native American reservations, are accorded the strictest protection. Only very small incremental increases in pollutant concentrations are allowed in order to maintain the very clean air quality in these areas.

PSD Class II Areas. Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS).

PSD Class III Areas. No areas have been designated yet as Class III. A larger incremental increase in pollutant concentrations would be allowed, up to the applicable WAAQS and NAAQS.

Table M.1, "Prevention of Significant Deterioration Increments" (p. 1830) provides the incremental increases allowed for specific pollutants in Class I and Class II areas.

Comparisons of potential PM_{10}, NO_2, and SO_2 concentrations with PSD increments are intended to evaluate a threshold of concern only and do not represent a regulatory PSD increment consumption analysis. Regulatory PSD increment consumption analyses are solely the responsibility of the State of Wyoming, which has been granted primacy (with EPA oversight) under the CAA. In project-specific EISs, the BLM does not expect that a PSD analysis will be performed; rather, the PSD standards are used as a reference only to give the public a better understanding of the level of potential impact.

Table M.1. Prevention of Significant Deterioration Increments

Pollutant	Averaging Period	PSD Increment – Class I (µg/m³)	PSD Increment – Class II (µg/m³)
Sulfur Dioxide (SO_2)	3 Hours	25	512
	24 Hours	5	91
	Annual	2	20
Particulate Matter (PM_{10})	24-Hours	8	30
	Annual	4	17
Nitrogen Dioxide (NO_2)	Annual	2.5	25
Carbon Monoxide (CO)	1-Hour	None	None
	8-Hours	None	None
Lead	3 months	None	None

Source: Wyoming DEQ 2004

PSD Prevention of Significant Deterioration
µg/m³ micrograms per cubic meter

Hazardous Air Pollutants

Section 112 of the CAA lists more than 180 chemicals as HAPs. In addition, Sections 112 (d) and 112(g) require regulatory agencies to establish MACT Standards for sources that emit HAPs. Any

source that emits or has the potential to emit 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAPs is considered a major source and will require a Title V, Part 70, operating permit review and permit. In addition to MACT standards, EPA has listed (on its Air Toxics Database) Reference Exposure Levels (RELs) for many of the HAPs. RELs are defined as concentrations at or below which no adverse health effects are expected.

Visibility and Regional Haze

Visibility impairment in the form of regional haze obscures the clarity, color, texture, and form of what we see. Haze-causing pollutants (mostly fine particles) are directly emitted into the atmosphere or are formed when gases emitted into the air form particles as they are carried downwind. Emissions from human-caused and natural sources can be carried great distances, contributing to regional haze. Changes in visibility or regional haze are caused by fine particles and gases scattering and absorbing light. A 1.0 deciview (dv) change in light extinction is considered potentially significant in mandatory federal PSD Class I areas as described in the EPA Regional Haze Regulations (40 CFR §51.300 et seq.). A 1.0-dv change is defined as approximately a 10% change in the extinction coefficient (corresponding to a 2 to 5% change in contrast, for a black target against a clear sky, at the most optically sensitive distance from an observer), which is a small but noticeable change in haziness under most circumstances when viewing scenes in mandatory federal Class I areas. For multi-source projects located within range of a Class I area, changes in extinction of less than 5% (0.5 dv) are generally considered unlikely to result in adverse impacts to visibility. Changes in extinction greater than 10% (1.0 dv) are generally considered unacceptable and will likely require additional more refined impact analysis typically including an evaluation of mitigation measures.

Atmospheric Deposition

As described in the Federal Land Managers' AQRV Work Group (FLAG) Phase I Report – Revised 2010 (NPS 2010), the National Park Service, the U.S. Forest Service, and the U.S. Fish and Wildlife Service (USFWS) have established thresholds to evaluate nitrogen and sulfur deposition within Class I areas. These deposition analysis thresholds (DATs) are defined as 0.005 kilogram per hectare per year (kg/ha/yr) in the western United States for both nitrogen and sulfur. These thresholds are typically used to analyze impacts of individual projects. Cumulative impacts are typically compared to the level of concern, which is defined by the National Park Servoce and USFWS as 3 kg/ha/yr for nitrogen and 5 kg/ha/yr for sulfur in Rocky Mountain regions. Deposition rates that are below the level of concern are believed to cause no adverse impacts.

Lake Chemistry

The USFWS considers lake chemistry changes to be potentially significant if the screening methodology predicts decreases in acid neutralizing capacity (ANC) of more than defined limits of acceptable change (LAC). A lake's LAC depends on its background ANC value. The LAC is defined as a 10% change for lakes with ANC background values greater than 25 microequivalents per liter (eq/l) and is defined as a change of 1 eq/l for lakes with ANC background values less than 25 eq/l. If the ANC of a lake is predicted to decrease by more than the applicable LAC then potential changes to lake chemistry may cause adverse effects and a more detailed analysis of lake chemistry impacts would be required.

Emissions Generating Activities Included in the Analysis

Emissions of criteria pollutants and GHGs were estimated for 11 different types of management activities that were identified as having the potential to generate emissions of the specified pollutants and for which activity, operation, and equipment data were available. In addition to these activities, emissions for **Coal Mining** operations in the planning area were also estimated using a different methodology (see below). The following is a list of the 11 sectors and the specific activities under each sector for which potential emissions were quantified:

Leasable Fluid Minerals – Conventional Natural Gas Development

Well pad and compressor station pad construction
Road construction and maintenance
Well drilling, completion, and testing
Well completion flares
Well workovers
Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Natural gas fired compressors
Dehydrator, separator, and water tank heaters
Dehydrator vents
Tank venting, flashing, and load-out
Wellhead equipment leaks
Pneumatic pumps and devices
Well pad and road reclamation
Wind erosion

Leasable Fluid Minerals – Coal Bed Natural Gas Development

Well pad, compressor station pad, and water disposal well pad construction
Road construction and maintenance
Well drilling, completion, and testing
Well workovers
Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Natural gas fired compressors
Dehydrator and tank heaters
Dehydrator vents
Wellhead equipment leaks
Pneumatic pumps and devices
Well pad and road reclamation
Wind erosion
Produced water evaporation ponds

Leasable Fluid Minerals – Oil Development

Well pad and compressor station pad construction
Road construction and maintenance
Well drilling, completion, and testing
Well completion flares

Well workovers
Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Natural gas fired compressors
Dehydrator, separator, and water tank heaters
Dehydrator vents
Tank venting, flashing, and load-out
Wellhead equipment leaks
Pneumatic pumps and devices
Well pad and road reclamation
Wind erosion

Locatable Minerals – Bentonite Mining

Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Exploratory drilling
Exploratory excavation and reclamation
Mine development excavation and reclamation
Product handling, transfer, and storage

Locatable Minerals – Uranium Mining

Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Injection well, production well, and monitoring well construction
Well drilling and workovers
Road and pipeline construction
Road and well pad maintenance and reclamation
Transport of resin

Salable Minerals – Sand, Gravel, and other Mineral Development

Construction vehicle exhaust and fugitive dust
Maintenance vehicle exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Product handling, transfer, and storage
Wind erosion

Fire Management and Ecology – Prescribed Fire

Heavy equipment exhaust and fugitive dust
Commuting vehicle exhaust and fugitive dust
Mechanical equipment (chainsaws, etc.) exhaust
Smoke from prescribed fire

Forest Products

Heavy equipment and mechanical equipment exhaust and fugitive dust associated with tree harvesting, pole and post harvesting, firewood collection, tree salvaging, and weed control.
Commuting vehicle exhaust and fugitive dust

Land Resources– Rights-of-Way and Renewable Energy Projects

Heavy equipment and mechanical equipment exhaust and fugitive dust associated with the construction of wind energy projects, telephone and fiber optics sites, pipelines, roads, powerlines, and communication sites.
Commuting vehicle exhaust and fugitive dust

Land Resources – Travel and Transportation Management

Recreation trail and road maintenance
Off-highway vehicles

Land Resources – Livestock Grazing Management

Heavy equipment exhaust and fugitive dust associated with construction of springs, reservoirs, wells, pipelines, fences, and reservoir maintenance.
Commuting vehicle exhaust and fugitive dust
Enteric fermentation and manure

There were some management activities that emissions were not estimated for because development potential was low, emissions were considered to be minor, or insufficient data was available to calculate emissions. Emissions from the following management activities were not estimated because the potential for development was considered low: phosphate mining, oil shale development, geothermal development, gemstones and lapidary materials development. Emissions from the following management activities were not estimated because (1) the level of activity is not expected to change between alternatives, *and* (2) the magnitude of emissions from the activity is considered to be very small in comparison to other management activities, or (3) sufficient operational or production data were not available to quantify emissions: wildland (unplanned) fires, invasive species and pest management, grassland and shrubland management, wild horse management and activities related to heritage and visual resources, socioeconomic resources, and fish and wildlife resources.

M.5. Emissions Calculations

For this analysis, emissions of PM_{10}, $PM_{2.5}$, NO_X, SO_2, CO, VOC, HAPs, and GHGs were estimated for a 20-year period, beginning with 2005 as the base year, 2015 as the mid-point interim year, and 2024 as the end of this period. Emissions were estimated for the four alternatives: Alternative A (No Action Alternative), Alternative B (Resource Conservation), Alternative C (Resource Utilization), and Alternative D (Preferred Alternative). Emissions were estimated for the base year 2005 corresponding to Alternative A while emissions for all alternatives were estimated for 2015 and 2024. A set of spreadsheets, originally developed for use in estimating emissions for the Lander RMP revision (BLM 2013d), were updated and adapted for use in estimating emissions for the Buffalo planning area for these years. Emission factors used to estimate emissions for various categories were obtained from (1) the EPA NONROAD2008a Emissions Model (EPA 2008), (2) Wyoming Department of Environmental Quality (DEQ) Air Quality Division Best Available Control Technology (BACT) levels for natural gas-fired internal combustion engines (Wyoming DEQ 2000), and (3) the MOBILE6.2.03 emission factor model for on-road vehicles (EPA 2003). Information regarding equipment types, numbers, activity, etc., was provided by specialists in the BLM BFO for some of the resources and information included in the *Surface Disturbance and Reasonable Foreseeable Action (RFA)* tables (Appendix G (p. 1671)) for the planning area. Emissions estimates for coal mining activities were estimated using emission estimates contained in the 2008 version of EPA's National Emission Inventory

(NEI) (EPA 2011b) and information contained in the latest version of the Mineral Occurrence Report for the planning area (BLM 2009c).

When reviewing the emission inventory, it is important to understand that assumptions were made regarding development. For example, there is uncertainty regarding ultimate development of energy resources (e.g., number of wells, equipment used, specific locations of wells, etc.). In general, the assumptions that were made would tend to result in a conservatively high estimate of emissions. For instance, given the number of sources included in this analysis, the likelihood that all emission sources would actually operate at their reasonable, foreseeable maximum emission rates over an entire year (or even 24 hours) is small. Also, depending on future economic conditions, mining and drilling methods, air pollution control technologies, and other factors that influence the pace of development, actual future emissions could be considerably different than presented. In addition, the size, location, and pace of development for future projects are not well known at this planning stage. For these reasons, it was determined that air quality modeling would not be included in this analysis. (A summary discussion of air quality modeling that has been and is being conducted in the planning area, primarily focused on the impacts of coal mining in the Powder River Basin, is provided in the *Air Quality* section in Chapter 3). As part of the NEPA analysis for actual development projects, the BLM will conduct an air quality analysis that will include air dispersion modeling of both project and cumulative impacts for those projects that may have a significant impact on air quality within the planning area.

A summary of total emissions for each pollutant species from all BLM activities is presented in Chapter 4, *Air Quality* section. Detailed emission totals for each category/planning year are presented at the end of this section.

Assumptions Used in Developing Emissions for the Buffalo RMP

The following assumptions were used in the emission calculations:

- All emission sources operated at their reasonably foreseeable maximum emission rates (as identified in the other resource sections of this document) simultaneously throughout the area.
- Induced or secondary growth related to increases in vehicle miles traveled is not included in the emissions inventory. Only activities directly related to BLM actions are considered.
- Stationary sources associated with oil and gas development would operate at emission levels based on currently observed BACT levels, and compressor stations for natural gas would be equipped with nonselective catalytic reduction catalyst. Also, it is assumed that conventional natural gas well fields would use gas gathering systems and process gas through centralized dehydration units.
- Activity data associated with management activities other than those related to conventional natural gas wells were averaged over the entire analysis period to produce annual average emissions, except for renewable energy development, where the single development activity was assumed to occur in one year (2015).
- EPA off-road emission standards were used to estimate emissions for non-road sources in project years 2005, 2015, and 2024. This approach simulates the replacement of existing sources by new lower-emitting equipment with future EPA off-road engine emission standards.
- Use of water application as a Best Management Practice would reduce fugitive dust emissions from ground-disturbing activities during construction and reclamation activities and maintenance of roads at project sites by 50% from uncontrolled levels.

Detailed descriptions for emissions estimation for each activity follow. Individual tables of air emissions for all BLM activities were calculated in spreadsheets for each activity.

Emissions Calculations by Category

Leasable Fluid Minerals – Conventional Oil, Natural Gas and Coalbed Natural Gas Development

The basis for emission calculations for conventional oil and gas development is Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1672) in Appendix G (p. 1671). However the values reported in Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1672) represented the combined totals for conventional Oil and Gas wells. For the calculations, the values in Table G.1, "RFA-1A Reasonable Foreseeable Development Assumptions: Oil and Gas" (p. 1672) were proportioned per the directive of the Buffalo Field Office (BFO) resource specialist and it was assumed that conventional oil wells represent 91% of the total wells and natural gas wells represented 9% of the total. Table M.2, "Number of Existing and Proposed Wells by Alternative" (p. 1836) presents the number and types of wells for each alternative on federal land as well as the cumulative totals on all lands (private, state, federal).

Table M.2. Number of Existing and Proposed Wells by Alternative

Alternative	Conventional Oil Wells Federal	Conventional Oil Wells Cumulative	Conventional NG Wells Federal	Conventional NG Wells Cumulative	CBNG wells Federal	CBNG wells Cumulative
Existing	1,992	4,133	197	372	9,211	26,064
Year 2015						
Alternative A	2,381	4,629	235	458	4,900	11,111
Alternative B	1,593	3,842	158	380	4,639	11,373
Alternative C	2,451	3,699	242	465	6,328	9,684
Alternative D	2,357	4,606	233	456	3,444	10,518
Year 2024						
Alternative A	2,769	5,497	274	544	589	3,842
Alternative B	1,195	3,923	118	388	66	3,319
Alternative C	2,909	5,637	288	558	3,444	6,697
Alternative D	2,723	5,451	269	539	1,775	5,028

Source: Appendix G (p. 1671)

CBNG coalbed natural gas
NG natural gas

The following list identifies the assumptions and sources of information used in the calculations of emissions for conventional oil, natural gas and coalbed natural gas development:

- Per well production information for conventional oil and gas wells were determined from the Powder River Basin Revised Projected "Oil" Production and Powder River Basin Revised Projected "Gas" Production tables revised August 16, 2010. Again per the BLM BFO resource specialist, 2% of the "oil" production is actually condensate and that along with what was in the "Gas" tables represents natural gas; 98% of the oil production is "just oil" and used for conventional oil computations.
- Emission factors for drill rig engines, diesel powered heavy (construction) equipment, generator engines, and other oil field equipment were obtained from EPA NONROADS 2008a Emissions Model.

- Emission factors for natural gas fired compressor engines were based on NSPS Emission Standards for Spark Ignition Engines 40 CFR Part 60 JJJJ, recent BACT determinations by Wyoming DEQ, EPA's AP-42 Compilation of Air Pollutant Emission Factors (EPA 1995), and American Petroleum Institute's (API) Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry (EPA 2006).
- Emission factors for on-road vehicles were obtained from EPA's MOBILE6.2 Motor Vehicle Emission Factor Model (EPA 2003),
- Emission factors for VOC and HAP emissions oil and gas sources were based on EPA's AP-42, EPA's Protocol for Equipment Leak Emissions Estimates (EPA 1995), GRI GLYCalc 4.0 emissions estimating software, EPA's Natural Gas STAR Program (http://www.epa.gov/gasstar/documents/ll_pneumatics.pdf), Wyoming DEQ's Oil and Gas Production Facilities Permitting Guidance, Chapter 6, Section 2 revised March 2010 (Wyoming DEQ 2010), and field gas analyses from the Lander Planning area (BLM 2013d).
- Activity and equipment data were obtained from resource specialists in the BFO, existing operator experience from producing fields in the Buffalo planning area, and professional judgment.

Emissions were estimated for produced water evaporation ponds based on several sources of information. Thoma (2009) reports both emission rates from evaporation ponds and concentrations in pond water. A mass balance calculation based on a methodology presented by the Colorado Department of Public Health and Environment (CDPHE) (CDPHE 2007) was also used. Thoma (2009) reports results of measurements of pollutant fluxes from ponds at two facilities in western Colorado. One facility (Williams) includes a skim pond that holds produced water temporarily. The produced water is later transferred to an evaporation pond. The other facility (EnCana) includes only an evaporation pond. Thoma reports emission rates for some individual species such as benzene, toluene, xylene, and methane. Emissions for these species were used to calculate a ratio of the reported alkane (which was equivalenced to VOC) emissions to the sum of the individual species emissions. The ratio of methane emissions to the sum of the individual species emissions was also calculated. These ratios are 1.888 and 0.395 for VOC and methane, respectively.

Thoma reports the concentrations of several species in the pond water and for our emissions estimates, mid-range values were used. Using a mass balance calculation as outlined in the CDPHE report (CDPHE 2007), the concentrations were used to calculate emissions rates. The mass balance calculation simply uses the concentration in the produced water multiplied by the volume of produced water with appropriate unit conversions to obtain an emission rate. The ratio of VOC to the sum of the individual species mass was used to obtain an emission rate for VOC. Similarly, an emission rate for methane was obtained using the ratio of methane to the sum of individual species emissions. Per well emission rates were estimated for these species using the current volume of produced water of 80,000 acre-feet per year, and, for the per-well calculations, 10 gallons per minute per well was assumed. This information was provided by the BLM. The calculated rates are presented in Table M.3, "Estimated Emissions Rates for Hydrocarbon Species from Produced Water Evaporation Ponds" (p. 1837). Multiplying these per well emission rates times the number of wells provides an estimate of evaporative pond emissions for hydrocarbons.

Table M.3. Estimated Emissions Rates for Hydrocarbon Species from Produced Water Evaporation Ponds

Species	Current Emissions (kilograms/year)	Emissions per well (kilograms/year)
Benzene	588,575	118
Toluene	1,354,307	273

Species	Current Emissions (kilograms/year)	Emissions per well (kilograms/year)
m,p-xylene	785,809	158
Volatile Organice Compounds	5,151,915	1,038
Methane	1,077,842	217
Source: CDPHE 2007		

Leasable Solid Minerals – Coal Mining

Criteria pollutant emissions for NO_X, SO_2, CO, PM_{10}, and $PM_{2.5}$ from coal mining activities in the planning area for the base year were obtained from EPA's NEI 2008 emission inventory (EPA 2011a). The information contained in this inventory was originally prepared for the entire state by Wyoming DEQ and submitted to EPA for inclusion in the NEI. Activities for which emissions are provided include mining, cleaning, and material handling processes. Estimates for VOCs and HAPs emissions are not available for coal mining activities in the NEI. To estimate emissions related to coal mining activities in the Buffalo planning area (Campbell, Sheridan, and Johnson Counties) for the future years (2015 and 2024), existing emissions estimates for 2008 were used along with estimates of future coal production in the Final Mineral Occurrence and Development Potential Report (BLM 2009c). In reviewing the NEI, all source category codes (SCCs) related to mining activity were selected and reviewed to consider whether they were related to coal mining activities. Using the list of coal related SCCs, emissions information for 2008 from the NEI were extracted for all three counties. Only Campbell County included emissions identified as coal related, since Campbell County includes the majority of the known coal deposits in the Powder River Basin, there is limited coal mining in Sheridan County, and no coal mining in Johnson County.

To project to the future years, the annual coal production estimates from the Mineral Occurrence Report were used. These include 381 million tons for 2008, 461 million tons for 2015, and 489 million tons for 2024. As an example, for NO_X, coal related emissions in Campbell County are 509 tpy in the 2008 NEI and coal production from the Mineral Report is 381 million tons. Taking the ratio of these two values gives 1.33 tpy of NO_X emission per million tons of coal production. Coal production in Campbell County in 2015 is estimated to be 461 million tons. Using the emissions ratio for NO_X, the estimated emissions for Campbell County for 2015 is 618 tpy. Since the NEI does not include coal mining emissions information for Sheridan County, it is assumed that the same ratio holds. Using the estimated coal production for Sheridan County in 2015 of 9 million tons, estimated NO_X emissions are therefore 12 tpy. Although the Mineral Occurrence Report includes low and high estimates for coal production in the area, the estimates are not very different and thus emissions for different alternatives, presented for all of the other managed resources, are not available for coal.

To estimate GHGs for coal mining activities, EPA's State Inventory Tool Module (EPA 2011c) was used. This tool provides estimates of CH_4 emissions from surface and underground mines for mining and post-mine (processing) activities in the Powder River Basin of Wyoming. The coal production numbers for planning area (above) were used to derive CH_4 and CO_2 equivalent emissions for coal mining activity.

Locatable Minerals – Bentonite Mining

Emissions estimates for future bentonite mining were based on operating data from the two existing bentonite mines in the Buffalo planning area (Petersen Draw and Mayoworth) and current authorized bentonite plans summarized in the Mineral Occurrence and Development Potential Report (June 2009), and updated through June 2010. In addition, input from the BLM BFO

resource specialist was considered. Emission factors for this category were obtained from EPA's AP-42 (EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003), and API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry (American Petroleum Institute 2009).

Locatable Minerals – Uranium Mining

Emission estimates for future uranium mining were based on the three active uranium mines in the Buffalo area as well as current authorized and pending uranium plans of operations within the Buffalo planning area summarized in BFO Mineral Occurrence and Development Potential Report (June 2009), and updated through June 2010. In addition, input from the BLM BFO resource specialist was considered. It was assumed that all future uranium mining will utilize in-situ recovery rather than open-pit mining. Future emissions were based on the assumption that by 2013 Buffalo would have 2 operating in situ recovery mines (Willow Creek and Nichols Ranch/Hank) plus one still inactive mine (Ruth). Emission factors for this category were obtained from EPA's AP-42 (EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003), and API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry (American Petroleum Institute 2009).

Salable Minerals – Sand, Gravel, and other Mineral Development

Emissions were estimated for this category primarily for sand and gravel sales using existing (June 2010) data, plus estimated future activity based outlined in Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1676) of Appendix G (p. 1671). Existing emission calculations were based on current June 2010 data. Future emissions were calculated using estimated tons of material to be processed for each alternative. Emission factors for this category were obtained from EPA's AP-42 (EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), and EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003).

Fire Management and Ecology – Prescribed Fire

Emission estimates for fire management were based on the number of acres of disturbance projected for each alternative for prescribed burning. Per BLM resource staff, no mechanical fire treatments were included. Buffalo emissions factors for mechanical treatments (heavy equipment, all-terrain vehicles, and chain saws) were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003). Emission factors for PM_{10}, $PM_{2.5}$, NO_X, SO_2, CO, VOCs, CH_4, and N_2O from smoke were obtained from the 2008 FETS Emissions Data provided by Wyoming DEQ for Campbell and Johnson counties (Western Regional Air Partnership 2008). No fire data were reported for Sheridan County.

Forest Products

Emissions for this category were estimated using values provided in Table G.2, "RFA-1B Reasonable Foreseeable Development Assumptions: Other Resource Uses" (p. 1676) of Appendix G (p. 1671). In addition, input was provided by the BLM resource specialist. Invasive species treated by prescribed fire in other areas were included in this category because they are now chemically treated. Emission factors for this category were obtained from EPA's AP-42

(EPA 1995), EPA's NONROADS 2008a Emissions model (EPA 2008), EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003), the User's Guide: Emission Control Technologies and Emission Factors for Unpaved Road Fugitive Emissions (EPA 1987) and API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry (EPA 2003).

Land Resources – Rights-of-Way and Corridors and Renewable Energy Projects

Emissions were estimated for this category for several surface disturbing projects under Land resources. Table M.4, "Basis for Emissions Calculations for Land Resource Projects in the Buffalo Planning Area" (p. 1840) shows the key criteria projected under each alternative that were used to as the basis for emissions calculations. Note that there were zero acres estimated for telephone and fiber optics projects, so this disturbance was not included in the table. Emission factors for surface-disturbing activities were obtained from EPA's AP-42 (EPA 1995). Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003).

Table M.4. Basis for Emissions Calculations for Land Resource Projects in the Buffalo Planning Area

Type of Project	Alternative A	Alternative B	Alternative C	Alternative D
Wind energy projects - acres of disturbance for planning area (over 20 years)	20,000	5,000	40,000	75,000
Wind energy projects - number of met towers	200	50	200	80
Pipelines projects - acres of disturbance/year	1,400	400	2,000	1,400
Roads (non-mineral) projects - acres of disturbance/year	6,275	2,090	8,364	6,275
Powerline projects - acres of disturbance/year	3,600	1,546	4,400	3,600
Communication sites - acres of disturbance/year	28	5	38	28
Source: Appendix G (p. 1671)				

Per BLM resource specialists, the following were assumed:

- one activity equals one site equals 1,000 acres for wind disturbance
- one activity equals one site equals 1 acre for met towers
- one activity equals 1.91 acres per mile for pipelines
- one activity equals 3.637 acres per mile for roads and powerlines
- one activity equals one site equals one acre for communication sites

Land Resources – Travel and Transportation Management

Emission sources under this category include activities at the only two recreation areas to accommodate OHV use (Middle Fork and Weston Hills) that the BFO manages. Emissions do not include the hundreds of miles of routes on BLM-administered lands without rights-of-way that

the BLM might maintain less regularly. Based on the transportation and access for recreation for Buffalo (per BLM specialist A. Barnes), maintenance occurs almost exclusively in the summer months. No roads are plowed during winter months and therefore winter activities were set to zero. Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor mode (EPA 2003). OHV emissions were estimated using EPA's NONROADS 2008a emissions model (EPA 2008) which calculated annual emissions based on EPA's National Emissions Inventory and county population for 2005. Emissions were then projected for 2015, and 2024. Emission factors for surface-disturbing activities were obtained from EPA's AP-42 (EPA 1995).

Land Resources – Livestock Grazing Management

Emissions were estimated for six construction activities related to livestock grazing: springs, wells, fence, reservoir, and pipeline construction and reservoir maintenance. Emission estimates for these activities were based on the number of acres of disturbance projected for each activity under alternative provided in Table G.3, "RFA-2 Summary of Projected Acres of Surface Disturbance by Resource" (p. 1680) of Appendix G (p. 1671). In addition, methane emissions related to animal enteric fermentation and manure deposits were calculated for estimated head of cattle, sheep, and horses projected for each alternative based on current livestock grazing permits. Emission factors for heavy equipment used in these activities were obtained from EPA's NONROADS 2008a emissions model (EPA 2008) and emission factors for commuting vehicles were obtained from EPA's MOBILE6.2 motor vehicle emission factor model (EPA 2003). Emission factors for enteric fermentation and manure management were obtained from Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories (Intergovernmental Panel on Climate Change 2006).

M.6. Summary of Emissions for All BLM Activities

The following tables summarize the projected total annual emissions for each alternative by resource for the years 2005, 2015, and 2024.

Table M.5. Total Annual Emissions from Natural Gas Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	0	0	0	0	0	0	0	39	0	0.00	39	36
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	0	0	0	0	0	0	0	2	0		2	2
Wind erosion	0	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	4	0	0	0	0	0	0	41	0	0.00	41	37
Natural Gas Compression - Operations a	3	3	95	0	48	48	14	37,966	79	0.34	39,739	36,119

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	19	0	0.00	19	17
Dehy venting and flashing	---	---	---	---	---	6	2	60	4		137	132
Station Visits - Operations	7	1	0	0	0	0	0	25	0		25	23
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	6	1	0	0	0	0	0	11	0		11	10
Tanks Condensate and Loadout	---	---	---	---	---	1	0	0	0		3	3
Wellhead Fugitives	---	---	---	---	---	93	9	55	853		17,961	17,956
Pneumatic Devices	---	---	---	---	---	68	7	40	626		13,191	13,187
	7	0	0	0	0	0	0	18	0		18	16
Sub-total: Operations	24	5	95	0	48	216	33	38,193	1,562	0.34	71,103	67,462

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	0	0	0	0	0	0	0	13	0		13	12
Sub-total: Mainte-nance	0	0	0	0	0	0	0	13	0	0.00	13	12
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	8	0		8	7
Sub-total: Reclama-tion	0	0	0	0	0	0	0	8	0	0.00	8	8
Total Emissions	28	5	96	0	48	216	33	38,256	1,562	0.34	71,166	67,519
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.6. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	37	1	10	3	0	4,272	0	0.04	4,286	3,877
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	43	0		43	39
Wind erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	18	4	37	1	11	5	0	4,315	0	0.04	4,329	3,917
Natural Gas Compression - Operations a	4	4	114	0	57	57	17	45,374	95	0.41	47,493	43,167

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NO_x	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	22	0	0.00	22	20
Dehy venting and flashing	---	---	---	---	---	7	2	72	4		164	157
Station Visits - Operations	9	1	0	0	0	0	0	30	0		30	27
Well Workover - Operations	0	0	1	0	0	0	0	87	0	0.00	87	79
Well & Pipeline visits for Inspection & Repair - Operations	7	1	0	0	0	0	0	13	0		13	12
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	111	11	65	1,019		21,465	21,459
Pneumatic Devices	---	---	---	---	---	82	8	48	748		15,765	15,760
	8	1	0	0	0	0	0	21	0		21	19
Sub-total: Operations	28	6	115	0	58	258	39	45,732	1,867	0.41	85,064	80,705

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	0	0	0	0	0	0	0	15	0		15	14
Sub-total: Mainte-nance	0	0	0	0	0	0	0	15	0	0.00	15	14
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclama-tion	0	0	0	0	0	0	0	10	0	0.00	10	9
Total Emissions	47	10	152	1	68	262	39	50,073	1,867	0.45	89,419	84,644
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.7. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	37	1	10	3	0	4,272	0	0.04	4,286	3,877
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	43	0		43	39
Wind erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	18	4	37	1	11	5	0	4,315	0	0.04	4,329	3,917
Natural Gas Compression - Operations a	5	5	132	0	66	66	20	52,780	110	0.48	55,245	50,212

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	26	0	0.00	26	23
Dehy venting and flashing	---	---	---	---	---	6	2	61	4		138	133
Station Visits - Operations	10	1	0	0	1	0	0	35	0		35	32
Well Workover - Operations	0	0	1	0	0	0	0	87	0	0.00	87	79
Well & Pipeline visits for Inspection & Repair - Operations	9	1	0	0	0	0	0	15	0		15	13
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	129	13	76	1,185		24,969	24,962
Pneumatic Devices	---	---	---	---	---	95	9	56	871		18,338	18,333
	10	1	0	0	0	0	0	25	0		25	22
Sub-total: Operations	33	7	133	0	67	297	44	53,160	2,170	0.48	98,881	93,813

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	18	0		18	16
Sub-total: Mainte-nance	1	0	0	0	0	0	0	18	0	0.00	18	16
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	11	0		11	10
Sub-total: Reclama-tion	0	0	0	0	0	0	0	12	0	0.00	12	10
Total Emissions	52	11	170	1	78	302	45	57,505	2,170	0.52	103,240	97,757
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.8. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	0	0	0	0	0	0	0	50	0	0.00	50	46
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	0	0	0	0	0	0	0	2	0		2	2
Wind erosion	0	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	3	0	0	0	0	0	0	52	0	0.00	53	48
Natural Gas Compression - Operations a	3	3	76	0	38	38	11	30,371	64	0.27	31,789	28,893

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	15	0	0.00	15	13
Dehy venting and flashing	---	---	---	---	---	4	2	48	3		110	105
Station Visits - Operations	6	1	0	0	0	0	0	20	0		20	18
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	5	0	0	0	0	0	0	9	0		9	8
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		3	3
Wellhead Fugitives	---	---	---	---	---	74	7	44	682		14,368	14,364
Pneumatic Devices	---	---	---	---	---	55	5	32	501		10,552	10,549
	6	1	0	0	0	0	0	14	0		14	13
Sub-total: Operations	19	4	76	0	39	172	26	30,553	1,250	0.27	56,879	53,967

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Mainte-nance	0	0	0	0	0	0	0	10	0	0.00	10	9
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	6	0		6	6
Sub-total: Reclama-tion	0	0	0	0	0	0	0	7	0	0.00	7	6
Total Emissions	23	5	77	0	39	173	26	30,622	1,250	0.27	56,949	54,030
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.9. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	0	0	0	0	0	0	0	50	0	0.00	50	46
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	0	0	0	0	0	0	0	2	0		2	2
Wind erosion	0	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	3	0	0	0	0	0	0	52	0	0.00	53	48
Natural Gas Compression - Operations a	2	2	57	0	29	29	9	22,774	48	0.20	23,837	21,666

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	11	0	0.00	11	10
Dehy venting and flashing	---	---	---	---	---	2	1	26	2		60	57
Station Visits - Operations	4	0	0	0	0	0	0	15	0		15	14
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	4	0	0	0	0	0	0	6	0		6	6
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		2	2
Wellhead Fugitives	---	---	---	---	---	56	6	33	511		10,774	10,771
Pneumatic Devices	---	---	---	---	---	41	4	24	376		7,913	7,910
	4	0	0	0	0	0	0	11	0		11	10
Sub-total: Operations	14	3	57	0	29	128	19	22,900	936	0.21	42,629	40,445

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Road Mainte-nance	0	0	0	0	0	0	0	8	0		8	7
Sub-total: Mainte-nance	0	0	0	0	0	0	0	8	0	0.00	8	7
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	5	0		5	4
Sub-total: Reclama-tion	0	0	0	0	0	0	0	5	0	0.00	5	5
Total Emissions	18	4	58	0	29	128	19	22,966	936	0.21	42,694	40,505

Table M.10. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	40	1	11	3	0	4,646	0	0.05	4,662	4,217
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	47	0		47	42
Wind erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	19	4	40	1	12	5	1	4,693	0	0.05	4,709	4,260
Natural Gas Compression - Operations a	4	4	117	0	59	59	18	46,710	98	0.42	48,891	44,437

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	23	0	0.00	23	21
Dehy venting and flashing	---	---	---	---	---	7	3	74	5		169	162
Station Visits - Operations	9	1	0	0	0	0	0	31	0		31	28
Well Workover - Operations	0	0	1	0	0	0	0	94	0	0.00	95	86
Well & Pipeline visits for Inspection & Repair - Operations	8	1	0	0	0	0	0	13	0		13	12
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	114	11	67	1,049		22,097	22,091
Pneumatic Devices	---	---	---	---	---	84	8	49	770		16,229	16,224
	9	1	0	0	0	0	0	22	0		22	20
Sub-total: Operations	29	7	118	0	59	265	40	47,084	1,922	0.42	87,573	83,085

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	0	0	0	0	0	0	0	16	0		16	14
Sub-total: Mainte-nance	0	0	0	0	0	0	0	16	0	0.00	16	14
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclama-tion	0	0	0	0	0	0	0	10	0	0.00	10	9
Total Emissions	49	11	159	1	71	270	41	51,803	1,922	0.47	92,308	87,368

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.11. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	40	1	11	3	0	4,646	0	0.05	4,662	4,217
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	47	0		47	42
Wind erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	19	4	40	1	12	5	1	4,693	0	0.05	4,709	4,260
Natural Gas Compression - Operations a	5	5	139	0	69	69	21	55,451	116	0.50	58,041	52,754

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	27	0	0.00	27	25
Dehy venting and flashing	---	---	---	---	---	6	2	64	4		145	139
Station Visits - Operations	11	1	0	0	1	0	0	36	0		36	33
Well Workover - Operations	0	0	1	0	0	0	0	94	0	0.00	95	86
Well & Pipeline visits for Inspection & Repair - Operations	9	1	0	0	0	0	0	16	0		16	14
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	136	14	80	1,245		26,233	26,225
Pneumatic Devices	---	---	---	---	---	100	10	59	915		19,266	19,261
	10	1	0	0	0	0	0	26	0		26	24
Sub-total: Operations	35	8	140	0	71	312	47	55,853	2,280	0.50	103,889	98,564

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Mainte-nance	1	0	0	0	0	0	0	19	0	0.00	19	17
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	12	0		12	11
Sub-total: Reclama-tion	0	0	0	0	0	0	0	12	0	0.00	12	11
Total Emissions	55	12	180	1	82	317	47	60,577	2,280	0.55	108,629	102,852

Table M.12. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	5	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	36	1	10	3	0	4,140	0	0.04	4,154	3,758
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	42	0		42	38
Wind erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	17	4	36	1	10	5	0	4,182	0	0.04	4,196	3,796
Natural Gas Compression - Operations a	4	4	113	0	56	56	17	44,932	94	0.40	47,030	42,746

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	22	0	0.00	22	20
Dehy venting and flashing	---	---	---	---	---	7	2	71	4		162	156
Station Visits - Operations	9	1	0	0	0	0	0	30	0		30	27
Well Workover - Operations	0	0	1	0	0	0	0	84	0	0.00	84	76
Well & Pipeline visits for Inspection & Repair - Operations	7	1	0	0	0	0	0	13	0		13	11
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	110	11	65	1,009		21,256	21,250
Pneumatic Devices	---	---	---	---	---	81	8	48	741		15,611	15,607
	8	1	0	0	0	0	0	21	0		21	19
Sub-total: Operations	28	6	114	0	57	255	39	45,285	1,849	0.41	84,233	79,916

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	0	0	0	0	0	0	0	15	0		15	14
Sub-total: Mainte-nance	0	0	0	0	0	0	0	15	0	0.00	15	14
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclama-tion	0	0	0	0	0	0	0	10	0	0.00	10	9
Total Emissions	46	10	150	1	68	260	39	49,492	1,849	0.45	88,454	83,735

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.13. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	5	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	36	1	10	3	0	4,140	0	0.04	4,154	3,758
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	42	0		42	38
Wind erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	17	4	36	1	10	5	0	4,182	0	0.04	4,196	3,796
Natural Gas Compression - Operations a	4	4	130	0	65	65	20	51,896	109	0.47	54,319	49,371

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	25	0	0.00	25	23
Dehy venting and flashing	---	---	---	---	---	5	2	60	4		136	131
Station Visits - Operations	10	1	0	0	1	0	0	34	0		34	31
Well Workover - Operations	0	0	1	0	0	0	0	84	0	0.00	84	76
Well & Pipeline visits for Inspection & Repair - Operations	8	1	0	0	0	0	0	15	0		15	13
Tanks Condensate and Load-out	---	---	---	---	---	1	0	0	0		4	4
Wellhead Fugitives	---	---	---	---	---	127	13	75	1,166		24,551	24,544
Pneumatic Devices	---	---	---	---	---	93	9	55	856		18,031	18,026
	10	1	0	0	0	0	0	24	0		24	22
Sub-total: Operations	33	7	131	0	66	292	44	52,268	2,134	0.47	97,223	92,240

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	18	0		18	16
Sub-total: Mainte-nance	1	0	0	0	0	0	0	18	0	0.00	18	16
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	11	0		11	10
Sub-total: Reclama-tion	0	0	0	0	0	0	0	11	0	0.00	11	10
Total Emissions	50	11	167	1	76	297	44	56,479	2,134	0.51	101,448	96,062

Table M.14. Total Annual Emissions from Natural Gas Wells - Year 2005 - Cumulative Effects

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	0	0	1	0	0	0	0	73	0	0.00	73	67
Well Completion Flaring	0	0	0	0	0	0	0	0	0	0.00	0	0
Commuting Vehicles - Construction	1	0	0	0	0	0	0	14	0		14	13
Wind erosion	0	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	7	1	1	0	0	0	0	87	0	0.00	87	79
Natural Gas Compression - Operations a	6	6	180	0	90	90	27	71,686	150	0.65	75,034	68,199

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	70	0	0.00	70	63
Dehy venting and flashing	---	---	---	---	---	10	4	114	7		259	249
Station Visits - Operations	14	1	0	0	1	0	0	47	0		47	43
Well Workover - Operations	0	0	0	0	0	0	0	0	0	0.00	0	0
Well & Pipeline visits for Inspection & Repair - Operations	12	1	0	0	0	0	0	20	0		20	18
Tanks Condensate and Load-out	---	---	---	---	---	7	1	1	1		26	26
Wellhead Fugitives	---	---	---	---	---	176	18	103	1,610		33,913	33,904
Pneumatic Devices	---	---	---	---	---	129	13	76	1,182		24,907	24,900
	13	0	0	0	0	0	0	34	0		34	30
Sub-total: Operations	45	9	180	0	91	413	62	72,150	2,950	0.65	134,310	127,432

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	24	0		24	22
Sub-total: Mainte-nance	1	0	0	0	0	0	0	24	0	0.00	24	22
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	0
Well Reclama-tion	1	0	0	0	0	0	0	15	0		15	14
Sub-total: Reclama-tion	1	0	0	0	0	0	0	16	0	0.00	16	14
Total Emissions	53	10	181	0	92	413	62	72,278	2,950	0.65	134,437	127,547

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.15. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	4	75	2	20	6	1	8,643	0	0.09	8,672	7,845
Well Completion Flaring	0	0	0	0	1	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	160	0		160	145
Wind erosion	4	1	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	35	7	75	2	22	9	1	8,803	0	0.09	8,832	7,990
Natural Gas Compression - Operations a	8	8	221	0	111	111	33	88,233	184	0.79	92,353	83,940

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	86	0	0.00	86	78
Dehy venting and flashing	---	---	---	---	---	13	5	140	9		319	306
Station Visits - Operations	17	2	0	0	1	0	0	58	0		58	53
Well Workover - Operations	0	0	1	0	0	0	0	176	0	0.00	176	160
Well & Pipeline visits for Inspection & Repair - Operations	14	1	0	0	0	0	0	25	0		25	23
Tanks Condensate and Load-out	---	---	---	---	---	9	1	1	2		32	32
Wellhead Fugitives	---	---	---	---	---	216	22	127	1,982		41,741	41,729
Pneumatic Devices	---	---	---	---	---	159	16	93	1,455		30,656	30,647
	16	2	0	0	0	0	0	41	0		41	38
Sub-total: Operations	55	12	223	1	112	508	76	88,980	3,631	0.80	165,488	157,006

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	30	0		30	27
Sub-total: Mainte-nance	1	0	0	0	0	0	0	30	0	0.00	30	27
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	1
Well Reclama-tion	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclama-tion	1	0	0	0	0	0	0	19	0	0.00	19	18
Total Emissions	92	20	299	2	134	517	77	97,832	3,632	0.88	174,369	165,040
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.16. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	4	4	75	2	20	6	1	8,643	0	0.09	8,672	7,845
Well Completion Flaring	0	0	0	0	1	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	160	0		160	145
Wind erosion	4	1	---	---	---	---	---	---	---		---	---
Sub-total: Construction	35	7	75	2	22	9	1	8,803	0	0.09	8,832	7,990
Natural Gas Compression - Operations a	9	9	262	1	131	131	39	104,780	219	0.94	109,673	99,682

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	102	0	0.00	102	93
Dehy venting and flashing	---	---	---	---	---	11	4	120	7		275	264
Station Visits - Operations	20	2	0	0	1	0	0	69	0		69	63
Well Workover - Operations	0	0	1	0	0	0	0	176	0	0.00	176	160
Well & Pipeline visits for Inspection & Repair - Operations	17	2	0	0	0	0	0	29	0		29	27
Tanks Condensate and Load-out	---	---	---	---	---	8	1	1	1		28	28
Wellhead Fugitives	---	---	---	---	---	257	26	151	2,353		49,569	49,555
Pneumatic Devices	---	---	---	---	---	188	19	111	1,728		36,405	36,395
	19	2	0	0	0	0	0	49	0		49	45
Sub-total: Operations	66	15	265	1	133	596	89	105,588	4,309	0.95	196,376	186,310

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	36	0		36	32
Sub-total: Mainte-nance	1	0	0	0	0	0	0	36	0	0.00	36	32
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	1
Well Reclama-tion	1	0	0	0	0	0	0	22	0		22	20
Sub-total: Reclama-tion	1	0	0	0	0	0	0	23	0	0.00	23	21
Total Emissions	102	22	340	2	155	606	90	114,450	4,309	1.03	205,266	194,352
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.17. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH_4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	8	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	2	38	1	10	3	0	4,421	0	0.04	4,436	4,013
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	87	0		87	79
Wind erosion	2	0	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	20	4	39	1	11	5	0	4,508	0	0.04	4,523	4,092
Natural Gas Compression - Operations a	6	6	183	0	92	92	28	73,230	153	0.66	76,650	69,667

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH_4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	71	0	0.00	72	65
Dehy venting and flashing	---	---	---	---	---	11	4	116	7		265	254
Station Visits - Operations	14	1	0	0	1	0	0	48	0		48	44
Well Workover - Operations	0	0	1	0	0	0	0	89	0	0.00	90	81
Well & Pipeline visits for Inspection & Repair - Operations	12	1	0	0	0	0	0	21	0		21	19
Tanks Condensate and Load-out	---	---	---	---	---	8	1	1	1		27	27
Wellhead Fugitives	---	---	---	---	---	179	18	106	1,645		34,643	34,634
Pneumatic Devices	---	---	---	---	---	132	13	78	1,208		25,443	25,436
	14	1	0	0	0	0	0	34	0		34	31
Sub-total: Operations	46	10	185	0	93	422	63	73,793	3,014	0.66	137,292	130,257

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH_4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	25	0		25	23
Sub-total: Mainte-nance	1	0	0	0	0	0	0	25	0	0.00	25	23
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	0
Well Reclama-tion	1	0	0	0	0	0	0	16	0		16	14
Sub-total: Reclama-tion	1	0	0	0	0	0	0	16	0	0.00	16	15
Total Emissions	68	14	223	1	104	426	64	78,342	3,014	0.70	141,855	134,386
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately												

Table M.18. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	8	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	2	2	38	1	10	3	0	4,421	0	0.04	4,436	4,013
Well Completion Flaring	0	0	0	0	0	2	0	0	0	0.00	0	0
Commuting Vehicles - Construction	8	1	0	0	0	0	0	87	0		87	79
Wind erosion	2	0	---	---	---	---	---	---	---		---	---
Sub-total: Construction	20	4	39	1	11	5	0	4,508	0	0.04	4,523	4,092
Natural Gas Compression - Operations a	6	6	187	0	94	94	28	74,773	156	0.67	78,265	71,136

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	73	0	0.00	73	66
Dehy venting and flashing	---	---	---	---	---	8	3	86	5		196	188
Station Visits - Operations	14	1	0	0	1	0	0	49	0		49	45
Well Workover - Operations	0	0	1	0	0	0	0	89	0	0.00	90	81
Well & Pipeline visits for Inspection & Repair - Operations	12	1	0	0	0	0	0	21	0		21	19
Tanks Condensate and Load-out	---	---	---	---	---	6	1	0	1		20	20
Wellhead Fugitives	---	---	---	---	---	183	18	108	1,679		35,374	35,364
Pneumatic Devices	---	---	---	---	---	134	13	79	1,233		25,979	25,972
	14	1	0	0	0	0	0	35	0		35	32
Sub-total: Operations	47	11	189	0	95	425	63	75,314	3,075	0.67	140,102	132,922

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	25	0		25	23
Sub-total: Mainte-nance	1	0	0	0	0	0	0	25	0	0.00	25	23
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	0
Well Reclama-tion	1	0	0	0	0	0	0	16	0		16	14
Sub-total: Reclama-tion	1	0	0	0	0	0	0	16	0	0.00	16	15
Total Emissions	69	15	227	1	106	430	64	79,864	3,075	0.72	144,667	137,052

Table M.19. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	4	78	2	21	6	1	9,017	0	0.09	9,047	8,184
Well Completion Flaring	0	0	0	0	1	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	166	0		166	151
Wind erosion	4	1	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	36	8	79	2	23	10	1	9,183	0	0.09	9,213	8,335
Natural Gas Compression - Operations a	8	8	224	0	112	112	34	89,569	187	0.81	93,751	85,211

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	87	0	0.00	87	79
Dehy venting and flashing	---	---	---	---	---	13	5	142	9		324	311
Station Visits - Operations	17	2	0	0	1	0	0	59	0		59	53
Well Workover - Operations	0	0	1	0	0	0	0	184	0	0.00	184	167
Well & Pipeline visits for Inspection & Repair - Operations	15	1	0	0	0	0	0	25	0		25	23
Tanks Condensate and Load-out	---	---	---	---	---	9	1	1	2		33	33
Wellhead Fugitives	---	---	---	---	---	219	22	129	2,012		42,373	42,361
Pneumatic Devices	---	---	---	---	---	161	16	95	1,477		31,120	31,111
	17	2	0	0	0	0	0	42	0		42	38
Sub-total: Operations	56	13	226	1	114	516	78	90,332	3,686	0.81	167,998	159,387

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO_2eq	CO2eq-metricT-onnes
Road Mainte-nance	1	0	0	0	0	0	0	31	0		31	28
Sub-total: Mainte-nance	1	0	0	0	0	0	0	31	0	0.00	31	28
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	1
Well Reclama-tion	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclama-tion	1	0	0	0	0	0	0	20	0	0.00	20	18
Total Emissions	94	20	305	2	137	526	79	99,565	3,687	0.90	177,262	167,767

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.20. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	4	4	78	2	21	6	1	9,017	0	0.09	9,047	8,184
Well Completion Flaring	0	0	0	0	1	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	166	0		166	151
Wind erosion	4	1	---	---	---	---	---	---	---		---	---
Sub-total: Construction	36	8	79	2	23	10	1	9,183	0	0.09	9,213	8,335
Natural Gas Compression - Operations a	9	9	269	1	135	135	40	107,451	225	0.97	112,469	102,224

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	105	0	0.00	105	95
Dehy venting and flashing	---	---	---	---	---	11	4	124	8		282	270
Station Visits - Operations	20	2	0	0	1	0	0	71	0		71	64
Well Workover - Operations	0	0	1	0	0	0	0	184	0	0.00	184	167
Well & Pipeline visits for Inspection & Repair - Operations	17	2	0	0	0	0	0	30	0		30	27
Tanks Condensate and Load-out	---	---	---	---	---	8	1	1	1		29	29
Wellhead Fugitives	---	---	---	---	---	263	26	155	2,413		50,833	50,818
Pneumatic Devices	---	---	---	---	---	193	19	114	1,772		37,333	37,322
	20	2	0	0	0	0	0	50	0		50	46
Sub-total: Operations	67	15	271	1	137	611	91	108,283	4,419	0.97	201,385	191,062

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	37	0		37	33
Sub-total: Mainte-nance	1	0	0	0	0	0	0	37	0	0.00	37	33
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	1
Well Reclama-tion	1	0	0	0	0	0	0	23	0		23	21
Sub-total: Reclama-tion	1	0	0	0	0	0	0	23	0	0.00	24	21
Total Emissions	105	23	350	2	159	621	92	117,526	4,419	1.06	210,659	199,452

Table M.21. Total Annual Emissions from Natural Gas Wells - Year 2015 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	4	73	2	20	5	1	8,516	0	0.09	8,544	7,729
Well Completion Flaring	0	0	0	0	1	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	157	0		158	143
Wind erosion	4	1	---	---	---	---	---	---	---	---	---	---
Sub-total: Construction	34	7	74	2	21	9	1	8,673	0	0.09	8,702	7,872
Natural Gas Compression - Operations a	8	8	220	0	110	110	33	87,791	184	0.79	91,890	83,520

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	86	0	0.00	86	78
Dehy venting and flashing	---	---	---	---	---	13	5	139	8		317	304
Station Visits - Operations	17	2	0	0	1	0	0	58	0		58	52
Well Workover - Operations	0	0	1	0	0	0	0	173	0	0.00	174	157
Well & Pipeline visits for Inspection & Repair - Operations	14	1	0	0	0	0	0	25	0		25	22
Tanks Condensate and Load-out	---	---	---	---	---	9	1	1	2		32	32
Wellhead Fugitives	---	---	---	---	---	215	22	127	1,972		41,532	41,520
Pneumatic Devices	---	---	---	---	---	158	16	93	1,448		30,502	30,493
	16	2	0	0	0	0	0	41	0		41	37
Sub-total: Operations	55	12	222	1	112	505	76	88,532	3,613	0.79	164,657	156,217

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	30	0		30	27
Sub-total: Mainte-nance	1	0	0	0	0	0	0	30	0	0.00	30	27
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	1
Well Reclama-tion	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclama-tion	1	0	0	0	0	0	0	19	0	0.00	19	18
Total Emissions	91	20	296	2	133	515	77	97,255	3,613	0.88	173,408	164,134

a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1; dehydrator unit HAP and formaldehyde HAP (gas compression) added separately

Table M.22. Total Annual Emissions from Natural Gas Wells - Year 2024 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	11	1	---	---	---	---	---	---	---		---	---
Heavy Equipment Combustive Emissions a	4	4	73	2	20	5	1	8,516	0	0.09	8,544	7,729
Well Completion Flaring	0	0	0	0	1	4	0	0	0	0.00	0	0
Commuting Vehicles - Construction	16	2	1	0	1	0	0	157	0		158	143
Wind erosion	4	1	---	---	---	---	---	---	---		---	---
Sub-total: Construction	34	7	74	2	21	9	1	8,673	0	0.09	8,702	7,872
Natural Gas Compression - Operations a	9	9	260	1	130	130	39	103,895	217	0.94	108,747	98,841

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Separator, Dehydrator & Water Tank Heaters - Operations a	0	0	0	0	0	0	0	101	0	0.00	101	92
Dehy venting and flashing	---	---	---	---	---	11	4	119	7		272	261
Station Visits - Operations	20	2	0	0	1	0	0	68	0		68	62
Well Workover - Operations	0	0	1	0	0	0	0	173	0	0.00	174	157
Well & Pipeline visits for Inspection & Repair - Operations	17	2	0	0	0	0	0	29	0		29	27
Tanks Condensate and Load-out	---	---	---	---	---	8	1	1	1		28	28
Wellhead Fugitives	---	---	---	---	---	254	25	150	2,333		49,151	49,137
Pneumatic Devices	---	---	---	---	---	187	19	110	1,714		36,097	36,087
	19	2	0	0	0	0	0	49	0		49	44
Sub-total: Operations	65	15	262	1	132	591	88	104,696	4,273	0.94	194,717	184,736

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Road Mainte-nance	1	0	0	0	0	0	0	35	0		35	32
Sub-total: Mainte-nance	1	0	0	0	0	0	0	35	0	0.00	35	32
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	1
Well Reclama-tion	1	0	0	0	0	0	0	22	0		22	20
Sub-total: Reclama-tion	1	0	0	0	0	0	0	23	0	0.00	23	21
Total Emissions	101	22	337	2	154	600	89	113,427	4,273	1.02	203,477	192,661

Table M.23. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	9	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	9	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	1	1	15	0	7	1	0	1,791	0	0.01	1,794	1,628
Commuting Vehicles - Construction	8	1	0	0	0	0	0	45	0		45	41
Sub-total: Constructionc	27	4	15	0	7	2	0	1,836	0	0.01	1,839	1,669
Natural Gas Compression - Operations a	2	2	44	0	22	22	7	17,752	37	0.16	18,581	16,861
Dehydrators	0	0	0	0	0	43	22	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	62	6	793	21,346		449,062	407,497

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	8	1	107	1,667		35,123	31,872
Station Visits - Operations	55	6	1	0	1	1	0	96	0		96	87
Well Workover - Operations	1	0	1	0	0	0	0	108	0	0.00	108	98
Well & Pipeline visits for Inspection & Repair - Operations	289	29	2	0	6	3	0	414	0		414	376
Sub-total: Operations	346	36	48	0	30	139	36	19,269	23,051	0.16	503,384	456,791
Road Mainte-nance	16	2	5	0	2	1	0	596	0		596	541
	---	---	---	---	---	11	1		2		46	42
Sub-total: Mainte-nance	16	2	5	0	2	11	1	596	2	0.00	642	583
Road Reclama-tion	1	0	0	0	0	0	0	12	0		12	11
Well Reclama-tion	12	1	3	0	3	0	0	366	0		366	332
Sub-total: Reclama-tion	13	2	3	0	3	0	0	378	0	0.00	378	343

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	402	44	72	1	42	152	37	22,079	23,053	0.17	506,244	459,386

Table M.24. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	9	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	12	0	5	1	0	1,554	0	0.01	1,556	1,412
Commuting Vehicles - Construction	7	1	0	0	0	0	0	42	0		42	39
Sub-total: Construction**c**	22	4	13	0	5	1	0	1,596	0	0.01	1,599	1,451
Natural Gas Compression - Operations	1	1	24	0	12	12	4	9,443	20	0.08	9,885	8,970
Dehydrators	0	0	0	0	0	8	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	33	3	422	11,356		238,889	216,778
Pneumatics	---	---	---	---	---	4	0	57	887		18,685	16,955

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	30	3	0	0	1	0	0	51	0		51	46
Well Workover - Operations	1	0	1	0	0	0	0	108	0	0.00	108	98
Well & Pipeline visits for Inspection & Repair - Operations	154	15	1	0	3	1	0	220	0		220	200
Sub-total: Operations	185	19	26	0	16	59	12	10,301	12,262	0.09	267,837	243,047
Road Mainte-nance	9	1	1	0	1	0	0	320	0		320	291
Evapora-tive Ponds	---	---	---	---	---	6	1		1		25	22
Sub-total: Mainte-nance	9	1	1	0	1	6	1	320	1	0.00	345	313
Road Reclama-tion	0	0	0	0	0	0	0	7	0		7	6
Well Reclama-tion	7	1	1	0	1	0	0	196	0		196	178
Sub-total: Reclama-tion	7	1	1	0	1	0	0	203	0	0.00	203	184

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	223	24	40	0	23	66	12	12,420	12,264	0.09	269,984	244,994

Table M.25. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	9	1	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	1	1	12	0	5	1	0	1,554	0	0.01	1,556	1,412
Commuting Vehicles - Construction	7	1	0	0	0	0	0	42	0		42	39
Sub-total: Constructionc	22	4	13	0	5	1	0	1,596	0	0.01	1,599	1,451
Natural Gas Compression - Operations a	0	0	3	0	1	1	0	1,135	2	0.01	1,188	1,078
Dehydrators	0	0	0	0	0	1	1	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	4	0	51	1,365		28,715	26,058

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Pneumat-ics	---	---	---	---	---	1	0	7	107		2,246	2,038
Station Visits - Operations	4	0	0	0	0	0	0	7	0		7	6
Well Workover - Operations	1	0	1	0	0	0	0	108	0	0.00	108	98
Well & Pipeline visits for Inspection & Repair - Operations	18	2	0	0	0	0	0	26	0		26	24
Sub-total: Operations	23	2	4	0	2	8	2	1,333	1,474	0.01	32,291	29,302
Road Mainte-nance	1	0	0	0	0	0	0	39	0		39	35
	---	---	---	---	---	1	0		0		3	3
Sub-total: Mainte-nance	1	0	0	0	0	1	0	39	0	0.00	41	38
Road Reclama-tion	0	0	0	0	0	0	0	1	0		1	1
Well Reclama-tion	1	0	0	0	0	0	0	24	0		24	21
Sub-total: Reclama-tion	1	0	0	0	0	0	0	24	0	0.00	24	22

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	47	6	16	0	8	10	2	2,992	1,474	0.02	33,955	30,812

Table M.26. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	0	0	3	0	2	0	0	398	0	0.00	399	362
Commuting Vehicles - Construction	1	0	0	0	0	0	0	7	0		7	7
Sub-total: Construction**c**	7	1	3	0	2	0	0	406	0	0.00	406	368
Natural Gas Compression - Operations	1	1	22	0	11	11	3	8,939	19	0.08	9,357	8,491
Dehydrators	0	0	0	0	0	8	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	31	3	400	10,750		226,140	205,209
Pneumatics	---	---	---	---	---	4	0	54	840		17,687	16,050

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	28	3	0	0	1	0	0	48	0		48	43
Well Workover - Operations	0	0	0	0	0	0	0	12	0	0.00	12	11
Well & Pipeline visits for Inspection & Repair - Operations	145	15	1	0	3	1	0	209	0		209	189
Sub-total: Operations	174	18	24	0	15	56	11	9,661	11,608	0.08	253,453	229,994
Road Mainte-nance	8	1	1	0	0	0	0	303	0		303	275
Evapora-tive Ponds	---	---	---	---	---	5	1		1		23	21
Sub-total: Mainte-nance	8	1	1	0	0	5	1	303	1	0.00	327	296
Road Reclama-tion	0	0	0	0	0	0	0	6	0		6	6
Well Reclama-tion	6	1	1	0	1	0	0	185	0		186	168
Sub-total: Reclama-tion	6	1	1	0	1	0	0	192	0	0.00	192	174

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	195	21	29	0	18	62	12	10,562	11,609	0.08	254,377	230,833

Table M.27. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	0	0	3	0	2	0	0	398	0	0.00	399	362
Commuting Vehicles - Construction	1	0	0	0	0	0	0	7	0		7	7
Sub-total: Constructionc	7	1	3	0	2	0	0	406	0	0.00	406	368
Natural Gas Compression - Operations a	0	0	0	0	0	0	0	127	0	0.00	133	121
Dehydrators	0	0	0	0	0	0	0	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	0	0	6	153		3,218	2,920

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	0	0	1	12		252	228
Station Visits - Operations	0	0	0	0	0	0	0	1	0		1	1
Well Workover - Operations	0	0	0	0	0	0	0	12	0	0.00	12	11
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	3	0		3	3
Sub-total: Operations	3	0	0	0	0	1	0	149	165	0.00	3,618	3,283
Road Mainte-nance	0	0	0	0	0	0	0	4	0		4	4
	---	---	---	---	---	0	0		0		0	0
Sub-total: Mainte-nance	0	0	0	0	0	0	0	4	0	0.00	5	4
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Reclama-tion	0	0	0	0	0	0	0	3	0		3	2
Sub-total: Reclama-tion	0	0	0	0	0	0	0	3	0	0.00	3	2

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	9	1	4	0	2	1	0	562	165	0.00	4,032	3,659

Table M.28. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	16	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	52	8	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	4	5	62	2	24	5	1	7,842	0	0.04	7,857	7,130
Commuting Vehicles - Construction	36	4	1	0	1	1	0	233	0		233	211
Sub-total: Construction**c**	109	18	63	2	25	6	1	8,075	0	0.04	8,090	7,341
Natural Gas Compression - Operations	1	1	31	0	15	15	5	12,194	26	0.11	12,764	11,583
Dehydrators	0	0	0	0	0	11	5	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	42	4	545	14,664		308,483	279,931
Pneumatics	---	---	---	---	---	6	1	73	1,145		24,128	21,895

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	38	4	0	0	1	0	0	66	0		66	60
Well Workover - Operations	3	0	4	0	1	0	0	629	0	0.01	631	572
Well & Pipeline visits for Inspection & Repair - Operations	198	20	2	0	4	2	0	284	0		285	258
Sub-total: Operations	241	25	37	0	22	77	15	13,792	15,835	0.12	346,357	314,298
Road Mainte-nance	11	1	1	0	1	0	0	414	0		414	375
Evapora-tive Ponds	---	---	---	---	---	7	1		2		32	29
Sub-total: Mainte-nance	11	1	1	0	1	7	1	414	2	0.00	446	404
Road Reclama-tion	0	0	0	0	0	0	0	9	0		9	8
Well Reclama-tion	8	1	1	0	1	0	0	253	0		253	230
Sub-total: Reclama-tion	9	1	1	0	1	0	0	262	0	0.00	262	238

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	369	45	102	2	49	90	16	22,543	15,836	0.16	355,155	322,282
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.29. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	16	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	52	8	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	5	62	2	24	5	1	7,842	0	0.04	7,857	7,130
Commuting Vehicles - Construction	36	4	1	0	1	1	0	233	0		233	211
Sub-total: Constructionc	109	18	63	2	25	6	1	8,075	0	0.04	8,090	7,341
Natural Gas Compression - Operations a	1	1	17	0	8	8	2	6,637	14	0.06	6,947	6,304
Dehydrators	0	0	0	0	0	9	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	23	2	297	7,981		167,905	152,364

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	3	0	40	623		13,133	11,917
Station Visits - Operations	21	2	0	0	1	0	0	36	0		36	33
Well Workover - Operations	3	0	4	0	1	0	0	629	0	0.01	631	572
Well & Pipeline visits for Inspection & Repair - Operations	108	11	1	0	2	1	0	155	0		155	141
Sub-total: Operations	133	14	22	0	12	45	10	7,794	8,619	0.07	188,807	171,331
Road Mainte-nance	6	1	0	0	0	0	0	225	0		225	204
	---	---	---	---	---	4	0		1		17	16
Sub-total: Mainte-nance	6	1	0	0	0	4	0	225	1	0.00	243	220
Road Reclama-tion	0	0	0	0	0	0	0	5	0		5	4
Well Reclama-tion	5	1	0	0	0	0	0	138	0		138	125
Sub-total: Reclama-tion	5	1	0	0	0	0	0	142	0	0.00	142	129

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	252	33	85	2	38	55	11	16,237	8,620	0.11	197,282	179,022

Table M.30. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	10	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	27	4	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	3	33	1	13	3	0	4,164	0	0.02	4,171	3,785
Commuting Vehicles - Construction	19	2	0	0	1	0	0	121	0		122	110
Sub-total: Construction**c**	58	9	33	1	14	3	0	4,285	0	0.02	4,293	3,895
Natural Gas Compression - Operations	1	1	27	0	13	13	4	10,586	22	0.10	11,081	10,055
Dehydrators	0	0	0	0	0	9	5	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	37	4	473	12,730		267,799	243,012
Pneumatics	---	---	---	---	---	5	0	64	994		20,946	19,007

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Station Visits - Operations	33	3	0	0	1	0	0	57	0		57	52
Well Workover - Operations	2	0	2	0	1	0	0	324	0	0.00	325	295
Well & Pipeline visits for Inspection & Repair - Operations	172	17	1	0	4	2	0	247	0		247	224
Sub-total: Operations	208	22	30	0	19	66	13	11,751	13,746	0.10	300,455	272,645
Road Mainte-nance	10	1	1	0	1	0	0	359	0		359	326
Evapora-tive Ponds	---	---	---	---	---	6	1		1		28	25
Sub-total: Mainte-nance	10	1	1	0	1	6	1	359	1	0.00	387	351
Road Reclama-tion	0	0	0	0	0	0	0	7	0		7	7
Well Reclama-tion	7	1	1	0	1	0	0	220	0		220	199
Sub-total: Reclama-tion	8	1	1	0	1	0	0	227	0	0.00	227	206

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	283	33	66	1	34	76	14	16,622	13,748	0.12	305,362	277,098
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.31. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	10	1	---	---	---	---	---	---	---	---	---	---
Wind Erosion	27	4	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	2	3	33	1	13	3	0	4,164	0	0.02	4,171	3,785
Commuting Vehicles - Construction	19	2	0	0	1	0	0	121	0		122	110
Sub-total: Constructionc	58	9	33	1	14	3	0	4,285	0	0.02	4,293	3,895
Natural Gas Compression - Operations a	0	0	9	0	4	4	1	3,421	7	0.03	3,581	3,249
Dehydrators	0	0	0	0	0	5	2	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	12	1	153	4,113		86,536	78,527

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	2	0	21	321		6,768	6,142
Station Visits - Operations	11	1	0	0	0	0	0	19	0		19	17
Well Workover - Operations	2	0	2	0	1	0	0	324	0	0.00	325	295
Well & Pipeline visits for Inspection & Repair - Operations	56	6	0	0	1	1	0	80	0		80	72
Sub-total: Operations	69	7	11	0	6	23	5	4,017	4,442	0.03	97,309	88,302
Road Mainte-nance	3	0	0	0	0	0	0	116	0		116	105
	---	---	---	---	---	2	0		0		9	8
Sub-total: Mainte-nance	3	0	0	0	0	2	0	116	0	0.00	125	113
Road Reclama-tion	0	0	0	0	0	0	0	2	0		2	2
Well Reclama-tion	2	0	0	0	0	0	0	71	0		71	64
Sub-total: Reclama-tion	2	0	0	0	0	0	0	73	0	0.00	73	67

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	132	17	45	1	20	28	5	8,492	4,442	0.06	101,800	92,378

Table M.32. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	33	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	57	9	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	6	6	78	2	32	7	1	9,789	0	0.05	9,806	8,898
Commuting Vehicles - Construction	44	4	1	0	2	1	0	272	0		273	247
Sub-total: Construction**c**	140	23	79	2	34	8	1	10,061	0	0.05	10,078	9,146
Natural Gas Compression - Operations a	4	4	126	0	63	63	19	50,231	105	0.45	52,578	47,711
Dehydrators	0	0	0	0	0	122	61	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	174	17	2,245	60,402		1,270,693	1,153,079

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	23	2	302	4,718		99,387	90,187
Station Visits - Operations	156	16	2	0	4	2	0	269	0		269	244
Well Workover - Operations	4	0	5	0	1	0	0	701	0	0.01	704	639
Well & Pipeline visits for Inspection & Repair - Operations	817	82	7	0	18	8	1	1,172	0		1,172	1,063
Sub-total: Operations	981	102	139	0	86	392	101	54,920	65,226	0.46	1,424,803	1,292,924
Road Mainte-nance	46	5	15	0	6	1	0	1,686	0		1,686	1,530
Evapora-tive Ponds	---	---	---	---	---	30			6		131	119
Sub-total: Mainte-nance	46	5	15	0	6	31	0	1,686	6	0.00	1,817	1,649
Road Reclama-tion	1	0	0	0	0	0	0	35	0		35	32
Well Reclama-tion	35	4	9	0	7	1	0	1,035	0		1,036	940

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	37	4	10	0	8	1	0	1,070	0	0.00	1,070	971
Total Emissions	1,204	134	243	3	133	433	102	67,738	65,232	0.51	1,437,769	1,304,690

Table M.33. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	21	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	57	9	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	5	5	71	2	28	6	1	8,967	0	0.05	8,984	8,152
Commuting Vehicles - Construction	41	4	1	0	2	1	0	262	0		263	238
Sub-total: Construction**c**	125	20	72	2	29	7	1	9,229	0	0.05	9,246	8,390
Natural Gas Compression - Operations	2	2	54	0	27	27	8	21,413	45	0.19	22,414	20,339
Dehydrators	0	0	0	0	0	19	9	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	74	7	957	25,749		541,693	491,554
Pneumatics	---	---	---	---	---	10	1	129	2,011		42,368	38,447

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	66	7	1	0	2	1	0	115	0		115	104
Well Workover - Operations	4	0	5	0	1	0	0	701	0	0.01	704	639
Well & Pipeline visits for Inspection & Repair - Operations	348	35	3	0	8	3	0	500	0		500	453
Sub-total: Operations	420	44	62	0	38	134	26	23,815	27,806	0.20	607,793	551,536
Road Mainte-nance	20	2	2	0	1	0	0	727	0		727	659
Evapora-tive Ponds	---	---	---	---	---	13	1		3		56	51
Sub-total: Mainte-nance	20	2	2	0	1	13	1	727	3	0.00	782	710
Road Reclama-tion	1	0	0	0	0	0	0	15	0		15	14
Well Reclama-tion	15	2	2	0	2	0	0	444	0		444	403
Sub-total: Reclama-tion	15	2	2	0	2	0	0	459	0	0.00	460	417

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	580	68	138	2	70	154	28	34,230	27,808	0.25	618,281	561,054
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.34. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	21	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	57	9	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	5	5	71	2	28	6	1	8,967	0	0.05	8,984	8,152
Commuting Vehicles - Construction	41	4	1	0	2	1	0	262	0		263	238
Sub-total: Construction**c**	125	20	72	2	29	7	1	9,229	0	0.05	9,246	8,390
Natural Gas Compression - Operations a	1	1	19	0	9	9	3	7,404	15	0.07	7,750	7,033
Dehydrators	0	0	0	0	0	10	5	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	26	3	331	8,904		187,308	169,971

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	3	0	45	696		14,650	13,294
Station Visits - Operations	23	2	0	0	1	0	0	40	0		40	37
Well Workover - Operations	4	0	5	0	1	0	0	701	0	0.01	704	639
Well & Pipeline visits for Inspection & Repair - Operations	120	12	1	0	3	1	0	173	0		173	157
Sub-total: Operations	148	15	24	0	14	50	11	8,694	9,615	0.07	210,626	191,131
Road Mainte-nance	7	1	0	0	0	0	0	251	0		251	228
Evapora-tive Ponds	---	---	---	---	---	4	0		1		19	18
Sub-total: Mainte-nance	7	1	0	0	0	4	0	251	1	0.00	271	246
Road Reclama-tion	0	0	0	0	0	0	0	5	0		5	5
Well Reclama-tion	5	1	0	0	0	0	0	154	0		154	139

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	5	1	0	0	0	0	0	159	0	0.00	159	144
Total Emissions	285	37	97	2	43	61	12	18,334	9,616	0.12	220,302	199,911
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.35. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	20	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	49	7	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	4	5	61	2	24	5	1	7,719	0	0.04	7,733	7,018
Commuting Vehicles - Construction	35	4	1	0	1	0	0	224	0		224	203
Sub-total: Construction**c**	108	18	62	2	25	6	1	7,943	0	0.04	7,958	7,221
Natural Gas Compression - Operations	2	2	55	0	27	27	8	21,917	46	0.20	22,941	20,818
Dehydrators	0	0	0	0	0	19	10	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	76	8	980	26,355		554,441	503,123
Pneumatics	---	---	---	---	---	10	1	132	2,059		43,365	39,351

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	68	7	1	0	2	1	0	118	0		118	107
Well Workover - Operations	3	0	4	0	1	0	0	595	0	0.01	597	542
Well & Pipeline visits for Inspection & Repair - Operations	357	36	3	0	8	3	0	511	0		511	464
Sub-total: Operations	430	45	62	0	38	137	27	24,253	28,460	0.20	621,975	564,405
Road Mainte-nance	20	2	3	0	1	0	0	744	0		744	675
Evapora-tive Ponds	---	---	---	---	---	13	1		3		57	52
Sub-total: Mainte-nance	20	2	3	0	1	13	1	744	3	0.00	801	727
Road Reclama-tion	1	0	0	0	0	0	0	16	0		16	14
Well Reclama-tion	15	2	2	0	2	0	0	455	0		455	413
Sub-total: Reclama-tion	16	2	2	0	2	0	0	470	0	0.00	470	427

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	574	66	129	2	67	157	29	33,410	28,463	0.24	631,203	572,780
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.36. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	20	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	49	7	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	4	5	61	2	24	5	1	7,719	0	0.04	7,733	7,018
Commuting Vehicles - Construction	35	4	1	0	1	0	0	224	0		224	203
Sub-total: Construction**c**	108	18	62	2	25	6	1	7,943	0	0.04	7,958	7,221
Natural Gas Compression - Operations a	1	1	16	0	8	8	2	6,396	13	0.06	6,695	6,076
Dehydrators	0	0	0	0	0	8	4	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	22	2	286	7,692		161,811	146,834

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Pneumat-ics	---	---	---	---	---	3	0	38	601		12,656	11,485
Station Visits - Operations	20	2	0	0	1	0	0	35	0		35	31
Well Workover - Operations	3	0	4	0	1	0	0	595	0	0.01	597	542
Well & Pipeline visits for Inspection & Repair - Operations	104	10	1	0	2	1	0	149	0		149	135
Sub-total: Operations	128	13	21	0	12	43	9	7,500	8,306	0.06	181,943	165,102
Road Mainte-nance	6	1	0	0	0	0	0	217	0		217	197
Evapora-tive Ponds	---	---	---	---	---	4	0		1		17	15
Sub-total: Mainte-nance	6	1	0	0	0	4	0	217	1	0.00	234	212
Road Reclama-tion	0	0	0	0	0	0	0	4	0		4	4
Well Reclama-tion	4	1	0	0	0	0	0	133	0		133	120

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	5	1	0	0	0	0	0	137	0	0.00	137	125
Total Emissions	246	32	84	2	38	53	10	15,797	8,307	0.10	190,271	172,660
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.37. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	99	15	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	9	9	118	3	45	10	1	14,974	0	0.08	15,003	13,614
Commuting Vehicles - Construction	69	7	2	0	3	1	0	447	0		447	406
Sub-total: Construction**c**	207	34	120	3	47	11	1	15,421	0	0.08	15,450	14,020
Natural Gas Compression - Operations	2	2	47	0	23	23	7	18,662	39	0.17	19,534	17,726
Dehydrators	0	0	0	0	0	16	8	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	65	6	834	22,441		472,098	428,401
Pneumatics	---	---	---	---	---	9	1	112	1,753		36,925	33,507

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	58	6	1	0	2	1	0	101	0		101	91
Well Workover - Operations	6	1	8	0	2	1	0	1,212	0	0.01	1,216	1,103
Well & Pipeline visits for Inspection & Repair - Operations	304	30	2	0	7	3	0	435	0		435	395
Sub-total: Operations	370	39	58	0	34	117	23	21,356	24,233	0.18	530,309	481,224
Road Mainte-nance	17	2	2	0	1	0	0	633	0		633	575
Evapora-tive Ponds	---	---	---	---	---	11	1		2		49	44
Sub-total: Mainte-nance	17	2	2	0	1	11	1	633	2	0.00	682	619
Road Reclama-tion	1	0	0	0	0	0	0	13	0		13	12
Well Reclama-tion	13	1	2	0	2	0	0	387	0		387	351
Sub-total: Reclama-tion	13	1	2	0	2	0	0	400	0	0.00	401	363

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	607	76	181	4	84	140	25	37,812	24,236	0.26	546,842	496,227
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.38. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---	---
Wind Erosion	99	15	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	9	9	118	3	45	10	1	14,974	0	0.08	15,003	13,614
Commuting Vehicles - Construction	69	7	2	0	3	1	0	447	0		447	406
Sub-total: Construction**c**	207	34	120	3	47	11	1	15,421	0	0.08	15,450	14,020
Natural Gas Compression - Operations a	1	1	32	0	16	16	5	12,907	27	0.12	13,509	12,259
Dehydrators	0	0	0	0	0	17	9	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	45	4	577	15,520		326,498	296,277

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	6	1	78	1,212		25,537	23,173
Station Visits - Operations	40	4	0	0	1	0	0	69	0		69	63
Well Workover - Operations	6	1	8	0	2	1	0	1,212	0	0.01	1,216	1,103
Well & Pipeline visits for Inspection & Repair - Operations	210	21	2	0	5	2	0	301	0		301	273
Sub-total: Operations	257	27	43	0	24	87	19	15,143	16,759	0.13	367,130	333,149
Road Mainte-nance	12	1	0	0	0	0	0	438	0		438	398
Evapora-tive Ponds	---	---	---	---	---	8	1		2		34	31
Sub-total: Mainte-nance	12	1	0	0	0	8	1	438	2	0.00	472	428
Road Reclama-tion	0	0	0	0	0	0	0	9	0		9	8
Well Reclama-tion	9	1	0	0	0	0	0	268	0		268	243

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	9	1	0	0	0	0	0	277	0	0.00	277	251
Total Emissions	485	63	163	3	72	106	21	31,280	16,761	0.21	383,330	347,849
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.39. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2015 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	75	11	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	7	7	91	2	35	8	1	11,516	0	0.06	11,537	10,469
Commuting Vehicles - Construction	53	5	1	0	2	1	0	341	0		341	309
Sub-total: Construction**c**	160	26	92	2	37	9	1	11,856	0	0.06	11,878	10,779
Natural Gas Compression - Operations	2	2	51	0	25	25	8	20,270	42	0.18	21,217	19,254
Dehydrators	0	0	0	0	0	18	9	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	70	7	906	24,375		512,782	465,320
Pneumatics	---	---	---	---	---	9	1	122	1,904		40,107	36,395

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Station Visits - Operations	63	6	1	0	2	1	0	109	0		109	99
Well Workover - Operations	5	1	6	0	2	0	0	918	0	0.01	921	836
Well & Pipeline visits for Inspection & Repair - Operations	330	33	3	0	7	3	0	473	0		473	429
Sub-total: Operations	399	42	60	0	36	127	25	22,798	26,322	0.19	575,610	522,332
Road Mainte-nance	19	2	2	0	1	0	0	688	0		688	624
Evapora-tive Ponds	---	---	---	---	---	12	1		3		53	48
Sub-total: Mainte-nance	19	2	2	0	1	12	1	688	3	0.00	741	672
Road Reclama-tion	1	0	0	0	0	0	0	14	0		14	13
Well Reclama-tion	14	2	2	0	2	0	0	421	0		421	382
Sub-total: Reclama-tion	15	2	2	0	2	0	0	435	0	0.00	435	395

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Total Emissions	592	71	157	3	76	148	27	35,777	26,324	0.25	588,663	534,177
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.40. Total Annual Emissions from Coalbed Natural Gas Wells - Year 2024 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---	---
Wind Erosion	75	11	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions a	7	7	91	2	35	8	1	11,516	0	0.06	11,537	10,469
Commuting Vehicles - Construction	53	5	1	0	2	1	0	341	0		341	309
Sub-total: Construction**c**	160	26	92	2	37	9	1	11,856	0	0.06	11,878	10,779
Natural Gas Compression - Operations a	1	1	24	0	12	12	4	9,690	20	0.09	10,143	9,204
Dehydrators	0	0	0	0	0	13	6	0	0	0.00	0	0
Central Processing Heaters	0	0	0	0	0	0	0	0	0	0.00	0	0
Wellhead fugitives	---	---	---	---	---	34	3	433	11,652		245,129	222,440

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Pneumat-ics	---	---	---	---	---	5	0	58	910		19,173	17,398
Station Visits - Operations	30	3	0	0	1	0	0	52	0		52	47
Well Workover - Operations	5	1	6	0	2	0	0	918	0	0.01	921	836
Well & Pipeline visits for Inspection & Repair - Operations	158	16	1	0	3	2	0	226	0		226	205
Sub-total: Operations	193	20	32	0	18	65	14	11,377	12,583	0.10	275,644	250,130
Road Mainte-nance	9	1	0	0	0	0	0	329	0		329	298
Evapora-tive Ponds	---	---	---	---	---	6	1		1		25	23
Sub-total: Mainte-nance	9	1	0	0	0	6	1	329	1	0.00	354	321
Road Reclama-tion	0	0	0	0	0	0	0	7	0		7	6
Well Reclama-tion	7	1	0	0	0	0	0	201	0		201	183

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Reclama-tion	7	1	0	0	0	0	0	208	0	0.00	208	189
Total Emissions	369	48	125	3	56	80	16	23,770	12,584	0.16	288,084	261,419
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1, and formaldehyde HAP added for gas compression												

Table M.41. Total Annual Emissions from Oil Wells - Year 2005 - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Commuting Vehicles - Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: Construction**c**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9,646.70
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	24.10	2.40	0.12	0.00	2.53	0.11	0.01	50.26	0.01	0.02	55	50
Oil - hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: Operations	24.10	2.40	0.12	0.00	2.53	0.11	0.01	524.23	0.01	0.02	529.29	480.30
Road Mainte-nance	14.12	1.58	4.21	0.11	1.60	0.34	0.03	511.57	0.01	0.01	514	466
Sub-total: Mainte-nance	14.12	1.58	4.21	0.11	1.60	0.34	0.03	511.57	0.01	0.01	513.77	466.22
Total Emissions	38.22	3.98	4.33	0.11	4.13	0.45	0.05	1,035.80	0.01	0.02	1,043.06	10,593.21
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.42. Total Annual Emissions from Oil Wells - Year 2015 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.76	0.71	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	29.13	29.09	765.34	91.88	180.40	30.36	3.04	35,364.22	1.68	0.38	35,517	32,229
Commuting Vehicles - Construction	12.46	1.25	0.19	0.00	0.69	0.05	0.00	58.90	0.67	0.67	280	255
Sub-total: Construction[c]	46.35	31.06	765.53	91.88	181.09	30.41	3.04	35,423.12	2.35	1.05	35,797.36	32,483.99
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.65	1.65	23.21	1.53	5.00	1.90	0.19	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.73	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	28.80	2.87	0.14	0.00	3.02	0.13	0.01	60.07	0.01	0.02	66	60
Oil - hauling	110.59	11.03	0.93	0.00	0.59	0.12	0.01	270.11	0.01	0.00	271	246
Sub-total: Operations	141.23	15.57	24.28	1.54	8.62	2.16	0.22	804.87	0.03	0.02	812.13	736.96
Road Mainte-nance	16.87	1.89	5.03	0.14	1.91	0.41	0.04	4.38	607.35	0.01	12,761	11,580
Sub-total: Mainte-nance	16.87	1.89	5.03	0.14	1.91	0.41	0.04	4.38	607.35	0.01	12,761.22	11,580.05
Total Emissions	204.45	48.51	794.84	93.55	191.63	32.98	3.30	36,232.37	609.73	1.08	49,370.71	44,801.00
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.43. Total Annual Emissions from Oil Wells - Year 2024 - Alternative A - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.76	0.71	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	29.13	29.09	765.34	91.88	180.40	30.36	3.04	35,364.22	1.68	0.38	35,517	32,229
Commuting Vehicles - Construction	12.46	1.25	0.19	0.00	0.69	0.05	0.00	58.90	0.67	0.67	280	255
Sub-total: Construction**c**	46.35	31.06	765.53	91.88	181.09	30.41	3.04	35423.12	2.35	1.05	35797.36	32483.99
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.65	1.65	23.21	1.53	5.00	1.90	0.19	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.73	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	33.50	3.34	0.17	0.00	3.51	0.16	0.02	69.87	0.01	0.02	77	70
Oil - hauling	128.36	12.83	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	163.70	17.83	24.15	1.54	9.02	2.16	0.22	770.58	0.03	0.02	778.68	706.61
Road Mainte-nance	19.63	2.19	5.85	0.158	2.23	0.47	0.05	5.09	706.48	0.01	14,844	13,470
Sub-total: Mainte-nance	19.63	2.19	5.85	0.16	2.23	0.47	0.05	5.09	706.48	0.01	14844.18	13470.22
Total Emissions	229.68	51.09	795.53	93.58	192.34	33.04	3.30	36,198.80	708.87	1.08	51,420.22	46,660.82
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.44. Total Annual Emissions from Oil Wells - Year 2015 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	0.02	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	0.11	0.11	2.93	0.35	0.69	0.12	0.01	135.42	0.01	0.00	136	123
Commuting Vehicles - Construction	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	1	1
Sub-total: Construction	0.18	0.12	2.93	0.35	0.69	0.12	0.01	135.65	0.01	0.00	137.08	124.39
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.01	0.01	0.09	0.01	0.02	0.01	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	19.28	1.92	0.10	0.00	2.02	0.09	0.01	40.21	0.01	0.01	44	40
Oil - hauling	74.13	7.38	0.62	0.00	0.39	0.08	0.01	180.79	0.01	0.00	181	165
Sub-total: Operations	93.41	9.31	0.81	0.01	2.43	0.18	0.02	694.97	0.02	0.01	699.63	634.87
Road Mainte-nance	11.29	1.26	3.37	0.09	1.28	0.27	0.03	2.93	406.52	0.01	8,542	7,751
Sub-total: Mainte-nance	11.29	1.26	3.37	0.09	1.28	0.27	0.03	2.93	406.52	0.01	8,541.62	7,751.02
Total Emissions	104.88	10.69	7.10	0.45	4.41	0.57	0.06	833.55	406.55	0.02	9,378.33	8,510.29
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.45. Total Annual Emissions from Oil Wells - Year 2024 - Alternative B - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	0.02	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	0.11	0.11	2.93	0.35	0.69	0.12	0.01	135.42	0.01	0.00	136	123
Commuting Vehicles - Construction	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	1	1
Sub-total: Construction**c**	0.18	0.12	2.93	0.35	0.69	0.12	0.01	135.65	0.01	0.00	137.08	124.39
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.01	0.01	0.09	0.01	0.02	0.01	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	14.46	1.44	0.07	0.00	1.52	0.07	0.01	30.15	0.00	0.01	33	30
Oil - hauling	55.41	5.54	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	69.87	6.98	0.94	0.01	2.03	0.17	0.02	730.14	0.02	0.01	733.94	666.01
Road Mainte-nance	8.47	0.95	2.53	0.068	0.96	0.20	0.02	2.20	304.84	0.00	6,405	5,812
Sub-total: Mainte-nance	8.47	0.95	2.53	0.07	0.96	0.20	0.02	2.20	304.84	0.00	6405.00	5812.16
Total Emissions	78.52	8.05	6.39	0.43	3.68	0.49	0.05	867.98	304.86	0.02	7,276.02	6,602.56
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.46. Total Annual Emissions from Oil Wells - Year 2015 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	5.18	0.78	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	31.72	31.67	833.17	100.02	196.39	33.05	3.31	38,498.24	1.83	0.41	38,664	35,086
Commuting Vehicles - Construction	13.56	1.36	0.21	0.00	0.75	0.05	0.01	64.12	0.73	0.73	305	277
Sub-total: Construction**c**	50.46	33.81	833.37	100.02	197.14	33.11	3.31	38,562.37	2.56	1.14	38,969.77	35,362.77
Well Workover Operations - Fugitive Dust	0.22	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.79	1.79	25.26	1.67	5.44	2.07	0.21	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.79	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	29.65	2.95	0.15	0.00	3.11	0.14	0.01	61.84	0.01	0.02	68	62
Oil - hauling	113.83	11.36	0.96	0.00	0.60	0.12	0.01	278.06	0.01	0.00	279	253
Sub-total: Operations	145.49	16.12	26.37	1.68	9.17	2.34	0.23	814.65	0.04	0.02	822.15	746.05
Road Mainte-nance	17.37	1.94	5.18	0.14	1.97	0.42	0.04	4.51	625.23	0.01	13,137	11,921
Sub-total: Mainte-nance	17.37	1.94	5.18	0.14	1.97	0.42	0.04	4.51	625.23	0.01	13,136.83	11,920.90
Total Emissions	213.31	51.87	864.92	101.84	208.28	35.86	3.59	39,381.52	627.82	1.17	52,928.75	48,029.72
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.47. Total Annual Emissions from Oil Wells - Year 2024 - Alternative C - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	5.18	0.78	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	31.72	31.67	833.17	100.02	196.39	33.05	3.31	38,498.24	1.83	0.41	38,664	35,086
Commuting Vehicles - Construction	13.56	1.36	0.21	0.00	0.75	0.05	0.00	64.12	0.73	0.73	305	277
Sub-total: Construction**c**	50.46	33.81	833.37	100.02	197.14	33.11	3.31	38562.37	2.56	1.14	38969.77	35362.77
Well Workover Operations - Fugitive Dust	0.22	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.79	1.79	25.26	1.67	5.44	2.07	0.21	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.79	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	35.20	3.50	0.17	0.00	3.69	0.16	0.02	73.41	0.01	0.02	81	73
Oil - hauling	134.85	13.48	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	172.06	18.80	26.21	1.67	9.64	2.34	0.23	774.18	0.03	0.03	782.67	710.22
Road Mainte-nance	20.62	2.30	6.15	0.166	2.34	0.50	0.05	5.35	742.24	0.01	15,595	14,152
Sub-total: Mainte-nance	20.62	2.30	6.15	0.17	2.34	0.50	0.05	5.35	742.24	0.01	15595.42	14151.92
Total Emissions	243.13	54.91	865.74	101.86	209.12	35.94	3.59	39,341.90	744.83	1.18	55,347.85	50,224.91
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.48. Total Annual Emissions from Oil Wells - Year 2015 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.61	0.69	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	28.26	28.22	742.31	89.11	174.97	29.45	2.95	34,300.19	1.63	0.37	34,448	31,260
Commuting Vehicles - Construction	12.08	1.21	0.18	0.00	0.67	0.05	0.00	57.13	0.65	0.65	272	247
Sub-total: Construction	44.95	30.12	742.50	89.11	175.64	29.50	2.95	34,357.33	2.28	1.02	34,720.30	31,506.63
Well Workover Operations - Fugitive Dust	0.19	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.60	1.60	22.51	1.49	4.85	1.85	0.18	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.70	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	28.52	2.84	0.14	0.00	2.99	0.13	0.01	59.48	0.01	0.02	65	59
Oil - hauling	109.51	10.92	0.92	0.00	0.58	0.12	0.01	267.47	0.01	0.00	268	244
Sub-total: Operations	139.82	15.38	23.57	1.49	8.43	2.10	0.21	801.63	0.03	0.02	808.81	733.95
Road Mainte-nance	16.71	1.87	4.98	0.13	1.89	0.40	0.04	4.34	601.43	0.01	12,637	11,467
Sub-total: Mainte-nance	16.71	1.87	4.98	0.13	1.89	0.40	0.04	4.34	601.43	0.01	12,636.82	11,467.17
Total Emissions	201.48	47.37	771.05	90.74	185.97	32.00	3.20	35,163.29	603.74	1.05	48,165.94	43,707.75
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.49. Total Annual Emissions from Oil Wells - Year 2024 - Alternative D - Federal

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.61	0.69	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	28.26	28.22	742.31	89.11	174.97	29.45	2.95	34,300.19	1.63	0.37	34,448	31,260
Commuting Vehicles - Construction	12.08	1.21	0.18	0.00	0.67	0.05	0.00	57.13	0.65	0.65	272	247
Sub-total: Construction**c**	44.95	30.12	742.50	89.11	175.64	29.50	2.95	34357.33	2.28	1.02	34720.30	31506.63
Well Workover Operations - Fugitive Dust	0.19	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.60	1.60	22.51	1.49	4.85	1.85	0.18	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.70	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	32.94	3.28	0.16	0.00	3.45	0.15	0.02	68.70	0.01	0.02	76	69
Oil - hauling	126.21	12.62	0.78	0.00	0.49	0.10	0.01	226.02	0.01	0.00	227	206
Sub-total: Operations	160.94	17.51	23.45	1.49	8.81	2.10	0.21	769.39	0.03	0.02	777.36	705.41
Road Mainte-nance	19.30	2.16	5.75	0.156	2.19	0.46	0.05	5.01	694.64	0.01	14,595	13,244
Sub-total: Mainte-nance	19.30	2.16	5.75	0.16	2.19	0.46	0.05	5.01	694.64	0.01	14595.40	13244.46
Total Emissions	225.19	49.79	771.70	90.76	186.64	32.06	3.20	35,131.72	696.96	1.05	50,093.07	45,456.50
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.50. Total Annual Emissions from Oil Wells - Year 2005 - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Commuting Vehicles - Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: Construction**c**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9,646.70
Well Workover Operations - Fugitive Dust	0.00	0.00	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	473.97	0.00	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	50.00	4.98	0.25	0.00	5.24	0.23	0.02	104.29	0.02	0.03	115	104
Oil - hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sub-total: Operations	50.00	4.98	0.25	0.00	5.24	0.23	0.02	578.25	0.02	0.03	588.74	534.25
Road Mainte-nance	29.30	3.27	8.74	0.24	3.32	0.70	0.07	1,061.40	0.01	0.01	1,066	967
Sub-total: Mainte-nance	29.30	3.27	8.74	0.24	3.32	0.70	0.07	1,061.40	0.01	0.01	1,065.98	967.31
Total Emissions	79.30	8.25	8.98	0.24	8.56	0.94	0.09	1,639.65	0.03	0.05	1,654.72	11,148.26
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.51. Total Annual Emissions from Oil Wells - Year 2015 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eqmetricTonnes**	**CO_2eqmetricTonnes**
Well Pad Construction - Fugitive Dust	9.64	1.45	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	59.02	58.93	1,550.36	186.12	365.44	61.51	6.15	71,637.69	3.40	0.77	71,947	65,288
Commuting Vehicles - Construction	25.23	2.54	0.38	0.00	1.40	0.10	0.01	119.32	1.36	1.36	568	516
Sub-total: Construction**c**	93.89	62.91	1,550.74	186.12	366.84	61.60	6.16	71,757.01	4.76	2.12	72,515.11	65,803.18
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.34	3.34	47.01	3.11	10.13	3.86	0.39	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.47	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eqmetricTonnes**	**CO_2eqmetricTonnes**
Well Visits for Inspection & Repair - Operations	56.00	5.58	0.28	0.00	5.87	0.26	0.03	116.81	0.02	0.04	129	117
Oil - hauling	214.74	21.45	1.80	0.01	1.14	0.23	0.02	525.24	0.03	0.00	527	478
Sub-total: Operations	274.48	30.40	49.09	3.12	17.17	4.35	0.44	1,117.48	0.07	0.04	1,131.64	1,026.89
Road Maintenance	32.81	3.67	9.78	0.26	3.72	0.79	0.08	8.51	1,181.03	0.02	24,815	22,518
Sub-total: Maintenance	32.81	3.67	9.78	0.26	3.72	0.79	0.08	8.51	1,181.03	0.02	24,815.10	22,518.24
Total Emissions	401.18	96.98	1,609.62	189.50	387.73	66.75	6.67	72,883.01	1,185.86	2.18	98,461.85	89,348.32
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.52. Total Annual Emissions from Oil Wells - Year 2024 - Alternative A - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	9.64	1.45	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring a	59.02	58.93	1,550.36	186.12	365.44	61.51	6.15	71,637.69	3.40	0.77	71,947	65,288
Commuting Vehicles - Construction	25.23	2.54	0.38	0.00	1.40	0.10	0.00	119.32	1.36	1.36	568	516
Sub-total: Constructionc	93.89	62.91	1550.74	186.12	366.84	61.60	6.15	71757.01	4.76	2.12	72515.11	65803.18
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.34	3.34	47.01	3.11	10.13	3.86	0.39	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.47	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	66.51	6.62	0.33	0.00	6.97	0.31	0.03	138.71	0.02	0.04	153	139
Oil - hauling	254.81	25.48	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	325.06	35.47	48.95	3.12	18.15	4.38	0.44	1083.09	0.07	0.05	1099.26	997.51
Road Mainte-nance	38.97	4.35	11.62	0.314	4.42	0.94	0.09	10.11	1402.52	0.02	29,469	26,741
Sub-total: Mainte-nance	38.97	4.35	11.62	0.31	4.42	0.94	0.09	10.11	1402.52	0.02	29468.85	26741.24
Total Emissions	457.91	102.74	1,611.31	189.55	389.41	66.92	6.68	72,850.21	1,407.35	2.19	103,083.21	93,541.93
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.53. Total Annual Emissions from Oil Wells - Year 2015 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.90	0.73	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	29.99	29.95	787.95	94.59	185.73	31.26	3.13	36,408.89	1.73	0.39	36,566	33,182
Commuting Vehicles - Construction	12.82	1.29	0.20	0.00	0.71	0.05	0.00	60.64	0.69	0.69	289	262
Sub-total: Construction	47.72	31.97	788.15	94.59	186.44	31.31	3.13	36,469.54	2.42	1.08	36,854.83	33,443.58
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.70	1.70	23.89	1.58	5.15	1.96	0.20	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.75	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	46.48	4.63	0.23	0.00	4.87	0.22	0.02	96.94	0.01	0.03	107	97
Oil - hauling	178.28	17.80	1.50	0.01	0.95	0.19	0.02	435.93	0.02	0.00	437	397
Sub-total: Operations	226.66	24.15	25.62	1.59	10.98	2.37	0.24	1,007.59	0.05	0.03	1,019.14	924.81
Road Mainte-nance	27.23	3.04	8.12	0.22	3.09	0.65	0.07	7.07	980.21	0.01	20,596	18,689
Sub-total: Mainte-nance	27.23	3.04	8.12	0.22	3.09	0.65	0.07	7.07	980.21	0.01	20,595.51	18,689.21
Total Emissions	301.61	59.17	821.89	96.40	200.51	34.34	3.43	37,484.19	982.68	1.13	58,469.47	53,057.60
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.54. Total Annual Emissions from Oil Wells - Year 2024 - Alternative B - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	4.90	0.73	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	29.99	29.95	787.95	94.59	185.73	31.26	3.13	36,408.89	1.73	0.39	36,566	33,182
Commuting Vehicles - Construction	12.82	1.29	0.20	0.00	0.71	0.05	0.00	60.64	0.69	0.69	289	262
Sub-total: Construction	47.72	31.97	788.15	94.59	186.44	31.31	3.13	36469.54	2.42	1.08	36854.83	33443.58
Well Workover Operations - Fugitive Dust	0.20	0.02	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	1.70	1.70	23.89	1.58	5.15	1.96	0.20	473.97	0.01	0.00	474	430
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.75	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	47.46	4.73	0.23	0.00	4.98	0.22	0.02	98.99	0.01	0.03	109	99
Oil - hauling	181.86	18.18	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	231.22	24.62	25.74	1.59	11.16	2.39	0.24	1042.65	0.05	0.03	1054.51	956.91
Road Mainte-nance	27.81	3.11	8.29	0.224	3.15	0.67	0.07	7.22	1000.87	0.01	21,030	19,083
Sub-total: Mainte-nance	27.81	3.11	8.29	0.22	3.15	0.67	0.07	7.22	1000.87	0.01	21029.66	19083.18
Total Emissions	306.75	59.70	822.17	96.40	200.75	34.37	3.43	37,519.40	1,003.34	1.13	58,939.01	53,483.67
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.55. Total Annual Emissions from Oil Wells - Year 2015 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	10.06	1.51	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	61.60	61.51	1,618.19	194.26	381.43	64.20	6.42	74,771.72	3.54	0.80	75,094	68,144
Commuting Vehicles - Construction	26.34	2.65	0.40	0.00	1.46	0.10	0.01	124.54	1.42	1.42	593	538
Sub-total: Construction	98.00	65.67	1,618.59	194.26	382.89	64.30	6.43	74,896.26	4.97	2.22	75,687.52	68,681.96
Well Workover Operations - Fugitive Dust	0.42	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.48	3.48	49.06	3.24	10.57	4.03	0.40	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.53	0.00	0.00	2	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	56.85	5.66	0.28	0.00	5.96	0.27	0.03	118.58	0.02	0.04	131	118
Oil - hauling	217.98	21.78	1.83	0.01	1.16	0.24	0.02	533.19	0.03	0.00	535	485
Sub-total: Operations	278.74	30.96	51.18	3.25	17.72	4.53	0.45	1,127.27	0.07	0.04	1,141.65	1,035.98
Road Mainte-nance	33.31	3.72	9.93	0.27	3.78	0.80	0.08	8.64	1,198.91	0.02	25,191	22,859
Sub-total: Mainte-nance	33.31	3.72	9.93	0.27	3.78	0.80	0.08	8.64	1,198.91	0.02	25,190.72	22,859.09
Total Emissions	410.04	100.35	1,679.70	197.78	404.39	69.63	6.96	76,032.17	1,203.95	2.27	102,019.89	92,577.03
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.56. Total Annual Emissions from Oil Wells - Year 2024 - Alternative C - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	10.06	1.51	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	61.60	61.51	1,618.19	194.26	381.43	64.20	6.42	74,771.72	3.54	0.80	75,094	68,144
Commuting Vehicles - Construction	26.34	2.65	0.40	0.00	1.46	0.10	0.00	124.54	1.42	1.42	593	538
Sub-total: Construction**c**	98.00	65.67	1618.59	194.26	382.89	64.30	6.42	74896.26	4.97	2.22	75687.52	68681.96
Well Workover Operations - Fugitive Dust	0.42	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.48	3.48	49.06	3.24	10.57	4.03	0.40	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.53	0.00	0.00	2	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	68.20	6.79	0.34	0.00	7.15	0.32	0.03	142.25	0.02	0.04	157	142
Oil - hauling	261.31	26.12	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	333.41	36.44	51.02	3.25	18.77	4.55	0.46	1086.69	0.07	0.05	1103.24	1,001.12
Road Mainte-nance	39.96	4.46	11.91	0.322	4.53	0.96	0.10	10.37	1438.28	0.02	30,220	27,423
Sub-total: Mainte-nance	39.96	4.46	11.91	0.32	4.53	0.96	0.10	10.37	1438.28	0.02	30220.08	27422.94
Total Emissions	471.37	106.57	1,681.52	197.84	406.19	69.81	6.97	75,993.32	1,443.31	2.28	107,010.84	97,106.03
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.57. Total Annual Emissions from Oil Wells - Year 2015 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	9.49	1.42	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	58.14	58.06	1,527.33	183.35	360.01	60.59	6.06	70,573.67	3.35	0.76	70,878	64,318
Commuting Vehicles - Construction	24.86	2.50	0.38	0.00	1.38	0.09	0.01	117.55	1.34	1.34	560	508
Sub-total: Construction	92.49	61.98	1,527.71	183.36	361.39	60.69	6.07	70,691.22	4.69	2.09	71,438.05	64,825.82
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.29	3.29	46.31	3.06	9.98	3.80	0.38	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.45	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	55.72	5.55	0.28	0.00	5.84	0.26	0.03	116.22	0.02	0.04	128	116
Oil - hauling	213.66	21.34	1.80	0.01	1.14	0.23	0.02	522.61	0.03	0.00	524	476
Sub-total: Operations	273.07	30.22	48.38	3.07	16.98	4.29	0.43	1,114.24	0.07	0.04	1,128.32	1,023.88
Road Mainte-nance	32.65	3.65	9.73	0.26	3.70	0.79	0.08	8.47	1,175.11	0.02	24,691	22,405
Sub-total: Mainte-nance	32.65	3.65	9.73	0.26	3.70	0.79	0.08	8.47	1,175.11	0.02	24,690.71	22,405.36
Total Emissions	398.21	95.85	1,585.83	186.69	382.08	65.77	6.58	71,813.93	1,179.87	2.15	97,257.08	88,255.06
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.58. Total Annual Emissions from Oil Wells - Year 2024 - Alternative D - Cumulative

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad Construction - Fugitive Dust	9.49	1.42	---	---	---	---	---					
Heavy Equipment Combustive Emissions & Flaring	58.14	58.06	1,527.33	183.35	360.01	60.59	6.06	70,573.67	3.35	0.76	70,878	64,318
Commuting Vehicles - Construction	24.86	2.50	0.38	0.00	1.38	0.09	0.00	117.55	1.34	1.34	560	508
Sub-total: Construction	92.49	61.98	1527.71	183.36	361.39	60.69	6.06	70691.22	4.69	2.09	71438.05	64825.82
Well Workover Operations - Fugitive Dust	0.40	0.04	---	---	---	---	---					
Well Workover Operations - On-site Exhaust	3.29	3.29	46.31	3.06	9.98	3.80	0.38	473.97	0.02	0.00	475	431
Well Workover Operations - On-road Exhaust	0.00	0.00	0.00	0.00	0.03	0.00	0.00	1.45	0.00	0.00	1	1

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Visits for Inspection & Repair - Operations	65.94	6.57	0.33	0.00	6.91	0.31	0.03	137.54	0.02	0.04	151	137
Oil - hauling	252.66	25.26	1.61	0.01	1.02	0.21	0.02	468.94	0.02	0.00	471	427
Sub-total: Operations	322.29	35.15	48.25	3.07	17.94	4.32	0.43	1081.90	0.07	0.05	1097.94	996.31
Road Mainte-nance	38.64	4.32	11.52	0.312	4.38	0.93	0.09	10.03	1390.68	0.02	29,220	26,515
Sub-total: Mainte-nance	38.64	4.32	11.52	0.31	4.38	0.93	0.09	10.03	1390.68	0.02	29220.06	26515.48
Total Emissions	453.42	101.45	1,587.48	186.74	383.71	65.94	6.58	71,783.14	1,395.44	2.16	101,756.05	92,337.62
a HAPs = Hazardous Air Pollutants, assumed = VOCs*0.1												

Table M.59. Projected Emissions from Coal Production (tpy) for Campbell and Sheridan Counties.

Year	Campbell County	Sheridan County	Total
2005	509	0	509
2015	618	12	630
2024	655	17	672
SO_2			
Year	Campbell County	Sheridan County	Total
2005	19	0	19
2015	23	0.4	23.4
2024	24	0.6	24.6
CO			
Year	Campbell County	Sheridan County	Total
2005	1222	0	1222
2015	1478	29	1507
2024	1568	42	1610
PM_{10}			
Year	Campbell County	Sheridan County	Total
2005	4621	0	4621
2015	5591	109	5700
2024	5930	158	6088
$PM_{2.5}$			
Year	Campbell County	Sheridan County	Total
2005	1426	0	1426
2015	1725	34	1759
2024	1830	49	1879
CH_4			
Year	Campbell County	Sheridan County	Total
2005	322545.11	52430.34	374975.4
2015	390271.118	63442.43	453713.5
2024	413975.22	67306.03	481281.2

Table M.60. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2005

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	16	2	0	0	0	0	0	35	0	0	35	32
Product Handling, Transfer, and Storage	797	92	---	---	---	---	---	---	---		---	---
Unpaved Roads	12	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	4	0	0	323	0		324	294
Heavy Equipment - Dust	3	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	7	0	2	1	0	743	0		743	674
Total	828	96	8	0	7	1	0	1,101	0	0	1,102	1,000

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.61. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative A

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	16	2	0	0	0	0	0	10	0	0	10	9
Product Handling, Transfer, and Storage	1,576	174	---	---	---	---	---	---	---		---	---
Unpaved Roads	12	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	4	0	0	323	0		324	294
Heavy Equipment - Dust	4	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	3	0	1	0	0	797	0		797	723
Total	1,608	177	4	0	5	1	0	1,130	0	0	1,130	1,026

Table M.62. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative A

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	16	2	0	0	0	0	0	10	0	0	10	9
Product Handling, Transfer, and Storage	1,576	174	---	---	---	---	---	---	---		---	---
Unpaved Roads	12	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	4	0	0	323	0		324	294
Heavy Equipment - Dust	4	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	1	0	0	0	0	797	0		797	723
Total	1,608	177	2	0	5	1	0	1,130	0	0	1,130	1,026

Table M.63. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative B

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	8	1	0	0	0	0	0	5	0	0	5	4
Product Handling, Transfer, and Storage	788	87	---	---	---	---	---	---	---		---	---
Unpaved Roads	6	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	2	0	0	161	0		161	146
Heavy Equipment - Dust	2	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	1	0	0	0	0	397	0		397	361
Total	804	89	2	0	3	0	0	563	0	0	564	511

Table M.64. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative B

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	8	1	0	0	0	0	0	5	0	0	5	4
Product Handling, Transfer, and Storage	788	87	---	---	---	---	---	---	---		---	---
Unpaved Roads	6	1	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	0	0	1	0	2	0	0	161	0		161	146
Heavy Equipment - Dust	2	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	0	0	0	0	0	0	0	397	0		398	361
Total	804	89	1	0	2	0	0	563	0	0	564	512

Table M.65. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative C

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	42	5	0	0	0	0	0	25	0	0	25	23
Product Handling, Transfer, and Storage	2,893	411	---	---	---	---	---	---	---		---	---
Unpaved Roads	163	16	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	14	0	57	4	0	4,281	0		4,287	3,891
Heavy Equipment - Dust	8	1	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	4	4	33	2	13	4	0	10,561	0		10,562	9,584
Total	3,111	438	47	2	70	8	1	14,867	0	0	14,875	13,498

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.66. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative C

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	42	5	0	0	0	0	0	25	0	0	25	23
Product Handling, Transfer, and Storage	2,893	411	---	---	---	---	---	---	---		---	---
Unpaved Roads	163	16	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	14	0	57	4	0	4,281	0		4,287	3,891
Heavy Equipment - Dust	8	1	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	3	3	10	2	4	3	0	10,562	0		10,563	9,585
Total	3,109	437	23	2	61	7	1	14,869	0	0	14,876	13,499

Table M.67. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2015 - Alternative D

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	36	4	0	0	0	0	0	22	0	0	22	20
Product Handling, Transfer, and Storage	1,288	212	---	---	---	---	---	---	---		---	---
Unpaved Roads	116	12	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	10	0	40	3	0	3,032	0		3,036	2,755
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	3	3	24	1	9	3	0	7,479	0		7,480	6,788
Total	1,448	231	33	1	50	6	1	10,533	0	0	10,539	9,563

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.68. Annual Emissions Estimation for Bentonite - Locatable Minerals Equipment Usage - Year 2024 - Alternative D

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Exploratory operations	36	4	0	0	0	0	0	22	0	0	22	20
Product Handling, Transfer, and Storage	1,288	212	---	---	---	---	---	---	---		---	---
Unpaved Roads	116	12	---	---	---	---	---	---	---		---	---
Commuting - Exhaust	1	1	10	0	40	3	0	3,032	0		3,036	2,755
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---		---	---
Heavy Equipment - Combustive	2	2	7	1	3	2	0	7,481	0		7,481	6,789
Total	1,448	230	17	1	43	5	0	10,534	0	0	10,540	9,564

Table M.69. Total Annual Emissions from Uranium ISL - Year 2005

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	2	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	17	0	7	2	0	382	0	0	385	349
Wind Erosion	2	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	5	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	10	2	17	0	7	2	0	382	0	0	385	349
Transport of Ion Exchange Resin	18	2	0	0	0	0	0	0	0		0	0
Well Workover - Operations	7	1	8	0	2	0	0	835	0	0	838	760
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	4	0		4	4

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Sub-total: Operations	26	3	8	0	3	0	0	839	0	0	842	764
Road Mainte-nance	0	0	0	0	0	0	0	4	0		4	4
Sub-total: Mainte-nance	0	0	0	0	0	0	0	4	0	0	4	4
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	1	0	0	0	0	0	0	31	0		31	28
Sub-total: Reclama-tion	1	0	0	0	0	0	0	31	0	0	31	28
Total Emissions	38	5	26	1	10	2	0	1,256	0	0	1,262	1,145

Table M.70. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	21	1	8	2	0	473	0	0	475	431
Wind Erosion	3	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	6	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	13	3	21	1	9	2	0	473	0	0	475	431
Transport of Ion Exchange Resin	22	2	0	0	0	0	0	185	0		185	168
Well Workover - Operations	7	1	4	0	1	0	0	1,027	0	0	1,031	935
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	5	0		5	5

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	31	3	4	0	1	0	0	1,217	0	0	1,221	1,108
Road Mainte-nance	0	0	0	0	0	0	0	5	0		5	5
Sub-total: Mainte-nance	0	0	0	0	0	0	0	5	0	0	5	5
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	1	0	0	0	0	0	0	39	0		39	35
Sub-total: Reclama-tion	1	0	0	0	0	0	0	39	0	0	39	35
Total Emissions	45	6	25	1	10	2	0	1,734	0	0	1,740	1,579

Table M.71. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	21	1	8	2	0	473	0	0	475	431
Wind Erosion	3	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	6	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	13	3	21	1	9	2	0	473	0	0	475	431
Transport of Ion Exchange Resin	11	1	0	0	0	0	0	185	0		185	168
Well Workover - Operations	4	1	0	0	0	0	0	514	0	0	515	468
Well & Pipeline visits for Inspection & Repair - Operations	1	0	0	0	0	0	0	3	0		3	2

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Sub-total: Operations	16	2	1	0	0	0	0	701	0	0	703	638
Road Mainte-nance	0	0	0	0	0	0	0	3	0		3	2
Sub-total: Mainte-nance	0	0	0	0	0	0	0	3	0	0	3	2
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	1	0	0	0	0	0	0	19	0		19	17
Sub-total: Reclama-tion	1	0	0	0	0	0	0	19	0	0	19	18
Total Emissions	30	5	22	1	9	2	0	1,196	0	0	1,200	1,089

Table M.72. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	11	0	4	1	0	236	0	0	239	217
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	3	0	0	0	0	0	0	0	0	---	---	---
Sub-total: Construction	6	1	11	0	4	1	0	236	0	0	239	217
Transport of Ion Exchange Resin	11	1	0	0	0	0	0	92	0		92	84
Well Workover - Operations	3	0	2	0	1	0	0	513	0	0	515	467
Well & Pipeline visits for Inspection & Repair - Operations	1	0	0	0	0	0	0	3	0		3	2

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	16	2	2	0	1	0	0	608	0	0	610	554
Road Mainte-nance	0	0	0	0	0	0	0	3	0		3	2
Sub-total: Mainte-nance	0	0	0	0	0	0	0	3	0	0	3	2
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	1	0	0	0	0	0	0	19	0		19	18
Sub-total: Reclama-tion	1	0	0	0	0	0	0	19	0	0	19	18
Total Emissions	23	3	13	0	5	1	0	867	0	0	871	790

Table M.73. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	1	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	1	1	11	0	4	1	0	236	0	0	239	217
Wind Erosion	1	0	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	3	0	0	0	0	0	0	0	0	---	---	---
Sub-total: Construction	6	1	11	0	4	1	0	236	0	0	239	217
Transport of Ion Exchange Resin	6	1	0	0	0	0	0	92	0		92	84
Well Workover - Operations	2	0	0	0	0	0	0	257	0	0	258	234
Well & Pipeline visits for Inspection & Repair - Operations	1	0	0	0	0	0	0	1	0		1	1

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Sub-total: Operations	8	1	0	0	0	0	0	350	0	0	351	319
Road Mainte-nance	0	0	0	0	0	0	0	1	0		1	1
Sub-total: Mainte-nance	0	0	0	0	0	0	0	1	0	0	1	1
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	0	0	0	0	0	0	0	10	0		10	9
Sub-total: Reclama-tion	0	0	0	0	0	0	0	10	0	0	10	9
Total Emissions	15	2	11	0	5	1	0	598	0	0	601	545

Table M.74. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	5	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	3	3	37	1	14	3	0	830	0	0	833	756
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	11	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	23	5	37	1	16	3	0	830	0	0	833	756
Transport of Ion Exchange Resin	39	4	0	0	0	0	0	323	0		323	293
Well Workover - Operations	12	2	7	0	2	1	0	1,797	0	0	1,804	1,637
Well & Pipeline visits for Inspection & Repair - Operations	4	0	0	0	0	0	0	9	0		9	8

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	54	6	7	0	2	1	0	2,129	0	0	2,136	1,938
Road Mainte-nance	0	0	0	0	0	0	0	9	0		9	8
Sub-total: Mainte-nance	0	0	0	0	0	0	0	9	0	0	9	8
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	2	0	0	0	0	0	0	68	0		68	62
Sub-total: Reclama-tion	2	0	0	0	0	0	0	68	0	0	68	62
Total Emissions	80	11	44	1	18	4	0	3,036	0	0	3,046	2,764

Table M.75. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad & Station Construction - Fugitive Dust	5	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	3	3	37	1	14	3	0	830	0	0	833	756
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	11	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	23	5	37	1	16	3	0	830	0	0	833	756
Transport of Ion Exchange Resin	19	2	0	0	0	0	0	323	0		323	293
Well Workover - Operations	7	1	1	0	0	0	0	899	0	0	902	818
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	5	0		5	4

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Sub-total: Operations	28	3	1	0	1	0	0	1,226	0	0	1,230	1,116
Road Mainte-nance	0	0	0	0	0	0	0	4	0		4	4
Sub-total: Mainte-nance	0	0	0	0	0	0	0	4	0	0	4	4
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	1	0	0	0	0	0	0	34	0		34	31
Sub-total: Reclama-tion	1	0	0	0	0	0	0	34	0	0	34	31
Total Emissions	52	8	38	1	16	4	0	2,094	0	0	2,101	1,907

Table M.76. Total Annual Emissions from Uranium ISL - Year 2015 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Well Pad Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	32	1	12	3	0	714	0	0	717	651
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	9	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	20	4	32	1	13	3	0	714	0	0	717	651
Transport of Ion Exchange Resin	33	3	0	0	0	0	0	277	0		277	251
Well Workover - Operations	10	1	6	0	2	0	0	1,541	0	0	1,546	1,403
Well & Pipeline visits for Inspection & Repair - Operations	3	0	0	0	0	0	0	8	0		8	7

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricT-onnes**
Sub-total: Operations	47	5	6	0	2	1	0	1,825	0	0	1,831	1,661
Road Mainte-nance	0	0	0	0	0	0	0	8	0		8	7
Sub-total: Mainte-nance	0	0	0	0	0	0	0	8	0	0	8	7
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	2	0	0	0	0	0	0	58	0		58	53
Sub-total: Reclama-tion	2	0	0	0	0	0	0	58	0	0	58	53
Total Emissions	68	10	38	1	16	4	0	2,605	0	0	2,614	2,372

Table M.77. Total Annual Emissions from Uranium ISL - Year 2024 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**N2O**	**CO2eq**	**CO2eq-metricTonnes**
Well Pad & Station Construction - Fugitive Dust	4	0	---	---	---	---	---	---	---	---	---	---
Heavy Equipment Combustive Emissions	2	2	32	1	12	3	0	714	0	0	717	651
Wind Erosion	4	1	---	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Construction	9	1	0	0	1	0	0	0	0	---	---	---
Sub-total: Construction	20	4	32	1	13	3	0	714	0	0	717	651
Transport of Ion Exchange Resin	17	2	0	0	0	0	0	277	0		277	251
Well Workover - Operations	6	1	1	0	0	0	0	770	0	0	773	702
Well & Pipeline visits for Inspection & Repair - Operations	2	0	0	0	0	0	0	4	0		4	4

Activity	Annual Emissions (Tons)											
	PM_{10}	$PM_{2.5}$	NOx	SO2	CO	VOC	HAPsa	CO2	CH4	N2O	CO2eq	CO2eq-metricT-onnes
Sub-total: Operations	24	3	1	0	1	0	0	1,051	0	0	1,054	957
Road Mainte-nance	0	0	0	0	0	0	0	4	0		4	3
Sub-total: Mainte-nance	0	0	0	0	0	0	0	4	0	0	4	3
Road Reclama-tion	0	0	0	0	0	0	0	0	0		0	0
Well Pad Reclama-tion	1	0	0	0	0	0	0	29	0		29	26
Sub-total: Reclama-tion	1	0	0	0	0	0	0	29	0	0	29	26
Total Emissions	45	7	33	1	14	3	0	1,798	0	0	1,804	1,637

Table M.78. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2005

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$a	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	15	2	---	---	---	---	---	---	---	---	---
Unpaved Roads	662	66	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	2	0	5	2	0	466	0	467	423
Heavy Equipment - Dust	22	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	11	10	170	4	76	11	1	17,704	0	17,707	16,068
Wind Erosion	53	8	---	---	---	---	---	---	---	---	---
Total	763	89	172	4	80	13	1	18,170	0	18,174	16,492

Table M.79. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative A

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	16	2	---	---	---	---	---	---	---	---	---
Unpaved Roads	662	66	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	2	0	5	2	0	466	0	467	423
Heavy Equipment - Dust	44	4	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	6	6	63	3	28	6	1	17,968	0	17,970	16,307
Wind Erosion	106	16	---	---	---	---	---	---	---	---	---
Total	835	95	65	3	33	8	1	18,435	0	18,437	16,731

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.80. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative A

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	15	2	---	---	---	---	---	---	---	---	---
Unpaved Roads	662	66	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	2	0	5	2	0	466	0	467	423
Heavy Equipment - Dust	44	4	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	5	5	19	3	10	5	0	17,972	0	17,974	16,310
Wind Erosion	89	13	---	---	---	---	---	---	---	---	---
Total	816	91	21	3	14	7	1	18,439	0	18,441	16,734

Table M.81. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative B

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	5	1	---	---	---	---	---	---	---	---	---
Unpaved Roads	208	21	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	1	0	1	1	0	147	0	147	133
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	2	2	20	1	9	2	0	5,646	0	5,647	5,124
Wind Erosion	11	2	---	---	---	---	---	---	---	---	---
Total	231	26	21	1	10	3	0	5,793	0	5,793	5,257

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.82. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative B

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	5	1	---	---	---	---	---	---	---	---	---
Unpaved Roads	208	21	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	1	0	1	1	0	147	0	147	133
Heavy Equipment - Dust	5	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	1	1	6	1	3	2	0	5,647	0	5,648	5,125
Wind Erosion	10	1	---	---	---	---	---	---	---	---	---
Total	229	25	7	1	4	2	0	5,794	0	5,794	5,258

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.83. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative C

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	63	9	---	---	---	---	---	---	---	---	---
Unpaved Roads	2,642	264	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	1	0	9	0	18	8	1	1,861	0	1,862	1,690
Heavy Equipment - Dust	87	9	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	25	24	252	13	113	25	2	71,695	0	71,703	65,066
Wind Erosion	209	31	---	---	---	---	---	---	---	---	---
Total	3,027	339	261	13	131	32	3	73,556	0	73,565	66,756

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.84. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative C

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	61	9	---	---	---	---	---	---	---	---	---
Unpaved Roads	2,642	264	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	1	0	9	0	18	8	1	1,861	0	1,862	1,690
Heavy Equipment - Dust	87	9	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	19	18	76	11	38	20	2	71,710	0	71,716	65,078
Wind Erosion	176	26	---	---	---	---	---	---	---	---	---
Total	2,986	327	85	11	56	27	3	73,571	0	73,578	66,768

Table M.85. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2015 - Alternative D

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	32	5	---	---	---	---	---	---	---	---	---
Unpaved Roads	1,358	136	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	5	0	9	4	0	956	0	957	868
Heavy Equipment - Dust	50	5	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	13	13	130	7	58	13	1	36,833	0	36,837	33,428
Wind Erosion	119	18	---	---	---	---	---	---	---	---	---
Total	1,572	176	134	7	67	17	2	37,789	0	37,794	34,296
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.86. Annual Emissions Estimation for Locatable Minerals Equipment Usage - Year 2024 - Alternative D

Activity	Annual Emissions (Tons)										
	PM_{10}	$PM_{2.5}$	NOx	SO_2	CO	VOC	HAPsa	CO_2	CH_4	CO_2eq	CO_2eqmetric tonnes
Product Handling, Transfer, and Storage	31	5	---	---	---	---	---	---	---	---	---
Unpaved Roads	1,358	136	---	---	---	---	---	---	---	---	---
Commuting - Exhaust	0	0	5	0	9	4	0	956	0	957	868
Heavy Equipment - Dust	50	5	---	---	---	---	---	---	---	---	---
Heavy Equipment - Combustive	10	9	39	6	20	10	1	36,841	0	36,844	33,434
Wind Erosion	100	15	---	---	---	---	---	---	---	---	---
Total	1,549	170	44	6	29	14	1	37,797	0	37,801	34,302

Table M.87. Total Annual Emissions from Fire Management Projects - Year 2005

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	71	60	20	6	685	36	4	0	37	2	1,488	1,351
Heavy Equipment Exhaust	0	0	0	0	0	0	0	6	0		6	6
Commuting Vehicles - Fugitive Dust	2	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	7	0		7	7
Total	73	60	20	6	685	36	4	13	37	2	1,502	1,363
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.88. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.89. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865

Table M.90. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	37	32	11	3	362	19	2	0	20	1	787	714
Heavy Equipment Exhaust	0	0	0	0	0	0	0	1	0		1	0
Commuting Vehicles - Fugitive Dust	0	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	1	0		1	1
Total	38	32	11	3	362	19	2	1	20	1	788	715
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.91. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	37	32	11	3	362	19	2	0	20	1	787	714
Heavy Equipment Exhaust	0	0	0	0	0	0	0	1	0		1	0
Commuting Vehicles - Fugitive Dust	0	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	1	0		1	1
Total	38	32	11	3	362	19	2	1	20	1	788	715

Table M.92. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	450	379	128	35	4,343	225	23	0	236	14	9,443	8,569
Heavy Equipment Exhaust	0	0	0	0	1	0	0	12	0		12	11
Commuting Vehicles - Fugitive Dust	4	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	14	0		14	13
Total	453	379	128	35	4,343	225	23	27	236	14	9,470	8,594
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.93. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	450	379	128	35	4,343	225	23	0	236	14	9,443	8,569
Heavy Equipment Exhaust	0	0	0	0	1	0	0	12	0		12	11
Commuting Vehicles - Fugitive Dust	4	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	14	0		14	13
Total	453	379	128	35	4,343	225	23	27	236	14	9,470	8,594

Table M.94. Total Annual Emissions from Fire Management Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1												

Table M.95. Total Annual Emissions from Fire Management Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)											
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**N2O**	**CO_2eq**	**CO2eq-metricT-onnes**
Fugitive Dust and Smoke	150	126	43	12	1,448	75	8	0	79	5	3,148	2,856
Heavy Equipment Exhaust	0	0	0	0	0	0	0	4	0		4	4
Commuting Vehicles - Fugitive Dust	1	0	---	---	---	---	---	---	---		---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	5	0		5	4
Total	151	126	43	12	1,448	75	8	9	79	5	3,157	2,865

Table M.96. Total Annual Emissions from Forest and Woodlands Projects - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmet-ric tonnes**
Heavy Equipment - Fugitive Dust	32	3	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	32	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	37	4	0	0	2	1	0	29	0	29	27

Table M.97. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	29	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	35	4	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.98. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	29	3	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	29	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	35	4	0	0	2	1	0	29	0	29	27

Table M.99. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	25	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	30	3	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.100. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	25	3	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	30	3	0	0	2	1	0	29	0	29	27

Table M.101. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	188	19	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	189	19	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	194	19	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.102. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	188	19	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	189	19	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	194	20	0	0	2	1	0	29	0	29	27

Table M.103. Total Annual Emissions from Forest and Woodlands Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	79	8	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	79	8	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	85	9	0	0	2	1	0	29	0	29	27
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.104. Total Annual Emissions from Forest and Woodlands Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eqtons**	**CO_2eqmetric tonnes**
Heavy Equipment - Fugitive Dust	79	8	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	2	0	0	10	0	10	9
Sub-total: Heavy Equipment	79	8	0	0	2	0	0	10	0	10	9
Commuting Vehicles - Fugitive Dust	6	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	19	0	19	17
Sub-total: Commuting Vehicles	6	1	0	0	0	0	0	19	0	19	17
Total	85	9	0	0	2	1	0	29	0	29	27

Table M.105. Total Annual Emissions from Renewable Energy Development - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	20	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	14	0	6	1	0	1427	0	1427	1295
Sub-total: Heavy Equipment	21	3	14	0	6	1	0	1427	0	1427	1295
Commuting Vehicles - Fugitive Dust	18	2	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	81	0	81	74
Sub-total: Commuting Vehicles	18	2	0	0	1	0	0	81	0	81	74
Total	39	5	14	0	7	1	0	1508	0	1508	1369

Table M.106. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	4	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	2	0	1	0	0	504	0	504	457
Sub-total: Heavy Equipment	37	4	2	0	1	0	0	504	0	504	457
Commuting Vehicles - Fugitive Dust	8	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	39	0	39	36
Sub-total: Commuting Vehicles	8	1	0	0	0	0	0	39	0	39	36
Total	45	5	2	0	1	0	0	543	0	543	493
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.107. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	90	9	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	2	0	1	0	0	1561	0	1561	1417
Sub-total: Heavy Equipment	90	9	2	0	1	0	0	1561	0	1561	1417
Commuting Vehicles - Fugitive Dust	21	2	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	97	0	97	88
Sub-total: Commuting Vehicles	21	2	0	0	1	0	0	97	0	97	88
Total	111	11	2	0	2	1	0	1658	0	1658	1505

Table M.108. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	2	0	1	0	0	477	0	477	433
Sub-total: Heavy Equipment	25	3	2	0	1	0	0	477	0	477	433
Commuting Vehicles - Fugitive Dust	7	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	31	0	31	28
Sub-total: Commuting Vehicles	7	1	0	0	0	0	0	31	0	31	28
Total	32	3	2	0	1	0	0	508	0	508	461
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.109. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO_2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO_2eqmet-ricTonnes**
Fugitive Dust	25	2	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	1	0	0	0	0	533	0	533	484
Sub-total: Heavy Equipment	25	3	1	0	0	0	0	533	0	533	484
Commuting Vehicles - Fugitive Dust	7	1	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	0	0	0	31	0	31	28
Sub-total: Commuting Vehicles	7	1	0	0	0	0	0	31	0	31	28
Total	32	3	1	0	1	0	0	564	0	564	512

Table M.110. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	166	17	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	8	0	3	1	0	1955	0	1955	1774
Sub-total: Heavy Equipment	167	17	8	0	3	1	0	1955	0	1955	1774
Commuting Vehicles - Fugitive Dust	30	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	1	0	139	0	139	126
Sub-total: Commuting Vehicles	30	3	0	0	1	1	0	139	0	139	126
Total	196	20	8	0	4	1	0	2094	0	2094	1900
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.111. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	166	17	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	2	0	1	1	0	2128	0	2128	1931
Sub-total: Heavy Equipment	166	17	2	0	1	1	0	2128	0	2128	1931
Commuting Vehicles - Fugitive Dust	30	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	1	0	139	0	139	126
Sub-total: Commuting Vehicles	30	3	0	0	1	1	0	139	0	139	126
Total	196	20	3	0	2	1	0	2267	0	2268	2058

Table M.112. Total Annual Emissions from Renewable Energy Development - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	282	28	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	1	7	0	3	1	0	1731	0	1731	1571
Sub-total: Heavy Equipment	283	29	7	0	3	1	0	1731	0	1731	1571
Commuting Vehicles - Fugitive Dust	28	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	140	0	140	127
Sub-total: Commuting Vehicles	28	3	0	0	1	0	0	140	0	140	127
Total	311	32	7	0	4	1	0	1871	0	1871	1698
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.113. Total Annual Emissions from Renewable Energy Development - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO_2**	**CH_4**	**CO_2eq**	**CO2eqmetricTonnes**
Fugitive Dust	282	28	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	1	0	2	0	1	1	0	1899	0	1899	1723
Sub-total: Heavy Equipment	283	29	2	0	1	1	0	1899	0	1899	1723
Commuting Vehicles - Fugitive Dust	28	3	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	1	0	0	140	0	140	127
Sub-total: Commuting Vehicles	28	3	0	0	1	0	0	140	0	140	127
Total	311	32	3	0	2	1	0	2039	0	2039	1850

Table M.114. Total Annual Emissions from Road Maintenance Projects - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	18	17	11	2	1,331	638	64	7,961	8	8,128	7,376
Total	18	17	11	2	1,331	638	64	7,965	8	8,132	7,379

Table M.115. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,799	7	11,952	10,846
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.116. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,131	6	13,247	12,021

Table M.117. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,799	7	11,952	10,846
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.118. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	4	0	4	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,131	6	13,247	12,021

Table M.119. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,800	7	11,953	10,847
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.120. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,132	6	13,248	12,022

Table M.121. Total Annual Emissions from Road Maintenance Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	16	15	22	2	1,559	548	55	11,795	7	11,948	10,842
Total	17	15	22	2	1,559	548	55	11,800	7	11,953	10,847
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.122. Total Annual Emissions from Road Maintenance Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPsa**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Road Maintenance	0	0	0	0	0	0	0	5	0	5	4
Motorized Recreation	11	10	30	3	1,463	371	37	13,127	6	13,243	12,017
Total	11	10	30	3	1,463	371	37	13,132	6	13,248	12,022

Table M.123. Total Annual Emissions from Livestock Grazing Projects - Year 2005

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	7	0	7	6
Sub-total: Construction	0	0	0	0	0	0	0	7	0	7	6
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,246	7,483
Total	3	0	0	0	3	0	0	75	389	8,253	7,489

Table M.124. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	7	0	7	6
Sub-total: Construction	0	0	0	0	0	0	0	7	0	7	6
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,246	7,483
Total	3	0	0	0	3	0	0	75	389	8,253	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.125. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative A

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	0	0	0	0	0	7	0	7	6
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	7	0	7	6
Sub-total: Construction	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Fugitive Dust	0	0	0	0	3	0	0	68	0	68	62
Commuting Vehicles - Vehicle Exhaust	---	---	---	---	---	---	---		389	8,178	7,421
Enteric Fermentation and Manure	3	0	0	0	3	0	0	68	389	8,246	7,483
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	75	389	8,253	7,490
Total	80	8	4	0	86	4	0	1,818	1,187	26,742	24,267

Table M.126. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.127. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative B

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490

a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table M.128. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.129. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative C

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	68	0	68	62
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	68	389	8,247	7,483
Total	3	0	0	0	3	0	0	76	389	8,254	7,490

Table M.130. Total Annual Emissions from Livestock Grazing Projects - Year 2015 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	71	0	71	64
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	71	389	8,249	7,486
Total	3	0	0	0	3	0	0	78	389	8,257	7,493
a HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1											

Table M.131. Total Annual Emissions from Livestock Grazing Projects - Year 2024 - Alternative D

	Annual Emissions (Tons)										
Activity	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**SO2**	**CO**	**VOC**	**HAPs a**	**CO2**	**CH4**	**CO2eq**	**CO2eqmetricTonnes**
Heavy Equipment - Fugitive Dust	0	0	---	---	---	---	---	---	---	---	---
Heavy Equipment - Vehicle Exhaust	0	0	0	0	0	0	0	8	0	8	7
Sub-total: Construction	0	0	0	0	0	0	0	8	0	8	7
Commuting Vehicles - Fugitive Dust	3	0	---	---	---	---	---	---	---	---	---
Commuting Vehicles - Vehicle Exhaust	0	0	0	0	3	0	0	71	0	71	64
Enteric Fermentation and Manure	---	---	---	---	---	---	---		389	8,178	7,421
Sub-total: Operations and Maintenance	3	0	0	0	3	0	0	71	389	8,249	7,486
Total	3	0	0	0	3	0	0	78	389	8,257	7,493

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Appendix N. Buffalo Air Resource Management Plan

N.1. Introduction

N.1.1. Purpose

1. The purpose of this Air Resource Management Plan is to further clarify air quality goals, objectives, and management actions set forth in Table 2.4, "1000 PHYSICAL RESOURCES (PR) – AIR QUALITY (AQ)" (p. 58) of the Draft Resource Management Plan and Environmental Impact Statement (Draft RMP and EIS). This Air Resource Management Plan describes air resources management and outlines specific requirements for proponents of projects that have the potential to generate air emissions and impact air resources within the planning area. Where applicable, this Air Resource Management Plan refers to the goals and objectives found in Table 2.4, "1000 PHYSICAL RESOURCES (PR) – AIR QUALITY (AQ)" (p. 58) of the Draft RMP and EIS.

2. This Air Resource Management Plan may be modified as necessary to comply with law, regulation, and policy and to address new information and changing circumstances.

N.1.2. Authority for Air Resource Management

1. **Federal Land Policy and Management Act of 1976**. Federal Land Policy and Management Act (FLPMA) provides Bureau of Land Management's (BLM) basic operating authority. It establishes a unified, comprehensive, and systematic approach to managing and preserving public lands in a way that protects "the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." The BLM Air Resource Management Program, part of the BLM Soil, Water, and Air Program, coordinates and supports the BLM's efforts to manage air resources within its "multiple use" and "sustained yield" mission, as provided by FLPMA. FLPMA directs that in developing and revising its RMPs, the BLM shall provide for compliance with applicable air pollution control laws, including state and federal pollution standards or implementation plans.

2. **Clean Air Act of 1970**. The Clean Air Act (CCA) is the comprehensive federal law that provides for regulation of air emissions from stationary and mobile sources, national ambient air quality standards (NAAQS) to protect public health and public welfare, and protection of visibility in relatively pristine areas such as Class I[1] national parks and wilderness areas. The CAA prescribes the measures that the United States (U.S.) Environmental Protection Agency (EPA) and other federal agencies and state, local, and tribal governments must take in order to regulate air pollution and achieve air quality that meets the NAAQS. In its RMPs and implementing authorizations, the BLM provides for compliance with the CAA and other pollution control laws. The CAA also requires that federal land managers responsible for lands within Class I areas protect the air quality related values of those areas.

[1]Class I is a CAA designation that affords certain areas the strictest air quality protection. Areas include some wilderness areas, national parks, and Native American reservations. See Section 1.3 paragraph 5 for additional information.

The Wyoming Department of Environmental Quality (WDEQ) Air Quality Division (AQD) has been delegated authority by the EPA to implement federal programs of the CAA. The WDEQ AQD is responsible for managing air quality through the Wyoming Air Quality Standards and Regulations and the Wyoming State Implementation Plan.

3. **Wilderness Act of 1964**. The Wilderness Act is the general legal authority for Congress to designate and for agencies to manage wilderness. Today, wilderness is designated for a variety of benefits, including clean air. The uses of wilderness include protection of air and watersheds; maintenance of soil and water quality, ecological stability, plant and animal gene pools, protection of archaeological and historical sites, habitat for wildlife; and livestock grazing. Wilderness provides opportunities for outdoor recreation and also provides for the exercise of valid existing rights such as water rights, mining claims, mineral leases, and rights-of-way. The majority of BLM Wilderness Areas allow some degradation of air quality associated with moderate industrial and population growth. The CAA allows States to require that Wilderness Areas meet a more stringent air quality standard using normal state processes.

   Minerals in wilderness are withdrawn from all forms of appropriation under the mining laws and from disposition under mineral leasing laws. Prior existing claims or leases with valid existing rights may be developed, though mineral development within wilderness is rare. The BLM as a Federal Land Manager analyzes potential impacts to designated Class II[2] wilderness areas, national parks and monuments.

4. **National Environmental Policy Act**. The National Environmental Policy Act (NEPA) establishes a public, interdisciplinary framework for federal decision-making and ensures that the BLM and other federal agencies take environmental factors into account when considering federal actions. The BLM uses the NEPA process to analyze potential impacts of its proposed actions on air and other resources and to consider appropriate measures to mitigate adverse impacts.

5. **Air Quality Memorandum of Understanding**. In June 2011, the U.S. Department of Agriculture, U.S. Department of the Interior (DOI), and the EPA signed the Memorandum of Understanding (MOU) Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the NEPA Process. This MOU outlines an approach to the analysis of impacts to air quality and air quality related values, such as visibility in Class I and sensitive Class II areas, in connection with oil and gas development on federal lands, and identifies a path to protect air quality while allowing for oil and gas development on federally managed lands.

N.1.3. Background

1. Preparation of the Analysis of the Management Situation in 2009 disclosed that extensive energy development within the planning area, especially coal and fluid minerals, leads to dust, emissions, and other air quality impacts.

[2] Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (Wyoming Ambient Air Quality Standards and NAAQS). See Section N.1.3 paragraph 5 for additional information.

2. Monitoring air quality and establishing background concentrations can help to characterize changes over time. Table N.1, "National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area" (p. 2071) displays the applicable primary NAAQS and Wyoming Ambient Air Quality Standards (WAAQS) and representative maximum pollutant concentrations for the planning area, based on monitoring data. Figure N.1, "Representative Maximum Pollutant Concentrations in the Planning Area as Percentage of NAAQS" (p. 2072) displays the representative maximum pollutant concentrations values from Table N.1, "National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area" (p. 2071) as percentages of the NAAQS. These representative concentrations indicate the status of air quality conditions within the planning area relative to the standards. These data indicate that ozone (O_3) concentrations are at least 75% of the NAAQS; therefore, O_3 is the primary pollutant of concern in the planning area.

   Existing visibility from Interagency Monitoring of Protected Visual Environments (IMPROVE) stations in the planning area are shown in Section 3.1 for the Thunder Basin site (Figure 3.13, "Annual Visibility (SVR) for the Thunder Basin IMPROVE Site" (p. 212)) and the Cloud Peak site (Figure 3.14, "Annual Visibility (SVR) for the Cloud Peak IMPROVE Site" (p. 213)). Visibility data from the Badlands IMPROVE site outside the planning area are also included (Figure 3.17, "Annual Visibility (SVR) for the Badlands National Park IMPROVE Site" (p. 216)). Data from these sites indicate good visibility in the planning area.

Table N.1. National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area

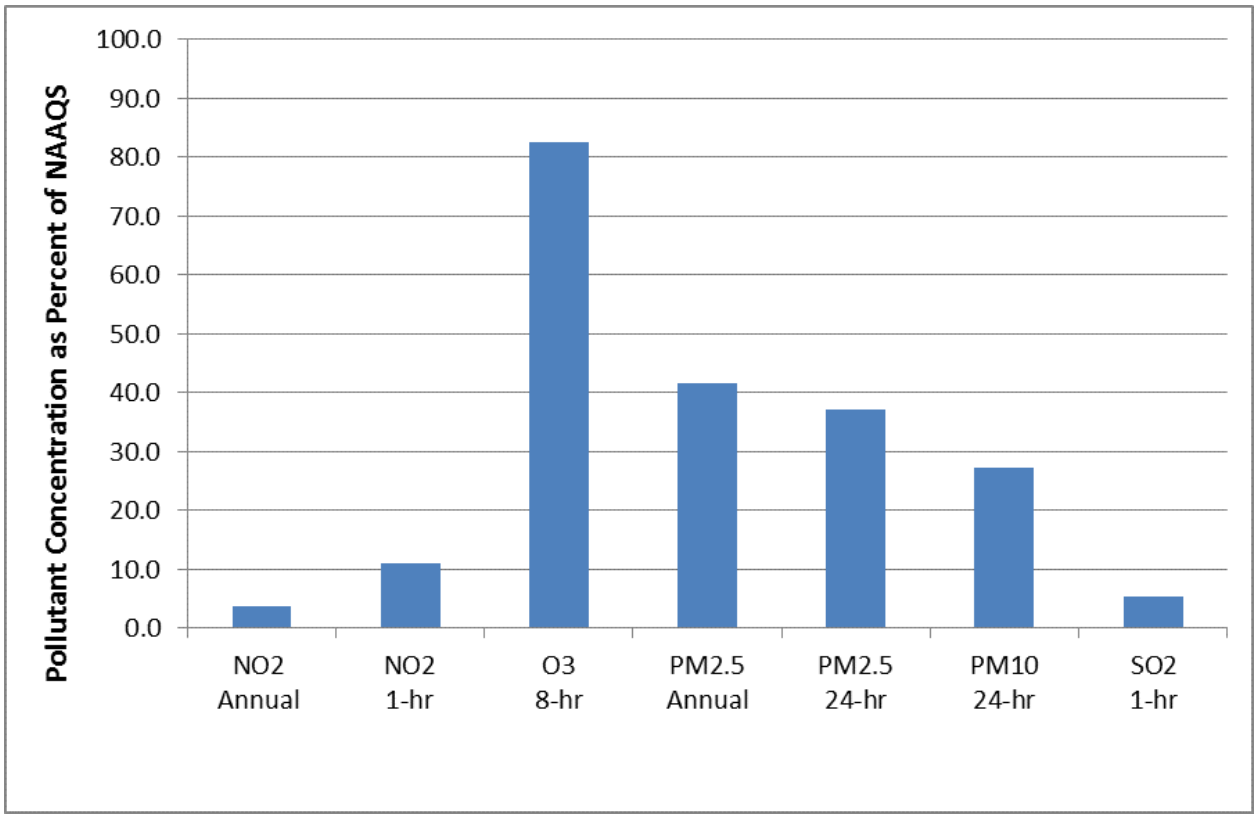
Pollu-tant	Averag-ing Time	NAAQS			WAAQS			Representative Concentrations		
		(ppm)	(ppb)	(µg/m³)	(ppm)	(ppb)	(µg/m³)	(ppm)	(ppb)	(µg/m³)
Carbon Monox-ide	1 hour [1]	35	35,000	40,000	35	35,000	40,000	0.77	800	920
	8 hour [1]	9	9,000	10,000	9	9,000	10,000	0.5	500	575
Nitrogen Dioxide	1 hour [2]	0.10	100	188	0.10	100	188	0.011	11	21
	Annual [3] (Arith-metic Mean)	0.053	53	100	0.053	53	100	0.002	2.0	4
Ozone	8 hour[4]	0.075	75	147	0.075	75	147	0.062	62	122
PM_{10}	24 hour [5]	N/A	N/A	150	N/A	N/A	150	N/A	N/A	41
	Annual [6]	N/A	N/A	N/A	N/A	N/A	50	N/A	N/A	11
$PM_{2.5}$	24 hour [7]	N/A	N/A	35	N/A	N/A	35	N/A	N/A	13
	Annual [8]	N/A	N/A	12	N/A	N/A	15	N/A	N/A	5.3

Pollu-tant	Averag-ing Time	NAAQS			WAAQS			Representative Concentrations		
		(ppm)	(ppb)	(µg/m³)	(ppm)	(ppb)	(µg/m³)	(ppm)	(ppb)	(µg/m³)
Sulfur Dioxide	1 hour [9]	0.075	75	195	0.075	75	195	0.004	4	10.5
	24-hour[10]	N/A	N/A	N/A	N/A	N/A	N/A	0.02	20	52
	Annual[11]	N/A	N/A	N/A	N/A	N/A	N/A	0.000	0	0

Source: BLM 2004c

[1] Not to be exceeded more than once per year. Data (2nd high) collected at Yellowstone National Park during 2011.
[2] To attain this standard, the 3-year average of the 98th percentile of 1-hour concentrations at each monitor within an area must not exceed 100 ppb. 3-year average of the 98th percentile 1-hour concentrations for Thunder Basin 2009 - 2011.
[3] To attain this standard, the annual average concentration in the calendar year must be less than or equal to 53 ppb. Thunder Basin annual average concentration for 2011.
[4] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 75 ppb. Design value (2009-2011) for the Thunder Basin National Grasslands site.
[5] Not to be exceeded more than once per year on average over 3 years. 2011 max PM10 concentration at Campbell County Air Quality Monitoring Station. Data Source: EPA's Air Quality System (AQS) Quick Look Report (AQS ID: 56-005-0456-81102)
[6] To attain this standard, the 3-year average of the annual means must be below 50 ug/m3. 3-year average of the weighted annual mean PM10 concentration at Campbell County Air Quality Monitoring Station. Data Source: EPA's AQS Quick Look Report (AQS ID: 56-005-0456). Years 2009-2011.
[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor in an area must not exceed 35 µg/m3. 3-year average of the 98th percentile of the 24-hour PM2.5 concentration at Highland Park, Sheridan Air Quality Monitoring Station. Data Source: EPA's Air Quality System (AQS) Quick Look Report (AQS ID: 56-033-0003-88101). Years 2009-2011
[8] To attain this standard, the 3-year average of the annual mean concentrations from single or multiple community-oriented monitors must not exceed 12.0 µg/m3. 3-year average annual mean PM2.5 concentration at Highland Park, Sheridan Air Quality Monitoring Station. Data Source: EPA's Air Quality System (AQS) Quick Look Report (AQS ID: 56-033-0003-88101). Years 2009-2011
[9] To attain this standard, the 3-year average of the 99th percentile of 1-hour concentrations at each monitor within an area must not exceed 100 ppb. 3-year average of the 99th percentile 1-hour concentrations for Wyoming Refinery, Newcastle, WY site for 2009 - 2011.
[10] 2011 max SO2 concentration at Cheyenne NCore Air Quality Monitoring Station. Data Source: EPA's Air Quality System (AQS) Quick Look Report (AQS ID: 56-021-0100-42401)
[11] 2011 max SO2 concentration at Cheyenne NCore Air Quality Monitoring Station. Data Source: EPA's Air Quality System (AQS) Quick Look Report (AQS ID: 56-021-0100-42401)
N/A – not applicable
NAAQS – National Ambient Air Quality Standards
$PM_{2.5}$ – particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
PM_{10} – particulate matter with an aerodynamic diameter equal to or less than 10 microns
ppm – parts per million
ppb – parts per billion
µg/m³ – micrograms per cubic meter
WAAQS – Wyoming Ambient Air Quality Standards
WARMS – Wyoming Air Resource Monitoring System

Data for representative concentrations provided by the WDEQ-AQD, April 2013.



Source: WARMS 2013

Note: The representative maximum pollutant concentrations as a percentage of the NAAQS were calculated using the values in Table N.1, "National and State Primary Air Quality Standards for Criteria Pollutants and Representative Concentrations for the Planning Area" (p. 2071), which also provides the location and time period associated with monitoring data.

Figure N.1. Representative Maximum Pollutant Concentrations in the Planning Area as Percentage of NAAQS

3. Consistent with the monitoring strategy of Management Action AQ-1002, the BLM Wyoming operates the Wyoming Air Resource Monitoring System (WARMS), a network of six air quality monitoring sites located throughout the state. Four of these sites are located in the planning area and two sites are located near the planning area – these sites are listed in Table N.2, "WARMS Network in and Near the Planning Area" (p. 2074) along with location, parameters monitored, and monitored $PM_{2.5}$ concentrations. These sites also monitor hourly meteorological conditions including wind speed, wind direction, temperature, relative humidity, solar radiation, precipitation, and barometric pressure. The purpose of the WARMS network is to provide a general indicator of existing air quality and long term trends in air quality; it is not intended for use in determining NAAQS compliance. As shown in Table N.2, "WARMS Network in and Near the Planning Area" (p. 2074), annual mean $PM_{2.5}$ values are below the NAAQS of 12 micrograms per cubic meter ($\mu g/m^3$) and the 98th percentile 24-hour average concentrations for any given year are below the NAAQS of 35 $\mu g/m^3$. The only WARMS monitor in Table N.2, "WARMS Network in and Near the Planning Area" (p. 2074) for which O_3 data are available is the Basin monitor, which recorded a maximum 8-hour average of 0.061 parts per million (ppm) in 2011 and 0.065 ppm in 2012, both of which are below the NAAQS of 0.075 ppm.

4. Two WARMS sites outside the planning area include the Basin site located approximately 40 miles west of the planning area and the Newcastle site located approximately 43 miles east of the planning area (Table N.2, "WARMS Network in and Near the Planning Area" (p. 2074)). These sites were upgraded in 2012 to be fully compliant with, and part of, the Clean Air Status and Trends Network (CASTNET) system supported by the EPA (Sheridan and Buffalo sites are also part of the CASTNET system). CASTNET provides long-term monitoring of air quality in rural areas to determine trends in regional atmospheric nitrogen, sulfur, and O_3 concentrations and dry deposition fluxes of sulfur and nitrogen pollutants in order to evaluate the effectiveness of national and regional air pollution control programs.

Table N.2. WARMS Network in and Near the Planning Area

Site	Approximate Location	Parameters Monitored			$PM_{2.5}$ Concentrations (ug/m^3)					
					2010		2011		2012	
		Speciated Aerosol (weekly)	$PM_{2.5}$ (1-hour)	Ozone (1-hour)	Annual Mean	24-hour 98th Percentile	Annual Mean	24-hour 98th Percentile	Annual Mean	24-hour 98th Percentile
In Planning Area										
Buffalo	30 miles SE of Buffalo	x	x		3.0	9	2.5	9	3.3	11
Fortification Creek	10 miles N of Gillette	x	x		-- [1]	--	--	--	--	--
Sheridan	In Sheridan	x	x	x[2]	1.5	9	1.5	11	3.0	16
South Coal	50 miles NNW of Gillette		x		0.8	6	0.8	10	1.8	14
Outside Planning Area										
Basin	40 miles W of Planning Area	x	x	x	--[3]	--	--	--	1.0	10
Newcastle	43 miles E of Planning Area	x	x	x[4]	0.3	4	0.5	4	4.0/0.8[5]	8/8[5]

[1] Fortification Creek is scheduled for installation Spring 2013; thus historic data not available.
[2] Sheridan did not start O_3 monitoring until January 2013; thus historic O_3 data not available.
[3] Basin did not monitor for $PM_{2.5}$ until upgraded to CASTNET status in late 2012; thus historic data not available.
[4] Newcastle did not start O_3 monitoring until late 2012; thus historic O_3 data not available.
[5] In 2012, an E-BAM replaced an e-sampler; data are provided from both monitors.
CASTNET Clean Air Status and Trends Network
E East
N North
NNW North northwest
O_3 Ozone
$PM_{2.5}$ particulate matter with an aerodynamic diameter equal to or less than 2.5 microns
µg/m^3 micrograms per cubic meter
SE Southeast
W West

5. The CAA Prevention of Significant Deterioration (PSD) program protects air quality in areas where the air is clean and the area is in attainment or unclassifiable with respect to NAAQS. The PSD program is a permitting program that, in Wyoming, is implemented by the WDEQ AQD. PSD is designed to protect clean air so it does not significantly deteriorate, while a margin for future industrial growth is maintained. Under the PSD program, each area in the United States is classified according to the following system:
   - **PSD Class I Areas** – Areas with pristine air quality, such as wilderness areas, national parks, and some Native American reservations, are accorded the strictest protection. Only very small incremental increases in pollutant concentrations are allowed in order to maintain the very clean air quality in these areas. Wilderness areas greater than 5,000 acres (and national parks greater than 6,000 acres) that had been established before August 7, 1977 were designated by the CAA as mandatory class I areas.
   - **PSD Class II Areas** – Essentially, all areas that are not designated as Class I are designated as Class II. Moderate incremental increases in pollutant concentrations are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS). Some Class II areas are federally-managed Class II wilderness areas, which are afforded additional air quality protection under the Wilderness Act beyond that provided by CAA.
   - **PSD Class III Areas** – No areas have been designated yet as Class III. A larger incremental increase in pollutant concentrations would be allowed, up to the applicable WAAQS and NAAQS.

   Class I areas near the planning area include: the Northern Cheyenne Indian Reservation[3] (25 miles north), the North Absaroka Wilderness Area (75 miles west), the Washakie Wilderness Area (96 miles west), Yellowstone National Park (97 miles west), Wind Cave National Park (80 miles east), and Badlands National Park (110 miles east).

N.1.4. Characterization of Air Resources in the Environmental Impact Statement

1. Emissions Inventory for Land Use Planning

   a. An air emissions inventory was compiled for the planning area to determine the relative magnitude of total air pollutant emissions and to compare emissions between alternatives. This emissions inventory is summarized in Appendix M (p. 1827). Emissions were calculated using assumptions about the likelihood of potential future activities occurring under each alternative. As a result, the compiled air emissions inventory represents a comparison of emissions of air pollutants based on best available information for future development projections. The methods and assumptions used in compiling the emissions inventory are provided in Chapter 4, Section 4.1.1.1, as well as Appendix M (p. 1827) which lists emissions generating activities and includes additional details on the computational methods (Appendix M (p. 1827), Section 5).

   b. The emissions inventory is valuable for contrasting the impact of land use allocations on air resources among alternatives and useful for identifying those activities that are likely to be major contributors of emissions.

[3]The Northern Cheyenne Indian Reservation received EPA redesignation approval on August 5, 1977, to become a Class I area under the PSD program (40 Code of Federal Regulations 52.1382(c)(2)).

c. The air emissions inventory supports two major conclusions: (1) for the majority of the pollutants examined, emissions are estimated to increase compared to baseline levels for all alternatives except Alternative B, and (2) oil and gas development activities and mining (primarily coal) are the largest contributors to total emissions compared to other managed activities in the planning area.

2. Class I Areas

a. There are no Class I areas within the planning area. The nearest Class I areas include the Northern Cheyenne Indian Reservation[3] (25 miles north), the North Absaroka Wilderness Area (75 miles west), the Washakie Wilderness Area (96 miles west), Yellowstone National Park (97 miles west), Wind Cave National Park (80 miles east), and Badlands National Park (110 miles east). See Table 3.4, "Class I and Class II Areas in or near the Buffalo Planning Area" (p. 211) in Chapter 3 for a list of Class I and federally-managed Class II areas in or near the planning area.

Though not located in Class I areas, there are two IMPROVE sites in the planning area: Cloud Peak (western region of the planning area) and Thunder Basin (eastern region of the planning area). A third IMPROVE site is located in the Northern Cheyenne Indian Reservation Class I area, approximately 45 miles from the northern boundary of the planning area. Visibility estimates for these locations, as well as the Badlands, are shown in Chapter 3.

N.2. Air Resource Management Plan

N.2.1. Coal Lease by Application

1. The WDEQ and DOI Office of Surface Mining Reclamation and Enforcement (OSM) have the permitting oversight and authority to mitigate air quality or land quality issues for a coal mining operation. The BLM does not stipulate any specific air quality or land quality permitting requirement for a coal lease, but requires lessees to comply with all applicable state and federal laws. A BLM EIS for a coal mining operation will analyze the potential effects to air quality, but any mitigation will be a requirement of the WDEQ through its permitting process.

2. The WDEQ AQD administers a permitting program to assist in managing the state's air resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit to construct. Coal mines fall into this category.

3. A new coal mine, or a modification to an existing mine, must be permitted by WDEQ AQD, pursuant to the provisions of Wyoming Air Quality Standards and Regulations Chapter 6, Section 2. Under these provisions, a permittee must compile detailed emissions inventories and demonstrate compliance with all applicable aspects of Wyoming Air Quality Standards and Regulations, including compliance with WAAQS and NAAQS, before either a permit or amendment is granted.

4. A Best Available Control Technology (BACT) analysis is required to demonstrate the use of an appropriate level of emissions controls. Per Wyoming Air Quality Standards and Regulations Chapter 6, Section 2, BACT at large mining operations typically includes, but

is not limited to: the paving of access roads; the treating of major haul roads with a suitable dust suppressant; the treatment of temporary haul roads; the use of silos, trough barns, or similar enclosed containers for the storage of large volumes of material awaiting load out and shipment; and the treatment of active work areas.

N.2.2. Mineral and Energy Development Authorizations

1. The BLM manages the location, density, and/or rate of development to protect air resources.

2. When reviewing a proposed project, the BLM will consider the magnitude of potential air emissions from the project, existing air quality conditions, proximity to Class I and sensitive Class II areas, and issues identified during project scoping to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the project.

3. The BLM will require an emissions inventory, as set forth in the MOU, for proposed oil and gas development projects that are analyzed through an EIS. The BLM may require an emissions inventory for proposed oil and gas or mineral development projects that are analyzed through an Environmental Assessment, and may require project specific air quality modeling (see Management Action AQ-1006) depending on project characteristics, proximity to a federally mandated Class I area, sensitive Class II area, or population center, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping. The emissions inventory will quantify emissions of regulated air pollutants from all sources related to the proposed project, and emissions impacting Class I areas, including fugitive emissions and greenhouse gas emissions. Emissions will be estimated for each year for the life of the project. The BLM will use this estimated emissions inventory to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the proposed project. This information will inform monitoring (see Section N.2.3 Monitoring), modeling (see Section N.2.4 Modeling) and mitigation (see Section N.2.5 Mitigation).

4. The BLM has the responsibility to implement the decisions of the RMP in a manner that protects air quality. The BLM also must recognize valid and existing leasing rights. At the project approval stage, the BLM can require specific actions and measures to protect air quality based on expected impacts (Management Actions AQ-1003 and AQ-1005). The BLM may require additional mitigation measures within its authority for emissions sources not otherwise regulated by WDEQ (see Section N.2.5 paragraph 2).

5. The proponent of a mineral and/or energy development project will be required to provide a detailed description of operator committed measures to reduce project related air pollutant emissions including greenhouse gases and fugitive dust. Project proponents for oil and gas development projects should refer to Table N.3, "Sample Emission Reduction Strategies for Oil and Gas Development Projects" (p. 2080) as a reference for potential mitigation technologies and strategies. The list is not intended to preclude the use of other effective air pollution control technologies that may be proposed. Details of the mitigation measure would be submitted by the applicant and enforced as a condition of the BLM-issued authorization.

6. The BLM, in determining the suitability of the operator committed measures required in Section 2.2 paragraph 5, will take into account proximity to a federally mandated Class I

area, sensitive Class II area, or population centers, location within a non-attainment or maintenance area, meteorologic or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during project scoping.

N.2.3. Monitoring

1. As part of a comprehensive Air Resource Management Plan for the planning area, the BLM will continue to work cooperatively with federal and state agencies responsible for managing air resources to determine, characterize, and track air resource conditions (Management Action AQ-1002 and AQ-1004). BLM will cooperate with efforts of the WDEQ to evaluate monitored exceedances. WDEQ has authority and primacy for regulating and monitoring air quality within the state, including determining causes of monitored exceedances of NAAQS and WAAQS.

2. The BLM will support and participate in regional monitoring efforts to meet Management Action AQ-1002.

N.2.4. Modeling

1. Air dispersion and photochemical grid models are useful tools for predicting project specific impacts to air quality, predicting the potential effectiveness of control measures and strategies, and for predicting trends in regional concentrations of some air pollutants.

2. BLM may require project proponents to conduct air quality modeling based on the absence of sufficient data to ensure compliance with laws and regulations or to determine the effectiveness of mitigation options. The BLM will decide whether far-field modeling is required to support the NEPA analysis for an oil and gas project in accordance with the MOU, based on existing air quality conditions; magnitude of potential air emissions from the project or activity; magnitude of existing emission sources in the area; proximity to a federally mandated Class I area, sensitive Class II area, an area expected to exceed a NAAQS or PSD increment or population center; location within a non-attainment or maintenance area; meteorologic or geographic conditions; project duration; or issues identified during project scoping (Management Action AQ-1006). BLM will require project-specific near field modeling or apply a similar analysis completed for a nearby project, if, after reviewing a proposed project's emission inventory, BLM determines that the project may cause significant near field impacts.

3. BLM will leverage data from current and future modeling efforts being conducted in the region (such as Powder River Basin Coal Review II, Moneta Divide, and other proposed projects that will analyze cumulative impacts with a photochemical grid model) to assess the air quality and air quality related values within the Buffalo Field Office. When results from these types of modeling analyses are used to evaluate impacts within the planning area, BLM will ensure that direct emissions from BLM's management actions within the Buffalo planning area are included in the particular analysis. Pending completion of these modeling analyses, the BLM, in cooperation with an interagency review team, will evaluate impacts from proposed federal actions within the planning area and identify and evaluate, in cooperation with WDEQ to whom EPA has delegated authority for regulating air quality in Wyoming, the need for additional emission mitigation measures or the need for a more refined modeling analysis.

4. Consistent with Management Action AQ-1004, the BLM will support and participate in regional modeling efforts through multi-state and/or multi-agency organizations such as Western Governors' Association – Western Regional Air Partnership, and the Federal Leadership Forum. If results from an interagency, regional modeling study are used to evaluate impacts within the planning area, the BLM will ensure that direct emissions from BLM's management actions within the region are included in the study.

5. The use of modeling to identify appropriate protection measures is more effective at the project approval stage rather than the leasing stage because the proposed action has been defined in terms of temporal and spatial characteristics as well as development processes and procedures. This better defined information allows more precise identification of impacts to air quality and appropriate level of mitigation.

N.2.5. Mitigation

1. Many of the activities that BLM authorizes, permits, or allows generate air pollutant emissions that have the potential to impact air quality. The primary mechanisms to reduce air quality impacts are to reduce emissions through strategies such as controlling the rate of development, or by implementation of mitigations such as use of emissions control technology.

2. The proponent of a project will be required to reduce air pollutant emissions by complying with all applicable state and federal regulations (including application of BACT) and may be required to apply additional mitigation and other control technologies or strategies.

3. BLM will ensure implementation of additional air emission control measures and strategies within its regulatory authority and in consultation with federal and state agencies responsible for managing air resources, if:

    a. proposed or committed measures are insufficient to achieve air quality goal PR:1 and objectives PR:1.1, PR:1.2, PR:1.3, and PR:1.4 and Management Action AQ-1003; or

    b. an air quality impact analysis shows that future impacts likely will be above acceptable levels; or

    c. a BLM-authorized source caused or contributed to a monitored exceedance of the NAAQS as determined by WDEQ, in consultation with BLM.

Mitigation may include reduction in the number of locations, density, and/or rate of development, or other measures. Example mitigation strategies for oil and gas development activities are presented in Table N.3, "Sample Emission Reduction Strategies for Oil and Gas Development Projects" (p. 2080).

Table N.3. Sample Emission Reduction Strategies for Oil and Gas Development Projects

Emission Reduction Measure	Advantages and Disadvantages
Control Strategies for Drilling and Compression	
Directional or Horizontal Drilling	May reduce construction related emissions (dust and vehicle and construction equipment emissions). Decreases surface disturbance and vegetation impacts (dust and carbon dioxide and nitrogen flux). Reduces habitat fragmentation. Applicability depends on geologic strata. May result in higher air impacts in one area with longer sustained drilling times.
Improved engine technology (Tier 2 or better) for diesel drill rig engines.	Can reduce oxides of nitrogen (NO_x), particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC) emissions. Use depends on availability of technology from engine manufacturers.
Selective Catalytic Reduction (SCR) for drill rig engines and/or compressors.	NO_x emissions reduction, potential decreased formation of visibility impairing compounds and ozone (O_3). NO_x control efficiency of 95% achieved on drill rig engines. NO_x emission rate of 0.1 (grams per horsepower per hour (g/hp-hour) achieved for compressors. Potential ammonia (NH_3) emissions and formation of visibility impairing ammonium sulfate. Regeneration/disposal of catalyst can produce hazardous waste. Not applicable to 2-stroke engines.
Non-selective catalytic reduction (NSCR) for drill rig engines and/or compressors.	NO_x emissions reduction, potential decreased formation of visibility impairing compounds and O_3. NO_x control efficiency of 80-90% achieved for drill rig engines. NO_x emission rate of 0.7 g/hp-hour achieved for compressor engines greater than 100 hp. Regeneration/disposal of catalysts can produce hazardous waste. Not applicable to lean burn or 2-stroke engines.
Natural gas fired drill rig engines and/or compressors.	NO_x emissions reduction, potential decreased formation of visibility impairing compounds and O_3. Requires onsite processing of field gas.
Electrification of drill rig engines and/or compressors.	Decreased emissions at the source. Transfers emissions to more efficiently controlled source (EGU). Depends on availability of power and transmission lines. Displaces emissions to electric generating unit (EGU).
Improved engine technology (Tier 2 or better) for all mobile and non-road diesel engines.	Reduced NO_x, PM, CO, and VOC emissions. Dependent on availability of technology from engine manufacturers.
Green (a.k.a. closed loop or flareless) completions and green workovers.	Reduction in VOC and methane emissions. Reduces or eliminates flaring and venting and associated emissions. Reduces or eliminates open pits and associated evaporative emissions. Increased recovery of gas to pipeline rather than atmosphere. Temporary increase in truck traffic and associated emissions. Need adequate pressure and flow. Need onsite infrastructure (tanks/dehydrator). Sales line must be available. Green completion permits required by Wyoming best available control technology (BACT) in some areas.

Emission Reduction Measure	Advantages and Disadvantages
Minimize/eliminate venting and/or use closed loop process where possible during "blow downs." Utilize plunger lift systems with smart automation.	Same as above. Best Management Practices required by Wyoming BACT.
Reclaim/remediate existing open pits, no new open pits.	Reduces VOC and greenhouse gas (GHG) emissions. Reduces potential for soil and water contamination. Reduces odors. Requires tank and/or pipeline infrastructure. May increase truck traffic and associated emissions.
Electrification of wellhead compression/pumping	Reduces local emissions of fossil fuel combustion and transfers to more easily controlled source. Depends on availability of power and transmission lines. Displaces emissions to EGU.
Seasonally reducing or ceasing drilling during specified periods, or using only lower-emitting drill and completion rig engines during specified time periods. Restrict drilling and/or blowdown activity based on meteorological conditions.	Reduces emissions during periods when emissions are more likely to have impact in local area or at sensitive receptors.
Control Strategies Utilizing Centralized Systems	
Centralization (or consolidation) of gas processing facilities (separation, dehydration, sweetening, etc.).	Reduces vehicle miles traveled (truck traffic) and associated emissions. Reduced VOC and GHG emissions from individual dehy/separator units. Requires pipeline infrastructure. Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts.
Liquids gathering systems (for condensate and produced water).	Reduces vehicle miles traveled and associated emissions. Reduced VOC and GHG emissions from tanks, truck loading/unloading, and multiple production facilities. Requires pipeline infrastructure. Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts.
Water and/or fracturing liquids delivery system, including centralized (“hub and spoke”) hydraulic fracturing.	Reduced long term truck traffic and associated emissions. Requires pipeline infrastructure. Not feasible for some terrain. Temporary increase in construction associated emissions. Higher potential for pipe leaks/groundwater impacts.
Control Strategies for Tanks, Separators, and Dehydrators	
Capture and control of flashing emissions from all storage tanks and separation vessels with vapor recovery and/or thermal combustion units.	Reduces VOC and GHG emissions. 98% VOC control if greater than or equal to 10 tons per year (TPY) required statewide by Wyoming BACT. Pressure build up on older tanks can lead to uncontrolled rupture.
Capture and control of produced water tank emissions.	Reduces VOC and GHG emissions. 98% VOC control and no open top tanks required by Wyoming Department of Environmental Quality in some areas.
Capture and control of dehydration equipment emissions with condensors, vapor recovery, and/or thermal combustion.	Reduces VOC, HAP, and GHG emissions. Still vent condensors required and 98% VOC control if greater than or equal to 8 TPY required statewide and in concentrated development area by Wyoming BACT. All dehy emissions controlled at 98% in Jonah Pinedale Anticline Development (no 8 TPY threshold).
Control Strategies for Misc. Fugitive VOC Emissions	

Emission Reduction Measure	Advantages and Disadvantages
Install and maintain low VOC emitting seals, valves, hatches on production equipment.	Reduces VOC and GHG emissions.
Initiate an equipment leak detection and repair program (including use of Forward Looking Infrared Radiometer cameras, grab samples, organic vapor detection devices, visual inspection, etc.), such as an enhanced direct inspection and maintenance program.	Reduction in VOC and GHG emissions.
Install or convert gas operated pneumatic devices and pumps to electric, solar, or instrument (or compressed) air driven devices/controllers.	Reduces VOC and GHG emissions. Required statewide by Wyoming BACT if no thermal combustion used. Electric or compressed air driven operations can displace or increase combustion emissions. Increase in noise due to compressor.
Use "low" or "no bleed" gas operated pneumatic devices/controllers.	Reduces VOC and GHG emissions. Closed loop required statewide by Wyoming BACT.
Use closed loop system or thermal combustion for gas operated pneumatic pump emissions.	Reduces VOC and GHG emissions. Required statewide by Wyoming BACT (98% VOC control or closed loop).
Install vapor recovery on truck loading/unloading operations at tanks.	Reduces emissions of VOC and GHG emissions. Wyoming BACT analysis required if VOC greater than or equal to 8 TPY or HAP greater than or equal to 5 TPY. Pressure build up on older tanks can lead to uncontrolled rupture.
Control Strategies for Fugitive Dust and Vehicle Emissions	
Unpaved surface treatments including watering, chemical suppressants, and gravel.	20% - 80% control of fugitive dust (particulates) from vehicle traffic. Potential impacts to water and vegetation from runoff of suppressants.
Use remote telemetry and automation of wellhead equipment.	Reduces vehicle traffic and associated emissions.
Speed limit control and enforcement on unpaved roads, and design of roads to reduce speed.	Reduction of fugitive dust emissions.
Reduce commuter vehicle trips through car pools, commuter vans or buses, innovative work schedules, or work camps.	Reduced combustion emissions, reduced fugitive dust emissions, reduced O_3 formation, reduced impacts to visibility.
Miscellaneous Control Strategies	
Use of ultra-low sulfur diesel in engines, compressors, construction equipment, etc.	Reduces emissions of particulates and sulfates. Fuel not readily available in some areas.
Reduce vehicle idling.	Reduced combustion emissions, reduced O_3 formation, reduced impacts to visibility, reduced fuel consumption. May not be feasible in remote locations where leaving vehicle in operation is a safety precaution.
Reduced density or rate of development.	Peak emissions of all pollutants reduced. May not be economically viable or feasible if multiple mineral interests. Emissions generated at a lower rate but for a longer period. Limited operating period, duration of impacts is longer.
Restrict construction activity based on meteorological conditions.	Reduces emissions during periods when emissions are more likely to have impact in local area or at sensitive receptors.

CO	Carbon monoxide
NO_X	Nitrogen oxide

PM	Particulate Matter

BACT Best Available Control Technology

CO Carbon monoxide

EGU Electric Generating Unit

G/HP-houre Grams per Horsepower per Hour

GHG Greenhouse Gas

NH_3 Ammonia

NO_X Nitrogen oxide

NSCR Non-Selective Catalytic Reduction

O_3 Ozone

PM Particulate Matter

SCR Selective Catalytic Reduction

TPY Tons per Year

VOC Volatile Organic Compound

N.2.6. Contingency Plans

1. If observed effects (e.g., monitored exceedances of the NAAQS) or modeled impacts show state or federal regulatory standards or applicable thresholds for air quality related values may be exceeded, BLM may require mitigation measures within BLM's authority to ensure conformance with RMP air quality goals and objectives. For example, the BLM may manage the location, density and rate of development, or require smaller-emission projects to demonstrate compliance with standards or applicable thresholds.

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Appendix O. Reclamation Policy for the Buffalo Field Office

Introduction

Reclamation is required for any surface-disturbing activity occurring as part of a federal action. A reclamation plan appropriate in detail and complexity and tailored to a specific surface-disturbing activity will be required for each activity. This appendix details the reclamation objectives and standards necessary to achieve a timely and proper recovery according to management objects of the disturbed site.

Wyoming Bureau of Land Management (BLM) Reclamation Policy, Instruction Memorandum (IM), No. WY-2012-032 (BLM 2012i) states "A reclamation plan shall be developed for all surface disturbing activities and will become part of the proposed action in the National Environmental Policy Act document." This policy was developed by the BLM and the State of Wyoming to ensure the following: uniform application of exploration, development, and reclamation standards; ensure prompt reclamation of lands to productive uses consistent with land management policies; shall integrate appropriate disciplines in the natural sciences, engineering and design arts in establishing criteria for reclaiming disturbed land, reviewing reclamation plans, and monitoring reclamation activities; shall assist in the identification of information needs that can be provided by research and encourage research projects to provide such information; utilize the best available information in developing and reviewing reclamation plans.

This appendix will address specific resources and impacts that the Buffalo Resource Management Plan (RMP) (BLM 1985c) and Powder River Basin Final Environmental Impact Statement (BLM 2003c) could not cover due to the high variability of soils and soils issues throughout the planning area. For more information on soils within the planning area see the *Soils* section in Chapter 3.

In preparing and reviewing reclamation plans, the BLM and the project proponent will adhere to Wyoming Reclamation Policy and *BLM's Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development "The Gold Book"* (BLM 2006f). As such a reclamation plan must set reasonable, achievable, and measurable reclamation goals which are consistent with the established land use plans. Advances in reclamation techniques will be incorporated into the plan through maintenance actions.

Background

The reclamation plan will provide a framework to develop project and site-specific reclamation actions and guide land management efforts toward a planned future condition for any surface disturbance. Early coordination between the BLM and project proponent is necessary to produce a comprehensive plan. The approved reclamation plan will serve as a binding agreement between the project proponent and the BLM for the expected reclamation condition of the disturbed lands and must be periodically reviewed and modified as necessary. The proponent will develop the reclamation plan, with appropriate BLM involvement in preplanning, data inventory, and approval. This is essential to develop the optimum reclamation proposal. Changes to an approved reclamation plan are allowed only with concurrence of the BLM authorized officer.

The starting point for reclamation planning is prior to disturbance activities and is an integral part of the operational plan. Every attempt should be made to develop and implement new ideas and technologies that limit or reduce the amount of land surface disturbance. Planning efforts that consider the processes necessary for successful reclamation are important. Important considerations should be preliminary surveys, corridoring disturbances (e.g., constructing firebreak lines along existing roads), salvaging and reusing all available topsoil, site stabilization/erosion control, controlling invasive non-native plants and noxious weeds, and maintenance and health of soils. Reclamation plans must consider vegetative succession patterns and processes. Monitoring and reporting is the best way to track success and implement adaptive management strategies.

The level of detail for the reclamation plan shall reflect: the complexity of the project, the environmental concerns, the reclamation potential for the site, and the reclamation strategy. These plans shall also incorporate any program or regulatory specific requirements for reclamation. The reclamation plan shall address short-term stabilization to facilitate long term reclamation. In areas listed in Table O.1, "Sensitive Soils on BLM-administered Surface in the Planning Area" (p. 2087) a site-specific reclamation plan will be required (see the *Soils* section in Chapter 3).

Goals

The goal of this reclamation appendix is to help the BLM to achieve the resource specific goals in the RMP.

A reclamation plan is a planning document which will provide comprehensive as well as detailed reclamation procedures, methods and actions to successfully meet the final objective.

The following items are emphasized to achieve reclamation goals:

1. Preliminary surveys provide data that allow for proper planning and timely implementation of planned activities. Preliminary surveys define baseline conditions. For instance, preliminary surveys give the project proponent the information to know what plant communities, composition, structure, (e.g., Ecological Site Description [ESD]) and successional pathway are appropriate for restoration of the project area;
2. Identify and map areas of Limited Reclamation Potential;
3. Identify and map soils with Low Reclamation Suitability, Severe Erosion Potential, Slopes in Excess of 25%;
4. Identify and map fragile watersheds;
5. Apply positive efforts to minimize disturbance of the existing environment;
6. Identify the appropriate soil salvage depth by mapping or onsite investigation;
7. Stabilization of disturbed soils shall include:
    a. Soil stabilization through establishment of a vegetative ground cover on disturbed sites during the first growing season following disturbance;
    b. Appropriate sediment and erosion control measures need to be applied to prevent soil loss due to wind and water erosion;
8. Establish desired native vegetation that fits in with the successional stage of the identified (ESD) or an alternate vegetative regime in consultation with the BLM;
9. Control of invasive and noxious weeds shall include:
    a. Annual monitoring, detection, and control of invasive and noxious weeds beginning with the first season of disturbance;

b. Positive efforts to control the spread of weeds, including power washing of machinery and equipment between work sites; and

10. Monitoring and management of reclamation sites to evaluate reclamation success and to plan and report on the program.

Objectives

The objective of interim reclamation is to restore desirable vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; minimize habitat loss, reduce visual impact, and reduce forage loss during the life of the disturbance.

The long-term objective of final reclamation is to return the land to a condition approximating that which existed prior to disturbance. This includes restoration of the landform and natural vegetative community, hydrologic systems, visual resources, and wildlife habitats. To ensure that the long-term objective will be reached through human and natural processes, action will be taken to ensure requirements are met for site stability, visual quality, hydrological functioning and vegetative productivity. On split estate the BLM will consider the views of private surface owner (Onshore Order No. 1.XII.B.4).

Reclamation Plan

Reclamation plans provide detailed guidelines for the reclamation process and fulfill federal, state, county, and other local agencies requirements. They can be used by regulatory agencies to ensure that the reclamation measures are implemented, are appropriate for the site, and are environmentally sound. Reclamation plans will be used by the project proponent throughout the operational period of the project and subsequent to cessation of surface-disturbing activities. In turn, responsible agencies, including the BLM, will use the reclamation plan as a basis to review and evaluate the success of the reclamation program. Reclamation plans should provide direction and standards to assist in monitoring and compliance evaluations.

Site-Specific Reclamation Plan

The RMP indicates and identifies soils in the planning area that are severely erosive or otherwise sensitive to physical disturbance (see the *Soils* section in Chapter 3 and Maps 3–5). Table O.1, "Sensitive Soils on BLM-administered Surface in the Planning Area" (p. 2087) shows the approximate acres and sensitive soils in the planning area. Surface disturbance in areas listed in Table O.1, "Sensitive Soils on BLM-administered Surface in the Planning Area" (p. 2087) will be strictly controlled or, if necessary, prohibited.

Table O.1. Sensitive Soils on BLM-administered Surface in the Planning Area

Relative Erosion Potential	Acres	Percent of Planning Area
Limited Reclamation Potential (LRP)	218,928	28
Severe Erosion Potential	215,496	28
Slopes in Excess of 25%	170,590	22
Source: NRCS 2010a		

Where surface disturbance is proposed in areas identified in Table O.1, "Sensitive Soils on BLM-administered Surface in the Planning Area" (p. 2087) or in areas where there are other resource concerns such as habitat fragmentation, a detailed site-specific reclamation plan

will be required. The site-specific reclamation plan must be appropriate for the site and be environmentally sound and may include any or all of the following:

1. ESDs, referenced plant communities, and soil map unit(s);
2. Describe methods planned to conserve suitable topsoil for use in reclamation, identify topsoil depth, and proposed location of stockpiled subsoil and topsoil;
3. Identification of the soils limited factors through soil analysis;
4. Predisturbance photo or current photo documenting the condition of the site;
5. Disturbance specific stabilization efforts and reclamation plans described by surveyed station number, latitude/longitude or by erosive feature;
6. Engineered diagrams layered on topographical maps showing cut/fills and limits of disturbance;
7. A statement of acreage of initial disturbance, acreage of disturbance for interim reclamation, and acreage that will be re-disturbed preparing the surface for final reclamation.

Success Criteria

The BLM will evaluate reclamation success using the requirements set forth in the BLM Reclamation Policy IM WY-2012-032 (BLM 2012i). A successful reclamation project or effort shall provide a site which is self-sustaining, vigorous, diverse, where a native plant community is established on the site, with a density sufficient to control erosion and non-native plant invasion, and to re-establish wildlife habitat or forage production.

Interim reclamation success criteria:

1. Erosion control measures are in place prior to mitigate any erosive features, such as rills, gullies, or sheet erosion;
2. Disturbed areas not essential for operational function will be recontoured to allow for restoration of the original landform;
3. The operator has ensured that 100% of disturbance site is in a stable condition. BLM will make the determination as indicated by the Erosion Control Classification System (Clark 1980).
4. The disturbance has been seeded with the approved seed mix;
5. Native, perennial vegetation is becoming established with desirable species and trending towards long-term goal(s);
6. Litter and desirable vegetation are within 65% of the ESDreference sheet for bare ground;
7. Site should be free of all listed species on county, Sate of Wyoming, or federal noxious weed list;
8. Plants must be resilient as evidenced by well-developed root systems, flowers, and seed heads.

Final reclamation success criteria:

In addition to the success criteria listed under interim reclamation the following shall be evaluated:

1. Private surface owner rights will be respected when considering desired objectives, vegetation methods, including specific seed mix(s), and soil treatments;
2. Restoring the original landform or creating a landform that approximates and blends in with the surrounding landform;
3. Measured quantitatively the site shall be stabilized to match surrounding environment and shall be re-vegetated to at least 65% of the ESD reference sheet for bare ground and/or meets the desired objective;

4. Site must be free of all listed species on county, State of Wyoming, or federal noxious weed list.

Monitoring Protocol

Monitoring of reclaimed areas will ensure reclamation success criteria have been met. Reclamation monitoring protocol will be included in the reclamation plan. The authorized officer will be notified by the project proponent when reclamation operations have been completed, meet the success criteria, and are ready for final inspection. For final release BLM will utilize an approved monitoring methodology. Approved monitoring methods are described in BLM Technical Reference 4400-4, 1996 and can be located on the web at: http://www.blm.gov/nstc/library/pdf/samplveg.pdf.

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Appendix P. Wyoming Standards for Healthy Rangelands

P.1. Introduction

According to the Department of the Interior's final rule for grazing administration, effective August 21, 1995, the Wyoming Bureau of Land Management (BLM) State Director is responsible for the development of standards for healthy rangelands and guidelines for livestock grazing management on 18 million acres of Wyoming's public rangelands. The development and application of these standards and guidelines are to achieve the four fundamentals of rangeland health outlined in the grazing regulations (43 Code of Federal Regulations [CFR] 4180.1). Those four fundamentals are: (1) watersheds are functioning properly; (2) water, nutrients, and energy are cycling properly; (3) water quality meets State standards; and (4) habitat for special status species is protected.

Standards address the health, productivity, and sustainability of the BLM-administered public rangelands and represent the minimum acceptable conditions for the public rangelands. The standards apply to all resource uses on public lands. Their application will be determined as use-specific guidelines are developed. Standards are synonymous with goals and are observed on a landscape scale. They describe healthy rangelands rather than important rangeland by-products. The achievement of a standard is determined by measuring appropriate indicators. An indicator is a component of a system whose characteristics (e.g., presence, absence, quantity, and distribution) can be measured based on sound scientific principles.

Guidelines provide for, and guide the development and implementation of, reasonable, responsible, and cost-effective management practices at the grazing allotment and watershed level. The guidelines in this document apply specifically to livestock grazing management practices on the BLM-administered public lands. These management practices will either maintain existing desirable conditions or move rangelands toward statewide standards within reasonable timeframes. Appropriate guidelines will ensure that the resultant management practices reflect the potential for the watershed, consider other uses and natural influences, and balance resource goals with social, cultural/historic, and economic opportunities to sustain viable local communities. Guidelines, like standards, apply statewide.

Quantifiable resource objectives and specific management practices to achieve the standards will be developed at the BLM Field Office level and will consider all reasonable and practical options available to achieve desired results on a watershed or grazing allotment scale. The objectives shall be reflected in site-specific activity or implementation plans as well as in livestock grazing permits/leases for the public lands. Interdisciplinary activity or implementation plans will be used to maintain or achieve the Wyoming standards for healthy rangelands. These plans may be developed formally or informally through mechanisms available and suited to local needs (such as Coordinated Resource Management [CRM] efforts).

The development and implementation of standards and guidelines will enable on-the-ground management of the public rangelands to maintain a clear and responsible focus on both the health of the land and its dependent natural and human communities. This development and implementation will ensure that any mechanisms currently being employed or that may be developed in the future will maintain a consistent focus on these essential concerns.

These standards and guidelines are compatible with BLM's three-tiered land use planning process. The first tier includes the laws, regulations, and policies governing BLM's administration and management of the public lands and their uses. The previously mentioned fundamentals of rangeland health specified in 43 CFR 4180.1, the requirement for BLM to develop these state (or regional) standards and guidelines, and the standards and guidelines themselves, are part of this first tier. Also part of this first tier are the specific requirements of various federal laws and the objectives of 43 CFR 4100.2 that require BLM to consider the social and economic well-being of the local communities in its management process.

These standards and guidelines will provide for statewide consistency and guidance in the preparation, amendment, and maintenance of BLM land use plans, which represent the second tier of the planning process. The BLM land use plans provide general allocation decisions concerning the kinds of resource and land uses that can occur on the BLM administered public lands, where they can occur, and the types of conditional requirements under which they can occur. In general, the standards will be the basis for development of planning area-specific management objectives concerning rangeland health and productivity, and the guidelines will direct development of livestock grazing management actions to help accomplish those objectives.

The third tier of the BLM planning process, activity or implementation planning, is directed by the applicable land use plan and, therefore, by the standards and guidelines. The standards and guidelines, as BLM statewide policy, will also directly guide development of the site-specific objectives and the methods and practices used to implement the land use plan decisions.

Activity or implementation plans contain objectives which describe the site-specific conditions desired. Grazing permits/leases for the public lands contain terms and conditions which describe specific actions required to attain or maintain the desired conditions. Through monitoring and evaluation, the BLM, grazing permittees, and other interested parties determine if progress is being made to achieve activity plan objectives.

Wyoming rangelands support a variety of uses which are of significant economic importance to the state and its communities. These uses include oil and gas production, mining, recreation and tourism, fishing, hunting, wildlife viewing, and livestock grazing. Rangelands also provide amenities which contribute to the quality of life in Wyoming such as open spaces, solitude, and opportunities for personal renewal. Wyoming's rangelands should be managed with consideration of the state's historical, cultural, and social development and in a manner which contributes to a diverse, balanced, competitive, and resilient economy in order to provide opportunity for economic development. Healthy rangelands can best sustain these uses.

To varying degrees, BLM management of the public lands and resources plays a role in the social and economic well-being of Wyoming communities. The National Environmental Policy Act (part of the above-mentioned first planning tier) and various other laws and regulations mandate the BLM to analyze the socioeconomic impacts of actions occurring on public rangelands. These analyses occur during the environmental analysis process of land use planning (second planning tier), where resource allocations are made, and during the environmental analysis process of activity or implementation planning (third planning tier). In many situations, factors that affect the social and economic well-being of local communities extend far beyond the scope of BLM management or individual public land users' responsibilities. In addition, since standards relate primarily to physical and biological features of the landscape, it is very difficult to provide measurable socioeconomic indicators that relate to the health of rangelands. It is important that standards be realistic and within the control of the land manager and users to achieve.

Implementation of the Wyoming standards and guidelines will generally be done in the following manner. Grazing allotments or groups of allotments in a watershed will be reviewed based on the BLM's current allotment categorization and prioritization process. Allotments with existing management plans and high-priority allotments will be reviewed first. Lower priority allotments will then be reviewed as time allows. The permittees and interested public will be notified when allotments are scheduled for review and are encouraged to participate in the review. The review will first determine if an allotment meets each of the six standards. If it does, no further action will be necessary. If any of the standards aren't being met, rationale explaining the contributing factors will be prepared. If livestock grazing practices are found to be among the contributing factors, corrective actions consistent with the guidelines will be developed and implemented. If a lack of data prohibits the reviewers from determining if a standard is being met, a strategy will be developed to acquire the data in a timely manner.

P.2. Standards for Healthy Public Rangelands

P.2.1. Standard #1

Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.

This Means That:

The hydrologic cycle will be supported by providing for water capture, storage, and sustained release. Adequate energy flow and nutrient cycling through the system will be achieved as optimal plant growth occurs. Plant communities are highly varied within Wyoming.

Indicators May Include But Are Not Limited To:

- Water infiltration rates
- Soil compaction
- Erosion (rills, gullies, pedestals, capping)
- Soil micro-organisms
- Vegetative cover (gully bottoms and slopes)
- Bare ground and litter

P.2.2. Standard #2

Riparian and wetland vegetation has structural, age, and species diversity characteristic of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge.

This Means That:

Wyoming has highly varied riparian and wetland systems on public lands. These systems vary from large rivers to small streams and from springs to large wet meadows. These systems are in various stages of natural cycles and may also reflect other disturbance that is either localized or widespread throughout the watershed. Riparian vegetation captures sediments and associated

materials, thus enhancing the nutrient cycle by capturing and utilizing nutrients that would otherwise move through a system unused.

Indicators May Include But Are Not Limited To:

- Erosion and deposition rate
- Channel morphology and floodplain function
- Channel succession and erosion cycle
- Vegetative cover
- Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.)
- Bank stability
- Woody debris and instream cover
- Bare ground and litter

P.2.3. Standard #3

Upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance.

This Means That:

In order to maintain desirable conditions and/or recover from disturbance within acceptable timeframes, plant communities must have the components present to support the nutrient cycle and adequate energy flow. Plants depend on nutrients in the soil and energy derived from sunlight. Nutrients stored in the soil are used over and over by plants, animals, and microorganisms. The amount of nutrients available and the speed with which they cycle among plants, animals, and the soil are fundamental components of rangeland health. The amount, timing, and distribution of energy captured through photosynthesis are fundamental to the function of rangeland ecosystems.

Indicators May Include But Are Not Limited To:

- Vegetative cover
- Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.)
- Bare ground and litter
- Erosion (rills, gullies, pedestals, capping)
- Water infiltration rates

P.2.4. Standard #4

Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support Threatened, Endangered, species of special concern, or sensitive species will be maintained or enhanced.

This Means That:

The management of Wyoming rangelands will achieve or maintain adequate habitat conditions that support diverse plant and animal species. These may include listed Threatened or Endangered species (U.S. Fish and Wildlife-designated), species of special concern (BLM-designated), and other sensitive species (State of Wyoming-designated). The intent of this standard is to allow the listed species to recover and be delisted.

Indicators May Include But Are Not Limited To:

- Noxious weeds
- Species diversity
- Age class distribution
- All indicators associated with the upland and riparian standards
- Population trends
- Habitat fragmentation

P.2.5. Standard #5

Water quality meets State standards.

This Means That:

The State of Wyoming is authorized to administer the Clean Water Act. BLM management actions or use authorizations will comply with all federal and state water quality laws, rules and regulations to address water quality issues that originate on public lands. Provisions for the establishment of water quality standards are included in the Clean Water Act, as amended, and the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the Code of Federal Regulations and in Wyoming's Water Quality Rules and Regulations. The latter regulations contain Quality Standards for Wyoming Surface Waters.

Natural processes and human actions influence the chemical, physical, and biological characteristics of water. Water quality varies from place to place with the seasons, the climate, and the kind substrate through which water moves. Therefore, the assessment of water quality takes these factors into account.

Indicators May Include But Are Not Limited To:

- Chemical characteristics (e.g., pH, conductivity, dissolved oxygen)
- Physical characteristics (e.g., sediment, temperature, color)
- Biological characteristics (e.g., macro- and micro-invertebrates, fecal coliform, and plant and animal species)

P.2.6. Standard #6

Air quality meets State standards.

This Means That:

The State of Wyoming is authorized to administer the Clean Air Act. BLM management actions or use authorizations will comply with all federal and state air quality laws, rules, regulations and standards. Provisions for the establishment of air quality standards are included in the Clean Air Act, as amended, and the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the Code of Federal Regulations and in Wyoming Air Quality Standards and Regulations.

Indicators May Include But Are Not Limited To:

- Particulate matter
- Sulfur dioxide
- Photochemical oxidants (ozone)

- Volatile organic compounds (hydrocarbons)
- Nitrogen oxides
- Carbon monoxide
- Odors
- Visibility

P.3. BLM Wyoming Guidelines for Livestock Grazing Management

1. Timing, duration, and levels of authorized grazing will ensure that adequate amounts of vegetative ground cover, including standing plant material and litter, remain after authorized use to support infiltration, maintain soil moisture storage, stabilize soils, allow the release of sufficient water to maintain system function, and to maintain subsurface soil conditions that support permeability rates and other processes appropriate to the site.
2. Grazing management practices should restore, maintain, or improve riparian plant communities. Grazing management strategies consider hydrology, physical attributes, and potential for the watershed and the ecological site. Grazing management should maintain adequate residual plant cover to provide for plant recovery, residual forage, sediment capture, energy dissipation, and groundwater recharge.
3. Range improvement practices (instream structures, fences, water troughs, etc.) in and adjacent to riparian areas will ensure that stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform are maintained or enhanced. The development of springs, seeps, or other projects affecting water and associated resources shall be designed to protect the ecological and hydrological functions, wildlife habitat, and significant cultural, historical, and archaeological values associated with the water source. Range improvements will be located away from riparian areas if they conflict with achieving or maintaining riparian function.
4. Grazing practices that consider the biotic communities as more than just a forage base will be designed in order to ensure that the appropriate kinds and amounts of soil organisms, plants, and animals to support the hydrologic cycle, nutrient cycle, and energy flow are maintained or enhanced.
5. Continuous season-long or other grazing management practices that hinder the completion of plants' life-sustaining reproductive and/or nutrient cycling processes will be modified to ensure adequate periods of rest at the appropriate times. The rest periods will provide for seedling establishment or other necessary processes at levels sufficient to move the ecological site condition toward the resource objective and subsequent achievement of the standard.
6. Grazing management practices and range improvements will adequately protect vegetative cover and physical conditions and maintain, restore, or enhance water quality to meet resource objectives. The effects of new range improvements (water developments, fences, etc.) on the health and function of rangelands will be carefully considered prior to their implementation.
7. Grazing management practices will incorporate the kinds and amounts of use that will restore, maintain, or enhance habitats to assist in the recovery of federal Threatened and Endangered species or the conservation of federally-listed species of concern and other state-designated special status species. Grazing management practices will maintain existing habitat or facilitate vegetation change toward desired habitats. Grazing management will consider Threatened and Endangered species and their habitats.

8. Grazing management practices and range improvements will be designed to maintain or promote the physical and biological conditions necessary to sustain native animal populations and plant communities. This will involve emphasizing native plant species in the support of ecological function and incorporating the use of nonnative species only in those situations in which native plant species are not available in sufficient quantities or are incapable of maintaining or achieving properly functioning conditions and biological health.
9. Grazing management practices on uplands will maintain desired plant communities or facilitate change toward desired plant communities.

P.3.1. Definitions

Activity Plans – Allotment Management Plans (AMPs), Habitat Management Plans (HMPs), Watershed Management Plans (WMPs), Wild Horse Management Plans (WHMPs), and other plans developed at the local level to address specific concerns and accomplish specific objectives.

Activity Plans – Allotment Management Plans (AMPs), Habitat Management Plans (HMPs), Watershed Management Plans (WMPs), Wild Horse Management Plans (WHMPs), and other plans developed at the local level to address specific concerns and accomplish specific objectives.

Coordinated Resource Management (CRM) – A group of people working together to develop common resource goals and resolve natural resource concerns. CRM is a people process that strives for win-win situations through consensus-based decision making.

Desired Plant Community – A plant community which produces the kind, proportion, and amount of vegetation necessary for meeting or exceeding the land use plan/activity plan objectives established for an ecological site(s). The desired plant community must be consistent with the site's capability to produce the desired vegetation through management, land treatment, or a combination of the two.

Ecological Site – An area of land with specific physical characteristics that differs from other areas both in its ability to produce distinctive kinds and amounts of vegetation and in its response to management.

Erosion – (v.) Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. (n.) The land surface worn away by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

Grazing Management Practices – Grazing management practices include such things as grazing systems (rest-rotation, deferred rotation, etc.), timing and duration of grazing, herding, salting, etc. They do not include physical range improvements.

Guidelines (For Grazing Management) – Guidelines provide for, and guide the development and implementation of, reasonable, responsible, and cost-effective management actions at the allotment and watershed level which move rangelands toward statewide standards or maintain existing desirable conditions. Appropriate guidelines will ensure that the resultant management actions reflect the potential for the watershed, consider other uses and natural influences, and balance resource goals with social, cultural/historic, and economic opportunities to sustain viable local communities. Guidelines, and, therefore, the management actions they engender, are based on sound science, past and present management experience, and public input.

Indicator – An indicator is a component of a system whose characteristics (e.g., presence, absence, quantity, and distribution) can be measured based on sound scientific principles. An indicator can be measured (monitored and evaluated) at a site- or species-specific level. Measurement of an indicator must be able to show change within timeframes acceptable to management and be capable of showing how the health of the ecosystem is changing in response to specific management actions. Selection of the appropriate indicators to be monitored in a particular allotment is a critical aspect of early communication among the interests involved on the ground. The most useful indicators are those for which change or trend can be easily quantified and for which agreement as to the significance of the indicator is broad based.

Litter – The uppermost layer of organic debris on the soil surface, essentially the freshly fallen or slightly decomposed vegetal material.

Management Actions – Management actions are the specific actions prescribed by the BLM to achieve resource objectives, land use allocations, or other program or multiple use goals. Management actions include both grazing management practices and range improvements.

Objective – An objective is a site-specific statement of a desired rangeland condition. It may contain qualitative (subjective) elements, but it must have quantitative (objective) elements so that it can be measured. Objectives frequently speak to change. They may measure the avoidance of negative changes or the accomplishment of positive changes. They are the focus of monitoring and evaluation activities at the local level. Objectives may measure the products of an area rather than its ability to produce them, but if they do so, it must be kept in mind that the lack of a product may not mean that the standards have not been met. Instead, the lack of a particular product may reflect other factors such as political or social constraints. Objectives often focus on indicators of greatest interest for the area in question.

Range Improvements – Range improvements include such things as corrals, fences, water developments (reservoirs, spring developments, pipelines, wells, etc.) and land treatments (prescribed fire, herbicide treatments, mechanical treatments, etc.).

Rangeland – Land on which the native vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs. This includes lands revegetated naturally or artificially when routine management of that vegetation is accomplished mainly through manipulation of grazing. Rangelands include natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

Rangeland Health – The degree to which the integrity of the soil and ecological processes of rangeland ecosystems are sustained.

Riparian – An area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not have vegetation dependent on free water in the soil.

Standards – Standards are synonymous with goals and are observed on a landscape scale. Standards apply to rangeland health and not to the important by-products of healthy rangelands. Standards relate to the current capability or realistic potential of a specific site to produce these by-products, not to the presence or absence of the products themselves. It is the sustainability of the processes, or rangeland health, that produces these by-products.

Terms and Conditions – Terms and conditions are very specific land use requirements that are made a part of the land use authorization in order to assure maintenance or attainment of the standard. Terms and conditions may incorporate or reference the appropriate portions of activity plans (e.g., Allotment Management Plans). In other words, where an activity plan exists that contains objectives focused on meeting the standards, compliance with the plan may be the only term and condition necessary in that allotment.

Upland – Those portions of the landscape which do not receive additional moisture for plant growth from run-off, streamflow, etc. Typically these are hills, ridgetops, valley slopes, and rolling plains.

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Appendix Q. Fire and Fuels Management

Q.1. Emergency Stabilization and Rehabilitation

Introduction

Emergency stabilization plans and/or rehabilitation plans are prepared after a wildland fire to minimize threats to life or property and stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of the fire. Not all fires need emergency stabilization and/or rehabilitation.

Wyoming Bureau of Land Management's (BLM) Reclamation policy identifies certain requirements which must be addressed when developing reclamation plans or proposals for surface-disturbing activities. For information about reclamation requirements, please refer to Appendix O (p. 2085).

The Burned Area Emergency Stabilization and Rehabilitation Handbook (BLM 2007c) provides detailed information specific to BLM policies, standards, and procedures used in the Burned Area Emergency Stabilization and Rehabilitation (ES&R) programs. The Handbook is intended to be the primary guidance to BLM ES&R activities. ES&R activities and treatment undertaken in the Buffalo Field Office will follow the Handbook guidance. As updates and revisions to the departmental manuals are completed, conformance to the new direction will supersede the criteria included herein.

Emergency stabilization is defined as "Planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life and property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. Emergency stabilization actions must be taken within one year following containment of a wildland fire" (DOI 2004).

Rehabilitation is defined as "Efforts undertaken within three years of containment of a wildland fire to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire" (DOI 2004).

ES&R funds are not used for rehabilitation of wildland fire suppression efforts; this includes rehabilitating firelines, helispots, fire camp, etc. Costs for rehabilitating wildland fire suppression efforts will be funded by the wildland fire project code.

Emergency Stabilization and Rehabilitation Protocols

Emergency stabilization protection priorities are: (1) human life and safety; and (2) property and unique biological resources (designated critical habitat for federal and state listed, proposed or candidate Threatened and Endangered species) and significant heritage sites (DOI 2004). Burned area rehabilitation protection priorities are: (1) to repair or improve lands damaged directly by a wildland fire; and (2) to rehabilitate or establish healthy, stable ecosystems in the burned area (DOI 2004).

Emergency Stabilization

The objective of emergency stabilization is "To determine the need for and to prescribe and implement emergency treatments to minimize threats to life or property or to stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of a fire" (DOI 2004).

Emergency stabilization plans are prepared by an interdisciplinary team, immediately following a wildland fire and specify emergency treatments and activities to be carried out within one year following containment of the wildfire. Generally, activities are only prescribed within the perimeter of a burned area.

Allowable emergency stabilization actions are limited to the following items, grouped by issue topic:

Human Life and Safety

- Replacing or repairing minor facilities essential to public health and safety when no other protection options are available.

Soil/Water Stabilization

- Placing structures to slow soil and water movement.
- Stabilizing soil to prevent loss of degradation or productivity.
- Increasing road drainage frequency and/or capacity to handle additional post-fire runoff.
- Installing protective fences or barriers to protect treated or recovering areas.

Designated Critical Habitat for Federal/State Listed, Proposed, or Candidate Species

- Conducting assessments of critical habitat in those areas affected by emergency stabilization treatments.
- Seeding or planting to prevent permanent impairment of designated critical habitat for federal and state listed, proposed or candidate Threatened and Endangered species.

Critical Heritage Resources

- Conducting assessments of significant heritage sites in those areas affected by emergency stabilization treatments.
- Stabilizing critical heritage resources.
- Patrolling, camouflaging, burying significant heritage sites to prevent looting.

Invasive Plants

- Seeding to prevent establishment of invasive plants, and direct treatment of invasive plants. Such actions will be specified in the emergency stabilization plan only when immediate action is required and when standard treatments are used that have been validated by monitoring data from previous projects, or when there is documented research establishing the effectiveness of such actions.

- Using integrated pest management techniques to minimize the establishment of non-native invasive species within the burned area. When there is an existing approved management plan that addresses non-native invasive species, emergency stabilization treatments may be used to stabilize the invasive species

Monitoring

- Monitoring of treatments and activities for up to three years from date of fire containment.

Burned Area Rehabilitation

The objectives of rehabilitation are: (1) to evaluate actual and potential long-term post- fire impacts to critical cultural and natural resources and identify those areas unlikely to recover naturally from severe wildland fire damage; (2) to develop and implement cost-effective plans to emulate historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with approved land management plans, or if that is infeasible, then to restore or establish a healthy, stable ecosystem in which native species are well represented; and (3) to repair or replace minor facilities damaged by wildland fire (DOI 2004).

Rehabilitation plans are prepared by an interdisciplinary team as a separate plan, independent of an emergency stabilization plan. The rehabilitation plan specifies non-emergency treatments and activities to be carried out within three years following containment of a wildfire. Generally, rehabilitation activities are prescribed only within the perimeter of a burned area.

Allowable rehabilitation actions are limited to the following items, grouped by issue topic:

Lands Unlikely to Recover Naturally

- Repair or improve lands unlikely to recover naturally from wildland fire damage by emulating historical or pre-fire ecosystem structure, function, diversity, and dynamics consistent with existing land management plans.

Weed Treatments

- Chemical, manual, and mechanical removal of invasive species, and planting of native and non-native species, restore or establish a healthy, stable ecosystem even if this ecosystem cannot fully emulate historical or pre-fire conditions.

Tree Planting

- Tree planting to reestablish burned habitat, reestablish native tree species lost in fire, prevent establishment of invasive plants.

Repair/Replace Fire Damage to Minor Facilities

- Repair or replace fire damage to minor operating facilities (e.g., fences, campgrounds, interpretive signs and exhibits, shade shelters, wildlife guzzlers, etc.) Rehabilitation may not include the planning or replacement of major infrastructure, such as visitor centers, residential

structures, administration offices, work centers and similar facilities. Rehabilitation does not include the construction of new facilities that did not exist before the fire, except for temporary and minor facilities necessary to implement burned area rehabilitation efforts.

Monitoring

- Monitoring of treatments and activities for up to three years from date of fire containment.

Policies on timeframes for ES&R planning funding, and implementation are very specific. ES&R treatments must be implemented, to the extent possible, before additional damage occurs to the burned area, immediately down slope of the burned area, or before undesirable vegetation becomes established. Treatments must be implemented at a time that will ensure a high or maximum probability of success. The ES&R Program timeframes in relations to tasks and responsibilities are shown in Table Q.1, "Emergency Stabilization and Rehabilitation Program Timeframes, Tasks, and Responsibilities" (p. 2104).

Table Q.1. Emergency Stabilization and Rehabilitation Program Timeframes, Tasks, and Responsibilities

Event	Timeframes	Task
Wildfire occurs	Immediately, prior to fire containment	Manager assigns a Resource Advisor. While the fire is still burning, the Resource Advisor, in consultation with resource specialists and the appropriate Manager, decides if ES&R is warranted bases on Values-at-Risk/Resources-at-Risk.
Initial Emergency Stabilization Plan needed. Submit Form 1310-2 plus supplemental attachments (Both 2822 and 2881 may be indicated on Form, though funding under 2881 may not occur until the following fiscal year)	Within 7 days of fire containment	Concurrently to State ES&R Program Lead, National ES&R Program Lead, and Denver Budget Office (BC-612).
Complete Emergency Stabilization Plan needed. Prepare/Submit complete Emergency Stabilization Plan	Within 21 days of fire containment	Less than $100,000 submit to State ES&R Program Lead. Greater than or equal to $100,000 submit to State ES&R Program Lead (for review) and concurrently to National ES&R Program Lead.
Receive approval/disapproval of Emergency Stabilization Plan	Within 6 working days of receipt by Approval Office	Requesting Office receives memo approving funding, or need for revision on a plan by plan basis. State Director or acting has funding approval authority for plans less than $100,000. Bureau of Land Management Budget Officer, after concurrence with Assistant Director WO-200 or their designee, has funding approval authority for plans greater than or equal to $100,000.
Receive notification of Emergency Stabilization funding approval	Immediately	Local fire office enters project data into NFPORS.

Event	Timeframes	Task
BAR Plan needed. Prepare/Submit BAR Plan	Timely, ideally soon after submitting Emergency Stabilization Plan, but no later than September 5 annually	To State ES&R Program Lead and National ES&R Program Lead. Field Office. Local fire office enters project data into NFPORS.
Receive approval/disapproval of BAR Plan funding	Before October 31 annually	Funding for BAR Plans is approved via the Annual Work Plan.
Accomplishment Report and Funding Request Form for next Fiscal Year 2881 funds	Early September	To State ES&R Program Lead for review and submission to National ES&R Program Lead for concurrence. Funding for years 2 and 3 is approved via the Annual Work Plan.
Close-out Report	Early September of 3rd year	To State ES&R Program Lead for review and submission to National ES&R Program Lead.
BAR Burned Area Rehabilitation ES&R Emergency Stabilization and Rehabilitation NFPORS National Fire Plan Operations and Reporting System WO Washington Office		

Due to the broad spectrum of situations encountered in emergency stabilization and/or rehabilitation, several options of possible treatments, either separately or in combination, must be considered. The ES&R Handbook list several treatments under the Treatment Guidance section.

Emergency Stabilization and Rehabilitation Guidelines for Wilderness Study Areas

Emergency stabilization and/or rehabilitation following wildland fire in a Wilderness Study Area (WSA) will comply with H-8550-1 - Management of Wilderness Study Areas (BLM 1995). The following italicized text condenses excerpts from H-8550-1 - Management of Wilderness Study Areas (BLM 1995):

Emergency stabilization, rehabilitation, and restoration of the wilderness resource created by impacts from wildfires must satisfy the non-impairment criteria unless an exception applies. These activities will be more intensive: where the effects of the fire were greater than would occur in an area where fire already plays its natural role on the landscape; in ecosystems that evolved without broad-scale fire; and for fires whose effects (even within the natural range) pose an unacceptable risk to life, property, or resources outside the WSA. Where wildfires have been managed for resource benefits, most stabilization, rehabilitation, and restoration activities are expected to be limited to the impacts caused by direct management actions or to prevent the spread of exotic vegetation. These activities will not be used to establish, or re-establish, conditions not provided for in sections 1.6.D.8 or 1.6.D.11 of this manual.

Any emergency stabilization and/or rehabilitation actions must maintain an area's suitability for preservation as wilderness and should be accomplished using methods and equipment that causes the least damage to wilderness resources. The use of motorized vehicles and mechanical equipment will be minimized to the extent possible.

When seeding is considered, the appropriate species and methods for seeding will be considered on a case-by-case basis to determine if the proposed method meets the policy and guidelines for WSAs. Seed and planting will utilize native species, and will minimize cross-country use of motorized equipment. Seedings and plantings will be staggered or irregular so as to avoid a

straight-line plantation appearance. Seed will be applied aerially unless the area to be stabilized and/or rehabilitated is small, or ground application will not impair wilderness characteristics. Because the covering of seed greatly affects its successful germination, mechanized equipment may be considered to cover the seed after aerial application. If the burned area is determined to be crucial wildlife habitat, and shrub seed is not applied aerially, then seedlings may be hand planted.

When a proposed emergency stabilization and/or rehabilitation project addresses a WSA, interested parties will be allowed a 30-day comment period on the proposed treatment, unless it is not possible to do so because of emergency conditions (i.e., the 30-day comment period would result in missing the optimum period for treatment). If a full 30-day period would result in missing the optimum period for emergency stabilization and/or rehabilitation, key contacts would be notified for immediate comment, and a follow up copy of the treatment prescription would be forwarded.

If it is determined that wilderness suitability is affected by damages from fire suppression actions, the disturbance must be repaired by fire suppression resources. ES&R funds may not be used to repair suppression damages.

Q.2. Fire Management Policy for Wilderness Study Areas

The following paragraphs are condensed excerpts from H-8550-1 - Management of Wilderness Study Areas (BLM 1995). For complete policy and guidance regarding WSAs, refer the handbook.

Policies for Specific Activities — Vegetation

Whenever possible, natural processes will be relied on to maintain native vegetation and to influence natural fluctuations in populations. Natural disturbance processes, including fire, insect outbreaks, and droughts, are important functions of the ecosystem. Manipulation of vegetation through management-ignited fire, chemical application, mechanical treatment, or human controlled biological means is allowed only where it meets the non-impairment standard or one of the exceptions. Exceptions that may pertain to vegetative treatment include emergencies, the protection or enhancement of wilderness characteristics, grandfathered uses, valid existing rights, and actions taken to recover a federally listed Threatened, Endangered, or Candidate species. Establishing non-native plants is an example of vegetation management that may impair and therefore may not be permitted within a WSA.

Emergencies:

As an exception to the non-impairment standard, vegetative manipulation in emergency situations may be allowed, e.g. there is no effective alternative for controlling insect and disease outbreaks or fires that threaten lands outside of a WSA. Reseeding or planting of native species may be undertaken following fire or other natural disaster if natural seed sources are not adequate to compete with non-native vegetation or substantial soil loss is expected.

Insect and Disease Control:

Native insect and disease control activities on vegetation will be allowed only to the extent that they meet the non-impairment criteria or one of the exceptions. When specific insects and diseases are documented to be non-native or introduced organisms, then it may be reasonable to

consider whether the protection and enhancement of wilderness characteristics exception to the non-impairment standard applies.

Restoration:

Where it meets the non-impairment standard or one of the exceptions, management action may be taken to restore vegetation to characteristic conditions of the ecological zone in which the area is situated where:

- natural successional processes have been disrupted by past human activity, to the extent that intervention is necessary in order to return the ecosystem to a condition where natural process can function;
- restoration through natural processes would require lengthy periods of time during which the impacted area would receive unwanted human use or be susceptible to substantial soil loss without intervention, or further ecological departure would occur; or,
- it is necessary to maintain fire-dependent ecosystems when adjacent land uses do not allow for natural fire occurrence. (see section 1.6.D.2.c).

Manipulation should only occur when restoration by natural forces is no longer attainable, and only to restore or maintain vegetative communities to the closest approximation of the natural range of conditions.

Restoration treatments should use the least disruptive techniques that have the best likelihood for success. Patient, incremental treatments should be favored over aggressive attempts to restore long-term changes all at once, unless repeated treatments would pose greater impairment risk to wilderness characteristics.

Policies for Specific Activities — Fire

The overall goal of managing fire in WSAs is to allow the frequency and intensity of the natural fire regime to play its inherent role in the ecosystem. This means both allowing fire where ecosystems evolved in the presence of fire, and preventing unnatural spread of fire in ecosystems that evolved without broad-scale fires.

Wildfires can be considered emergencies and, as such, management response to a wildfire falls under one of the exceptions to the non-impairment criteria. Nevertheless, the non-impairment criteria will be met to the extent practical. This means using "minimum impact suppression tactics" or "light hand on the land" suppression techniques wherever possible, while providing for the safety of firefighters and the public and meeting fire management objectives. Fire managers should inform suppression personnel during dispatch that the [wild]fire is in a WSA and that special constraints may apply to prevent impairment of wilderness characteristics. A fire resource advisor with experience in WSA management should be assigned to all fires in WSAs to assist in the protection of wilderness characteristics.

The goal of prescribed fire is to make conditions possible for natural fire to return to the WSA. In some instances, the goal may be to mimic a natural fire regime where reliance on wildfire is not feasible. Use of prescribed fires in WSAs is limited to instances where this use meets the non-impairment standard or one of the exceptions, such as to clearly protect or enhance the land's wilderness characteristics. The BLM may utilize prescribed fire in WSAs where the natural role of fire cannot be returned solely by reliance on wildfire or where relying on wildfires might create unacceptable risks to life, property, or natural resources outside the WSA.

Fuel treatments include thinning or removing vegetation, either mechanically or chemically, in advance of, or as a replacement for, wildland fire (either wildfire or prescribed fire). The goal of fuel treatment is to make conditions possible for natural wildfire to return to the WSA. In some instances, fuel treatment may be necessary to protect site-specific resources in advance of a prescribed fire to prevent the loss of those resources. This necessity must be clearly demonstrated in the prescribed fire plan. Pre-fire treatment used to replace either type of wildland fire…is only allowed in WSAs where it meets the non-impairment standard or one of the exceptions. Due to their controversial nature and the complexities of analyzing the effects of these treatments on the non-impairment criteria, more extensive National Environmental Policy Act (NEPA) analysis (e.g., an Environmental Impact Statement) including public involvement may be required when fuel treatments are proposed for use as a replacement for wildland fire. The policy in 1.6.D.8.b.iii [vegetation restoration] must be satisfied. Fuel treatments *may* be permitted under the restoration or public safety exceptions to the non-impairment standard when:

A. prescribed fire in the WSA will inevitably cause unacceptable risks to life, property, or natural resources outside the WSA; or
B. natural successional processes have been disrupted by past human activity to the extent that intervention is necessary in order to return the ecosystem to a condition where natural process can function; or
C. non-native species have altered the fire regime so that wildland fires pose an undue risk to the native ecosystem.

Conclusive documentation of A, B, or C, above, must be included in the NEPA analysis of the proposed action. When fuel treatment is allowed, the BLM must strive to achieve the desired conditions through the least impacting method. Fuel treatments should not be authorized in a WSA if the same objectives can be accomplished by the BLM through fuel treatments on public lands outside of the WSA.

Appendix R. Travel and Transportation Management

The Bureau of Land Management's (BLM) present transportation network has been largely created from past resource uses and public access patterns. In order to effectively manage for a complete and comprehensive transportation network throughout the BLM-administered public lands within the Buffalo Field Office (BFO), the BLM must assess present and future access needs; evaluate existing trails, primitive roads, and roads; and determine an appropriate travel and transportation system.

As required by Executive Order (EO) 11644 (as amended by EO 11989) and regulation (43 Code of Federal Regulations [CFR] 8340), and in conformance with the BLM Washington Office Instruction Memorandum (IM) No. 2008-014 (BLM 2007e) and Manual 1626 - Travel and Transportation Management (BLM 2011a), BLM-administered lands within the BFO are identified as "Limited to Designated Roads and Trails," "Closed," or "Open" (Map 53). Those areas that are designated "Limited" may have seasonal restrictions or travel limitations to designated roads and vehicle routes. A travel management plan (TMP) designating roads Open for motorized and nonmotorized use throughout the BFO will be completed for each Travel Management Area (TMA). A conscientious effort, subject to financial and resource availability, will be made to complete these plans within five years of the signing of the RMP Record of Decision (ROD). TMA planning will be accomplished through a community-based process by involving cooperating agencies, community groups, and special interest groups. Modifications to the transportation network (new routes, reroutes, or closures) in "Limited" areas may be made through activity level planning or with site-specific National Environmental Policy Act (NEPA) analysis. Modifications to off-highway vehicle (OHV) designations (Open, Closed, or Limited) require an Resource Management Plan (RMP) amendment.

Developing a Travel and Transportation Management Network

During the development of a TMP, the BLM will seek to balance access needs of motorized and nonmotorized users while sustaining the natural and cultural resources. Through site-specific planning, roads and trails will be inventoried, mapped, and analyzed as necessary to evaluate and designate the roads and trails as "Open," "Seasonally Open," or "Closed" to various types of use (foot, equestrian, bicycle, motorized, and others). Site-specific planning includes identifying opportunities for trail construction or improvement of specific areas where intensive use may be appropriate. Intensive use areas may be identified with use restricted to designated trails under the Limited designation.

Off-Highway Vehicle Designations

Specific criteria for "Open," "Limited," and "Closed" OHV designations are provided in definitions outlined in 43 CFR 8340.0-5 (f), (g), and (h) and 43 CFR 8342.1, Designation Criteria. Generally, the BLM will designate Limited areas where use is limited to identified existing roads and trails (Limited to existing) or emphasize the designation of travel networks (Limited to designated). The following further clarifies these designations:

- **Open:** Areas designated as Open are intended for intensive OHV or other transportation use areas where all types of vehicle use is permitted at all times, anywhere in the area subject to the operating regulations and vehicle standards set forth in 43 CFR 8341 and 8342.
- **Closed:** Areas where OHV use is prohibited. Areas, roads, and/or trails are designated Closed if closure to all OHV use is necessary to protect resources, promote visitor safety, or reduce user conflicts. Administrative use of motor vehicles may be allowed within these areas.
- **Limited:** Areas where transportation use must be restricted to meet specific objectives. For areas classified as Limited, the BLM must consider a full range of possibilities, including travel that will be limited to types or modes of travel; limited to identified roads and trails; limited to time or season of use; limited to certain types of vehicles (i.e., OHVs, motorcycles, all-terrain vehicles, high clearance, etc.); limited to authorized or permitted vehicles or users; limited to BLM administrative use only; or other types of limitations. In addition, the BLM must provide specific guidance about the process for managing motorized vehicle access for authorized, permitted, or otherwise approved vehicles for those specific categories of motorized vehicle uses that are exempt from a Limited OHV designation.

Travel and Transportation Planning Process

Motorized travel in areas to be managed as designated roads and trails will be limited to existing roads, primitive roads, and trails prior to the formal designation of routes. In areas where the travel network has been inventoried and travel routes have been defined, only designated routes will be open for travel prior to the completion of a new TMP. Areas currently limited to designated routes include Burnt Hollow, Middle Fork, Welch Ranch and Weston Hills Management Areas.

Travel Management Area Delineation

TMAs will be delineated for the entire field office. TMAs will often consist of other designated management areas (i.e., Special Recreation Management Areas [SRMAs], Wildlife Management Areas, etc.). Topography, land tenure and ecosystem types will also assist in delineation of TMAs. Initial TMAs include individual SRMAs, Wilderness Study Areas (WSAs), and the Powder River Basin. Modifications to TMAs will occur through interdisciplinary team review prior to beginning subsequent NEPA documentation for travel planning.

For areas managed as “Limited to designated roads and trails” (Map 53), a TMP will be developed that defines designated motorized and nonmotorized transportation networks. These TMPs will be developed to address site-specific, geographical areas identified as TMAs. The TMAs will be prioritized in response to current issues such as current OHV use, areas with sensitive resources, areas with special or specific designations (i.e., Areas of Critical Environmental Concern, SRMAs, Wildlife Habitat Management Areas, etc.), public health and safety, use and user conflicts, and resource protection.

Travel and Transportation Management (TTM) planning guidance (H-1601-Land Use Planning Handbook) (BLM 2005b), Appendix C; Manual 1626 - Travel and Transportation Management (BLM 2011a) requires a completed travel and transportation network upon completion of the Land Use plan to the extent possible. If this is not possible, a preliminary network must be identified and a process established to select a final travel management network. Determination of the final travel and transportation network for the BFO has been deferred until the completion of the Buffalo RMP because of the complexity of the road network and land tenure pattern, and the need to verify the roads and trails inventory for the planning area.

In general, TTM for designated roads and trails includes the following:

- During the planning process, teams made up of BLM, cooperating agencies, and members of the public will be used to ensure resource concerns and OHV user needs are properly addressed. Maps will be available to the teams that include all known roads to aid identification of roads and vehicle routes to be considered for designation as Open to OHV use.
- From inventory data, complete a map of the TMA, and identify the baseline of roads, primitive roads, and trails. The BFO travel network is only partially inventoried. Map 52 illustrates the preliminary transportation network for the BFO. Aerial photos and satellite imagery will be used to establish which routes existed at the time of the ROD. The final travel and transportation network will not be designated until the inventory is completed.

The following steps outline the process in completing a travel and transportation inventory:

1. Acquire funding to be used to inventory data in each TMA for those areas known to have an incomplete route inventory.

2. Analyze aerial photos, satellite imagery and Geographic Information Systems data to collect route data.

3. Data collected from aerial photos and satellite imagery will be ground truthed.

4. Existing routes will be assigned a definition, interim route category, and interim maintenance level and a map will be prepared for each TMA. (Note: Final designations will not take place until the completion of the TMP.)

A TMP will be prepared for each TMA using an interdisciplinary approach. Goals and objectives will be defined for each TMA. Each TMP will include a clear and concise purpose and need statement and alternatives for the designated road network will be prepared.

Route Designation Criteria

The following factors are considered when developing route designations:

- Are resource conflicts present?
- Are critical resources such as Threatened and Endangered or WSAs present?
- Are high-priority resources such as crucial wildlife habitat present?
- What are management objectives for the area?
- What are the travel and transportation needs in the area?
- Is there evidence of OHV- related problems?
- Are needs and desires of public land users being met?
- Is visitor use high or low?
- How would OHV proposals affect activity and experience opportunities in the area?
- What benefits or outcomes would accrue from various options?
- Are other issues or problems present (noxious weeds, etc.)?
- Are sufficient data sources available to support the decision?
- Are budget and manpower resources sufficient to implement this designation?

All route designations shall be based on protecting public land resources, the promotion of user safety, and the minimization of conflicts amongst the various public land uses; and in accordance with the following criteria:

- Routes shall be located to minimize damage to soil, watershed, vegetation, air, cultural or other public land resources, and to prevent impairment of wilderness suitability in relevant areas.
- Routes shall be located to minimize harassment of wildlife or major disruption of wildlife habitats. Special attention will be given to protect Threatened or Endangered species and their habitats.
- Routes shall be located to minimize conflicts between off-road vehicle use and other existing or proposed recreational uses of the same or neighboring public lands, and to ensure the compatibility of such uses with existing conditions in populated areas, taking into account visibility, noise and other factors.
- Motorized areas and routes shall not be located in officially designated wilderness areas or primitive areas. Motorized areas and routes shall be located in natural areas only if the authorized officer determines that off-road vehicle use in such locations will not adversely affect their natural, aesthetic, scenic, or other values for which such areas are established.

A subsequent NEPA document will be developed with an array of alternatives that will identify the travel routes open for motorized use. The document must address all modes of transportation and primary use for the TMA. Additionally, the plan should identify maintenance intensities and legal access needs and indicate changes in the status of existing routes and areas. The plan will also address necessary improvements, trailheads, staging areas and signs, where applicable.

The public will be notified of the objective of the proposed TMP and of scoping meetings through local media, as appropriate, to reach the potentially affected user groups. Resource Advisory Councils, local government, state and federal agencies, gateway communities, and local organizations, as applicable, will be invited. Maps of the planning area will be prepared and available to facilitate discussion in identifying public issues, concerns, and access needs.

Substantive public comments will be incorporated into the TMP, the NEPA document will be completed and the signed Finding Of No Signification Impact and Decision Record made available for public review. Completion of the TMP for a TMA will establish a transportation network for a particular TMA through the identification of roads, primitive roads, and trails as "Open," "Limited," or "Closed" for a particular use.

The TMP will be implemented on the ground which will include corresponding public information, education, and signing efforts. Please refer to the TTM Implementation section for further information.

Upon completion of the TMP and subsequent NEPA document, the final travel and transportation network will be published in the Federal Register notice, where required.

Definitions, route categories, and maintenance levels of all of the designated routes will be entered into the Facility Asset Management System (FAMS).

A map will be produced and made available to the public depicting the designated roads, primitive roads, trails and permitted uses.

As per 43 CFR 8342.3, the BLM will monitor effects of the off-road vehicle use within TMAs. The BLM may amend, revise, or revoke designated routes, or take other actions to address any issues identified through monitoring. Additionally, where off-road vehicles are causing or will cause considerable adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, threatened or endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s)

of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence (43 CFR 8341.2).

Provisions for route decommission and rehabilitation of closed or illegal routes include the following:

- OHV use is causing, or will cause, considerable adverse effects.
- A road or vehicle route poses a threat to public safety.
- Road density is adversely affecting resources.
- Closure is necessary for desired future conditions for access.
- Closure is necessary for visual resource protection.
- Closure is necessary for sensitive habitat management.

Travel and Transportation Management Implementation

The BLM uses several means to implement travel management designations. A major component of travel management is a series of well-designed maps and/or brochures that clearly portray TMA designations. Another component is the BLM sign program. Signing in the field must be sufficient to ensure that the public understands the regulations for any given area. Law enforcement and public education provide further assistance in implementation. The final step in the process is monitoring and evaluation, which may lead to adaptive management.

1. OHV Signs

- Signs are designed to notify the public of travel management designations in the field. They should be simple to understand, inexpensive, durable, and easy to install and replace.
- Signs will be standardized. OHV signs must be standardized within the BLM, especially among neighboring field offices. The message on the sign may vary according to the nature of the individual OHV designation but the size, type of substrate, layout and design should be the same. Efforts will be made to use alternative materials deemed as effective as being "vandal-proof," or made of environmentally-friendly products.
- Portal signs will indicate places where access roads leave public roads and enter TMAs, where appropriate. Due to the land tenure patterns within the planning area, portal signs may not be available at all access points. Portal signs will explain the travel management designation for the TMA.
- For areas designated as "Limited to Designated Roads," all designated roads may be identified with numbers on travel management maps, consistent with statewide road & trail signing efforts. Every effort will be made to number routes with on-the-ground signs, but land tenure and the scope of the planning area may prevent the numbering of all routes.
- Until TMPs are completed, areas designated as "Limited to Designated Roads" will be managed as "Limited to Existing Roads." In such areas, only portal signs are necessary. Individual roads and vehicle routes need not be signed.
- For road closures and closed areas, documentation stating the rationale for the closure must be made available to the public.

2. Maps and Brochures

Maps will provide detailed information to the public regarding travel management designations. A site-specific map will be published for each TMA following completion of the TMP. TMP decisions may eventually be reflected on 1:100,000-scale Surface Management Status maps. However, given the scope of the Surface Management Status maps and the cost and timeframe

for updating such maps, the public must not rely on 1:100,000-scale maps for TMP decisions. Brochures for specific areas may also be published.

3. Education

Educational programs will be included in travel management implementation planning. The BFO will initiate programs for the public that emphasize responsible OHV-use, respect for the land, resources, and private property rights. Information about regulations, penalties, consequences for irresponsible behavior, and potential impacts to resources from inappropriate use will be incorporated into the outreach program.

4. Enforcement

Law Enforcement is essential for successful OHV implementation and management. All federal and state laws that apply to motor vehicle use (including the Wyoming Off-Road Recreational Vehicles Act) are subject to enforcement. The BLM may also enter into cooperative law enforcement agreements with other federal, state and local agencies.

When OHV designations (which may include closures or restrictions) are developed through RMPs, publication of the Federal Register Notice for ROD, is required and is sufficient for legal enforcement. When the BLM issues an order that closes or restricts the use of public lands, adequate public notification is required. For those orders to be legally enforceable and upheld in court the requirements found in 43 CFR Subpart 8364, Closures and Restrictions, must be followed.

5. Monitoring and Evaluation

Monitoring is an integral component of OHV management (BLM 2012a). The BLM will monitor the effectiveness and appropriateness of the OHV designations.

Items to monitor include, but are not limited to the following:

- Resource damage resulting from OHV use
- Unauthorized route development
- Effects of OHV use on wildlife
- Effects of OHV use on other recreation or resource uses
- OHV user conflicts and complaints
- Trends in the number of OHV violations and incident reports
- OHV associated private land conflicts
- Identification of maintenance needs
- Fence and barrier conditions

Other Travel and Transportation Management Elements

Authorized and Permitted Uses

Use of OHVs may be administratively authorized or permitted for non-casual activities, such as accessing range improvements, exploration for energy or minerals, and access to inholdings. Temporary excursions leaving existing vehicular routes are permitted only to accomplish necessary tasks. Necessary tasks are actions that support commercial or industrial uses of public lands which need to be accomplished by a person or organization seeking or holding authorization

from the BLM to build, maintain, or place infrastructure necessary to achieve planning goals and objectives, or exercise valid existing rights.

Necessary tasks that support commercial or industrial uses of public lands may be allowed under permit in areas managed under Limited designations (motorized use limited to designated roads and trails), and not in areas closed to motorized use, such as WSAs or in areas with seasonal limitations.

Authorizations or permits that include OHV activities will address the use of OHVs as part of the authorization or permit. Authorized OHV activities require an appropriate level of NEPA environmental analysis, should be compatible with the land use plan goals, and may have use stipulations associated with the authorization or permit. Relevant NEPA documents should analyze whether any new roads would remain open to the public, open solely for administrative access, or reclaimed following completion of the original proposed action. Mitigation measures pertaining to motor vehicle use or the necessary task exemption will be included in the terms and conditions, conditions of approval, and/or stipulations.

Sometimes necessary tasks are and will be accomplished without formal written approval or in advance of receiving an authorization in accordance with Onshore Order 1. Another example is mineral activities defined as casual use (except in areas designated as Closed to OHV use) by 43 CFR 3809 – Surface Management Regulations. Cross-country or off-road vehicle travel in these cases is authorized so long as resource damage does not occur. In these cases actions proposed by the proponent leads to the issuance of a permit or authorization and may be authorized after initial contact with the field office.

It is recognized that in many cases cross-country or off-road motorized vehicle use is the most efficient tool for operators and industry to achieve BLM objectives and requirements. Livestock herding, scientific studies, habitat treatments, etc. all are examples of actions that may require cross-country or off-road motorized vehicle travel. The BLM may grant administrative use authorizations on a case-by-case basis with written approval from the authorized officer or as part of the permitted use.

Authorizations will be conditional upon consistency with Land Use and Activity level planning decisions and other BLM objectives. The project proponent is encouraged to be as detailed as possible in the application for authorization. The BLM will consider an application complete when the information provided is sufficient to facilitate impact analysis, enforcement, monitoring, and evaluation. Project proponents are encouraged to submit the waiver request in tandem with other applications, renewals, or proposals, but the agency will accept the applications at all times. Waiver applications may not be accepted for individuals that are being actively investigated for violation of an OHV rule. Waivers and authorizations may not be granted to individuals who have been convicted of an OHV violation. Additionally, individuals conducting off-road travel under an authorization must carry a copy of the authorization and any relevant stipulations and conditions.

Limited cross-country vehicle travel is allowed for the purpose of maintaining existing range improvements or animal husbandry efforts if established access routes do not exist, so long as resource damage does not occur. Travel on wet or muddy soils should be avoided to prevent rutting and erosion. In these cases the project proponent is expected to submit a request for exemption from travel management regulations.

Recreational Use to Accommodate Necessary Tasks

In areas with Limited travel designations, the public is allowed to pursue certain recreational activities up to 300 feet from designated roads and trails as long as such activity does not cause resource damage, create new roads or extend existing roads. Valid reasons for pursuing recreational activities include direct access for big game carcass retrieval or to dispersed campsites. Additionally, parking alongside a route to remove the vehicle from the traffic lane is considered a necessary task. Any motorized travel outside of these parameters or that causes resource damage is a violation of the RMP decisions and is subject to enforcement action including citation and fine.

Off-Highway Vehicle Access for Persons with Disabilities

Section 504 of the Rehabilitation Act (Public Law 93-112 as amended) requires federal land managing agencies to provide reasonable opportunities for access for persons with disabilities. Accordingly, during hunting seasons, individuals possessing a valid Wyoming Game & Fish Department "Permit for Hunters with Qualifying Disabilities" will be allowed to use an OHV to retrieve big game carcasses in areas designated as "Limited to designated" routes beyond the 300 foot travel zone without any additional authorization, provided that resource damage or the creation of new roads does not occur. *Note: Personal mobility devices (such as wheelchairs, mobility scooters, etc.) utilized for medical purposes are exempt from travel management restrictions.*

In addition, Field Managers will consider requests by persons with disabilities for authorization for cross-country travel for the purposes of gaining access to the public lands for recreational purposes. These requests will be considered on case-by-case basis. Decisions will be based on a combination of factors including need, other available opportunities, resource management considerations, and the assurance that the activity can be carried out without causing resource damage. If OHV use authorizations are granted, the above criteria will be included in the written authorization.

BLM Administrative Use

Off-road travel by BLM employees conducting official business is allowed only for necessary tasks and only if such travel does not cause resource damage or create unauthorized or unplanned roads and trails. Such travel by BLM employees must meet the same standard required of permit holders who are performing necessary tasks in conjunction with their permit or authorization. Administrative use of motor vehicles may be allowed within closed areas outside of WSAs, however, written approval from the authorizing officer must be obtained prior to off-road use in closed areas unless an emergency situation exists. Additionally, emergency operations such as firefighting will use existing roads whenever feasible.

Over-Snow Travel

Over-snow travel is restricted in closed areas and during relevant seasonal closures. However, the BLM recognizes that snowmobiles may not cause resource damage when operated off-route in an appropriate manner. Historically there have been few places within the planning area that receive sufficient snow cover (4 inches - 6 inches) for the safe and sustainable operation of snowmobiles. However, should snow cover be sufficient to prevent resource damage, snowmobiles may operate off of designated routes in areas "Limited to designated routes," provided that no seasonal restrictions or temporary closures exist and resource damage does not occur.

Temporary Closures and Restrictions

The purpose of a temporary closure and restriction is to protect public health and safety, or prevent undue or unnecessary resource degradation due to unforeseen circumstances. Where off-highway vehicles are causing or will cause considerable adverse effects upon soil, vegetation, wildlife, wildlife habitat, cultural resources, historical resources, Threatened or Endangered species, wilderness suitability, other authorized uses, or other resources, the affected areas shall be immediately closed to the type(s) of vehicle causing the adverse effect until the adverse effects are eliminated and measures implemented to prevent recurrence.

Wilderness Study Areas

OHV designations for lands in WSAs must conform to Manual 6330 - Management of Wilderness Study Areas (BLM 2012c). Cross-country travel by motor vehicle is strictly prohibited in WSAs. Signs, maps, publications, outreach and enforcement will be used to inform the public aware of motorized restrictions. Exceptions will be allowed in accordance with Manual 6330 (BLM 2012c). The 300 foot travel exception which applies to the "Limited" category does not apply in WSAs as these areas are closed entirely to motorized use. In addition, the exemption for retrieving harvested big and trophy game animals within 300 feet of an existing road or trail is not allowed in WSAs, nor is any exemption for cross-country travel for hunters with qualifying disabilities.

Known existing routes within WSAs were documented and mapped during the original wilderness inventory process (BLM 1979) and updated during this RMP revision. This route inventory data is the baseline for the travel and transportation network for the following WSAs: Fortification Creek, Gardner Mountain, and North Fork.

In WSAs, motorized and mechanized use may be permitted to continue along existing routes identified in the wilderness inventory conducted in support of Sections 603 and 202 of FLPMA. None of the WSAs within the planning area contain documented ways in the original inventory that meet exception criteria for motorized travel. Therefore, no motorized use is allowed in WSAs except as defined for valid and existing rights in Manual 6330 (BLM 2012c).

Resource Damage

While generally defined (see glossary) the determination of whether resource damage has occurred is left to the discretion of Field Managers and law enforcement personnel. Project proponents are encouraged to contact their local field offices prior to using any vehicle off of established routes, so as to ensure that they will not cause resource damage. In addition project proponents must notify the BLM in writing when and where off-road travel has occurred prior to an authorization. This may be done at the application phase, but must occur prior to final authorization.

Revised Statute 2477 Assertions

A TMP is not intended to provide evidence bearing on or addressing the validity of any Revised Statute 2477 assertions. Revised Statute 2477 rights are adjudicated through a separate, judicial and administrative process that is entirely independent of the BLM's planning process. Consequently, travel management planning should not take into consideration Revised Statute 2477 assertions or evidence. Travel management planning should be founded on an independently determined purpose and need that is based on resource uses and associated access to public lands and waters. At such time as a decision is made on Revised Statute 2477 assertions, the BLM will adjust its travel routes accordingly.

Route Definitions, Route Management Categories, Maintenance Levels

Road maintenance, construction, and any other related TTM is mandated by BLM Manual 9113 (BLM 1985b). BLM Manual 9113 (BLM 1985b) provides for "best management practices" to be used in evaluating, maintaining, and constructing BLM travel and transportation routes. As guided in Manual 9113 (BLM 1985b), "Bureau roads must be designed to an appropriate standard no higher than necessary to accommodate their intended functions adequately (timber hauling administrative access, public travel); and design, construction, and maintenance activities must be consistent with national policies for safety, esthetics, protection and preservation of cultural, historic, and scenic values, and accessibility for the physically handicapped."

Route Definitions

IM 2006-173 (BLM 2006d), "Implementation of the Roads and Trails Terminology Report," dated June 16, 2006, established BLM definitions for road, primitive road (which was added as a new transportation asset category), and trail, and required transportation assets to be classified as such. As part of this BLM-wide classification process, existing FAMS transportation assets were reviewed and reclassified to accurately reflect the new definitions.

- **Road:** A linear route declared a road by the owner, managed for use by low clearance vehicles having four or more wheels, and maintained for regular and continuous use.
- **Primitive Road:** A linear route managed for use by four-wheel drive or high-clearance vehicles. Primitive roads do not normally meet any BLM road design standards.
- **Trail:** A linear route managed for human-powered, stock, or OHV forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high clearance vehicles.

Primitive roads shall not be designated within a WSA or within lands that have been identified as having wilderness characteristics for which a land use plan has determined that wilderness characteristics are to be protected. Any linear feature located within areas that have been identified as WSAs and/or those lands outside of WSAs with wilderness characteristics will be identified in a transportation inventory as a "route." Except for nonmotorized and nonmechanized trails, these routes will not be classified as a transportation asset and will not be entered into FAMS unless one of the following conditions is met:

- Congress designates the area as Wilderness (then nonmotorized and nonmechanized trails only), or
- RMP decision is made to not protect the area for wilderness characteristics, or
- Congress releases the area from Wilderness consideration.

Route Management Categories

Route Management Categories describe the primary purposes and uses for the routes. Many routes fall under more than one management category. Much use by private landowners, grazing permittees, and the public occurs on Collector Roads and is provided under casual use; therefore, a formal use authorization is not required. Maintenance levels outline the degree of maintenance to be performed, dependent on funding levels. Maintenance of routes with limited or no public access may be the responsibility of the landowner.

Private landowner maintenance of routes on BLM-administered land will be supervised by the BLM. Route maintenance is generally prioritized, based on safety concerns and degree of use. Inadequate funding may preclude the BLM from maintaining routes at levels assigned in this TMP. Route Management Categories and Maintenance Levels are monitored and may be modified as needs and conditions change.

Items A through C of this list conform to BLM guidelines included in the Pocket Field Guide: Road Standards, Excerpts from BLM Manual Section 9113. The types of roads that exist on the public lands are as follows:

- **Collector Road:** These roads normally provide primary access to large blocks of public land, and connect with or are extensions of a public road system. Collector roads accommodate mixed traffic and serve many uses. They are generally capable of handling high traffic volumes. Collector roads usually require application of the highest engineering standards used by the BLM. Collector roads receive routine maintenance.
- **Local Roads:** These BLM roads normally serve a smaller area than collectors, and connect to collectors or the public road system. Local roads receive lower volumes of traffic, carry fewer traffic types, and generally serve fewer users. Low volume local roads in mountainous terrain, where speeds are reduced, may be single lane roads with turnouts, and may be maintained to a lower standard than collector roads.
- **Resource Roads:** These are normally spur roads that provide point access and may connect to local or collector roads. They carry low traffic volumes and accommodate few uses.

Maintenance Levels

Route management categories and route maintenance levels on roads, primitive roads, and trails designated Open to motorized or nonmotorized use within the BFO will be stored in a FAMS database. Guidance directs the BLM that upon approval of the RMP ROD, designated travel routes must be entered into FAMS. The FAMS data will serve as the current information on the BLM's transportation system. There are five maintenance levels assigned to a travel route ranging from low maintenance priority to high priority. The following further details the maintenance levels:

- **Level 1:** This level is assigned to roads where maintenance is limited to protecting adjacent land and resource values. These roads are no longer needed and are closed to traffic. The objective is to remove these roads from the transportation system. At a minimum, drainage and runoff patterns will be maintained as needed to protect adjacent land. Grading, brushing, or slide removal will not be performed unless roadbed drainage is being adversely affected or is causing erosion. Closure and traffic restrictive devices will be maintained.
- **Level 2:** This level is assigned to roads open seasonally or year-round and uses may include commercial, recreation, private property access, and administration purposes. Typically, these roads are passable by high clearance vehicles and are maintained, as needed, depending on funding levels. Seasonal closures or other restrictions may be needed to meet resource objectives or because of snow levels or other weather conditions. At a minimum, drainage structures will be inspected within a 3-year period and maintained as needed. Grading will be conducted as necessary to correct drainage problems. Brushing will be conducted as needed and slides may be left in place provided they do not adversely affect drainage.
- **Level 3:** This level is assigned to roads open seasonally or year-round and uses may include commercial, recreation, private property access, and administrative purposes. Typically, these roads are natural or have an aggregate surface, but may include bituminous surface roads. These roads have a defined cross section with drainage structures such as rolling dips, culverts or ditches and may normally be negotiated by passenger cars driven cautiously. User comfort and convenience are not considered a high priority. At a minimum, drainage structures will be inspected annually and maintained as needed. Grading will be conducted to provide a reasonable level of riding comfort at prudent speeds for the road conditions. Brushing will be conducted as needed to improve sight distance. Slides adversely affecting drainage will receive high priority for removal and other slides will be removed on a scheduled basis.

- **Level 4:** This level is assigned to roads open seasonally or year-round. Uses include commercial, recreation, private property access, and administrative purposes. Typically, these roads are single or double lane and have an aggregate or bituminous surface. This maintenance level provides access for passenger cars driven at prudent speeds. At a minimum, the entire roadway will be maintained at least annually, although a preventive maintenance program may be established. Major problems will be repaired as discovered.
- **Level 5:** This level is assigned to roads open seasonally or year-round that carry the highest traffic volume of the transportation system. Uses include commercial, recreation, private property access, and administrative purposes. Typically, these roads are single or double lane and have an aggregate or bituminous surface. This maintenance level provides access for passenger cars traveling at prudent speeds. The entire roadway will be maintained at least annually and a preventive maintenance program will be established. Problems will be repaired as discovered.

Routes (ways) within WSAs are not maintained other than by the passage of vehicles, with certain exceptions. Exceptions are limited to the minimum mechanical maintenance necessary under Manual 6330 (BLM 2012c).

Appendix S. Areas of Critical Environmental Concern

S.1. Proposed Areas of Critical Environmental Concern Designated by Alternative D

S.1.1. Fortification Creek Elk Area

SUPPORTING INFORMATION
The Fortification Creek Area of Critical Environmental Concern (ACEC) encompasses the crucial seasonal ranges occupied by a locally and regionally important geographically isolated elk herd (71,755 acres). The Bureau of Land Management (BLM)-administered surface totals 32,602 acres and the mineral estate is 61,481 acres. The area is composed of rough prairie break topography bisected by several drainages. Typical vegetation is sagebrush/grassland intermixed with juniper. Elk historically occurred in the area but were extirpated in the late 1800s. Today, a herd of approximately 200 elk resides yearlong in the area, as a result of reintroductions from Yellowstone National Park in the 1950s The elk herd and their habitat is threatened by encroaching coalbed natural gas development. The Fortification Creek area also contains a Wilderness Study Area (WSA), scenic values, and steep slopes with highly erodible soils. Timing limitations (WL-4015) are proposed for elk crucial winter range and calving areas including Fortification Creek. However, timing limitations are not sufficient to prevent big-game disturbance during these sensitive seasons. Timing limitations simply delay the surface-disturbing activities until after the sensitive period. After construction, disruptive activities for operation and maintenance are not prohibited even during sensitive periods. Surface disturbance and occupancy (WL-4014) are prohibited within other important big-game areas including Ed O. Taylor, Kerns, Bud Love, and Amsden Creek but not Fortification Creek. Big game within the other areas are migratory, residing only seasonally. The surface disturbance prohibition within these areas protects portions of an important seasonal habitat, crucial winter range. The Fortification Creek elk herd is a non-migratory herd with no surface disturbance and occupancy prohibitions. Without such a prohibition the Fortification Creek herd has no secure areas to winter, calve or escape to when threatened; the elk herd is likely to decline and potentially faces extirpation without additional management. A surface disturbance prohibition (mineral, rights-of-way [ROW], renewable) is also necessary to protect the scenic and recreational value of the Fortification Creek area. Fortification Creek is an important recreational area due to the presence of wilderness characteristics. Coalbed Natural Gas (CBNG) (well, powerline, and pipeline networks to serve wells every 80 acres) and other forms of development would eliminate wilderness characteristics and opportunities for solitude or primitive recreational opportunities and have a major impact on the remaining scenic and recreational values of the area. Current & Proposed Resource Management Plan (RMP) management is insufficient to protect the relevance and importance criteria. BLM determined in the Powder River Basin Final Environmental Impact Statement (BLM 2003c, Appendix R) that the Fortification Creek area meets relevance criteria for scenic value and a wildlife resource. It also meets the importance criteria for local significant qualities (wilderness characteristics), has circumstances that make it fragile, and unique (plains inhabiting elk herd, and minimal impacts from man), and has been recognized as warranting protection to satisfy national priority concerns.
ACEC OBJECTIVE(S) DECISIONS
Objective Statement: The objective of a Fortification Creek ACEC is to preserve the following significant, fragile, and unique resources contained within: wilderness characteristics, scenic values, steep slopes with highly erodible soils, and an isolated elk herd minimally impacted by man.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

** Note: The WSA will be managed under the Manual 6330 - Management of Wilderness Study Areas pending an act of Congress. The following management prescriptions predominately apply to lands outside the WSA.

Physical Resources:

Water developments and other proposals for physical resources shall be compatible with other resource values. Water availability may be a limiting factor for the elk herd, particularly during the dry summer months. Additional water developments may benefit the elk.

Mineral Resources:

Mineral leases within the WSA have expired and the WSA is administratively closed from further leasing. The ACEC will be recommended for withdrawal from mineral entry, unavailable for mineral leasing, and closed to salable mineral development. Existing lease rights shall be retained; current leases may be developed in accordance with their lease stipulations and site-specific National Environmental Policy Act analysis. Once leases are terminated they will be administratively closed from further leasing.

Fire and Fuels Management:

Suppression activities, planned fire, and fuel treatments shall be allowed where compatible with other resource values. Suppression activity shall avoid the use of heavy equipment unless there is a direct and measurable risk to life or property.

Biological Resources:

Allow desirable non-native plant species for initial reclamation activities.

Heritage and Visual Resources:

The WSA is managed as Visual Resource Management (VRM) Class I. The remainder of the ACEC will be managed as VRM Class II.

Land Resources:

Commercial quality timber is not present. Shrub and woodland projects designed for environmental restoration shall be allowed with consideration of other resources such as retaining sufficient big game hiding cover.

The ACEC will be managed as a ROW exclusion area that is also closed to renewable energy development.

The WSA will be Closed to motorized travel and travel will be Limited to designated routes in the remainder of the ACEC. Additionally, lands within crucial winter and calving areas will be seasonally Closed.

Special Designations:

A WSA (12,419 acres) exists within the proposed boundaries of the ACEC. The WSA will be managed under BLM Manual 6330 – Management of Wilderness Study Areas, and may include additional stipulations as outlined in the "Management Actions and Allowable Use Decisions" section.

IMPLEMENTATION DECISIONS

Implementation Decisions: (e.g., The land use plan decision may be to designate motorized travel areas while the supporting implementation decisions would address specific route designations)

Marketing: Until adequate public access is acquired, the area will not be marketed for recreational use. If access is acquired, or a trail is constructed, information in the form of maps will be available at the field office.

Monitoring: An extensive elk and CBNG reclamation monitoring program being proposed as part of the Fortification Creek amendment. The extensive monitoring will likely continue for several years following CBNG reclamation activities. Vehicle counters will be placed as time and funding allows.

Management:

Administrative:

Travel Management: The area will be managed as Limited to designated routes, with very few routes designated. Designated routes will be primarily for provision of access to inholdings within the ACEC and to provide egress for administrative use.

Special Recreation Permits: Allowed with general stipulations. Stipulations on large-scale events?

Agreements: Maintain cooperative agreements with State Land Board and Wyoming Department of Game and Fish.

S.1.2. Pumpkin Buttes

SUPPORTING INFORMATION

The boundary of Pumpkin Buttes Areas of Critical Environmental Concern (ACEC) includes all portions of the Pumpkin Buttes Traditional Cultural Property that are Bureau of Land Management (BLM)-administered surface (1,733 acres). The Pumpkin Buttes are approximately 45 miles southwest of Gillette, rising approximately 800 feet above the surrounding landscape. The buttes consist of five flat topped mesas referred to as North Butte, North Middle Butte, South Middle Butte, South Butte and Indian Butte. The top of North Middle Butte is 6049 feet, which is the highest elevation in Campbell County. All of South Middle Butte and roughly one third of North Middle Butte are BLM-administered surface. The majority of the mineral estate under the buttes was reserved by the government. There is no public access to the BLM-administered surface on either butte, although, BLM purchased an administrative easement to South Middle Butte. South Middle Butte is currently used as a communication site and includes six transmission towers. There are several uranium claims on and near the buttes, with one proposed uranium mining operation on BLM-administered surface on North Middle Butte. Nearly all the fluid minerals under the buttes are currently leased. There is extensive coalbed natural gas development around the buttes, and an existing oil field within three miles. A proposed 200 turbine wind-energy development is located on fee surface within two miles of the east side of the buttes.

Recent consultations with several Native American tribes revealed that in the past the buttes were utilized for many types of traditional, religious and ceremonial purposes. Numerous past indications of traditional and religious uses (stone circles, eagle traps, cairns, etc.) remain on most of the buttes. In 2007 the BLM determined in consultation with fifteen tribes that the Pumpkin Buttes is a traditional cultural property and that the area has an ongoing connection to traditional beliefs and practices of several Native American tribes. During the consultation process, some tribes expressed an interest in using the buttes for ceremonial or educational purposes.

The Pumpkin Buttes are also a prominent landmark associated with several historic events. All of the explorers of the Powder River Basin in the early and mid 19th century mention the buttes in their journals. The name "Pumpkin Buttes" was credited to the unique geographic features by Jim Bridger in the 1850s They are also often mentioned as a landmark in several emigrant diaries from travelers on the Bozeman Trail in the 1860s The buttes had a secondary role in the Red Cloud War and Great Sioux War, documented as a lookout for the U.S. Army and Native American tribes. There are active golden eagle and prairie falcon nests on top of the buttes. Wildlife common to the area include mule deer, pronghorn, Greater Sage-Grouse, coyote, bobcat, raptors and numerous song birds. Bald eagles frequent the buttes in the winter. There are no Threatened or Endangered or proposed species or habitat on the butte. Sensitive species that may occur include: Greater Sage-Grouse, loggerhead shrike, Brewer's sparrow, sage sparrow.

The site meets the relevance criteria since it contains several a rare and sensitive archeological resources, and is a significant religious and cultural resource important to several Native American tribes. The site meets the importance criteria since it retains has qualities which give it significant special worth and distinctiveness. The area also has qualities that make it fragile, sensitive, irreplaceable and vulnerable to adverse change. The area also meets the importance criteria because it warrants protection in order to carry out the mandates of Federal Land Planning Management Act.

Current and proposed management is insufficient to protect the relevance and importance criteria. In compliance with the National Historic Preservation Act, any impacts to the site as a result of a federal undertaking must be considered and adverse effects must either be avoided or mitigated. If Alternative D (specifically Cultural 005, 006, 007) is selected, the creation of a Cultural Resource Project Plan, surface disturbance restrictions, and application of no surface occupancy (NSO) and controlled surface use stipulations to fluid minerals leases will result in a degree of protection for the area. The existence of fluid mineral leases under the majority of the area, numerous

uranium claims and proposed mining operations, nearby wind-energy development and the existence of multiple communications towers on the buttes creates a difficult management condition in which it is exceedingly difficult to effectively balance resource concerns. Additionally, there are intangible significant aspects of the area, such as cultural and religious significance to the tribes that standard surface occupancy management decisions cannot adequately address. Since the area may be an important part of several tribes' ongoing cultural identity, special management is necessitated. Federal agencies are mandated by the American Indian Religious Freedom Act to provide access for tribes to sites with cultural significance on federal surface.

Development of existing minerals leases, locatable minerals development, wind-energy projects and the existence of communications towers on the Pumpkin Buttes directly conflict with the legal rights of Native American tribes to utilize the area for traditional cultural rights and practices. Because of these factors, the site should be designated as an ACEC.

ACEC OBJECTIVE(S) DECISIONS

Objective Statement: Management of the Pumpkin Buttes ACEC is consistent with Native American religious practices. The Pumpkin Buttes are preserved and protected as a nationally significant cultural resource.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Mineral Resources:

The area will be recommended for withdrawal from mineral entry and closed to disposal of mineral materials. An NSO on fluid leasable minerals will be applied to all lands within the ACEC.

Fire and Fuels Management:

Fire suppression activity should avoid the use of heavy equipment unless there is a direct and measurable risk to life or property.

Biological Resources:

Do not allow non-native plant species for initial reclamation activities.

Heritage and Visual Resources:

Establish tribal access and allow for traditional cultural rights and practices

Manage as Visual Resource Management Class II

Land Resources:

ACEC will be managed as a rights-of-way exclusion area that is also closed to renewable energy development.

Travel is Limited to designated routes.

Special Designations:

No other Special Designations exist within the proposed boundaries of the ACEC.

IMPLEMENTATION DECISIONS

Implementation Decisions: (e.g., The land use plan decision may be to designate motorized travel areas while the supporting implementation decisions would address specific route designations)

Marketing: The area will not be marketed for recreational use.

Monitoring:

Management: A management plan will be created for the ACEC which includes input from native American tribes and all other stakeholders.

Administrative:

Travel Management: The area will be managed as Limited to designated routes. Designated routes will be primarily for provision of access to communication sites and for administrative use.

Special Recreation Permits: Commercial guiding will not be allowed.

Agreements:

Partners:

Other administration:

S.1.3. Welch Ranch

SUPPORTING INFORMATION
The Welch Management Area is a 1,748-acre parcel, located approximately 10 miles north of Sheridan, Wyoming. The Welch area is accessible from Sheridan via Wyoming State Highway 338 (Decker Road). Two developed parking areas exist at the junction of Highway 338 and the Tongue River with directional signs identifying the area. Several unimproved primitive roads totaling 6.1 miles serve the livestock operations on the property both from Highway 338 and from the Ash Creek Road located just north of the property. The Welch Ranch was acquired in 2004 as part of a land exchange (BLM 2005f). As a new acquisition, the Bureau of Land Management (BLM) must evaluate the area as a potential Area of Critical Environmental Concern (ACEC). The Welch area is located in the Powder River Basin, a part of the Northern Great Plains, which includes most of northeastern Wyoming and a portion of southeastern Montana. The Welch property occupies a portion of the Tongue River valley floor and the adjacent dissected uplands between Ash Creek and Hidden Water Creek. At least two homesteads were present on the property, including the Tryor homestead and the Evans homestead, which included a post office. There is also evidence of prehistoric use, including lithic scatters and quarries. Approximately 1.5 miles of the Tongue River runs through the Welch Ranch. A coal seam fire exists on a ridge in the southwestern corner of the parcel. The Big Horn Mountains are within sight of the Welch Ranch to the west. The coal fire began in 1909 and while the origin is unclear, the fire is now considered to be part of the natural process. The Office of Surface Mining has voiced concerns regarding human health and safety in relation to the coal fire and has suggested that special management may be necessary to prevent unsafe exposure to this hazard. The coal fire on the north side of the river is an important resource because it represents a threat to health and safety, influences plant and animal distribution and form, and represents historical mining operations. To date no known injuries have resulted from public interaction with the fire vents. The riparian corridor is part of a migratory bird corridor and boasts excellent habitat for mule deer and other big game. The Tongue River is a red ribbon fishery identified as having regional importance. A free-flowing prairie river with easy public access from a major population center in Wyoming. Without special designation and management, there is a strong possibility that visitation will degrade the importance and relevance criteria. Increased public awareness of riparian health will assist in improving the habitat and subsequently increasing the species diversity and numbers of birds to the point that the area will be acknowledged as an Important Bird Area. The Welch Ranch offers nonmotorized dispersed recreation including camping, mountain bicycling, freshwater fishing, hiking, small and big game hunting, upland bird hunting, picnicking, wildlife viewing, bird watching and float trips. Motorized use is prohibited within the management area. Prohibitions within the developed parking area include overnight camping, open fires and discharge of firearms. The area meets the relevance criteria for significant scenic values, fish and wildlife resources, and presence of a natural hazard (coal fire). The Welch Ranch meets the importance criteria in that it has more than locally significant qualities which give it special worth and which warrant special management for safety or public welfare. Welch constitutes one of very few riparian areas managed by the BLM and one of the few areas in Sheridan County with public fishing and boating access. Prairie riparian habitats represent less than 1% of the planning area. The combination of the rarity of the habitat type, the accessibility of the location in close proximity to a population center, and the high recreational use underscore the need for special management at the Welch Ranch.
ACEC OBJECTIVE(S) DECISIONS
Objective Statement: The Welch Ranch ACEC will be sustained or enhanced for nonmotorized and wildlife based recreational opportunities, preservation of outstanding scenic values and for the safety of visitors.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Physical Resources:

Prohibit surface disturbance resulting in impacts to physical resources unless those activities can be demonstrated to protect the relevance and importance criteria.

Mineral Resources:

The area will be recommended for withdrawal from mineral entry and closed to disposal of mineral materials. The fluid leasable minerals are not administered by the BLM.

Fire and Fuels Management:

Fire suppression activity should avoid the use of heavy equipment unless there is a direct and measurable risk to life or property.

Biological Resources:

Prohibit the use of non-native plant species for all reclamation activities.

Prohibit the introduction of desirable non-native wildlife species.

Heritage and Visual Resources:

Manage as Visual Resource Management Class II

Land Resources:

This ACEC will be managed as a rights-of-way (ROW) exclusion area that is also closed to renewable energy development. The burying of low voltage powerlines is preferred in ROW that have been authorized but not developed.

Travel is limited to administrative use on designated routes.

The area will be managed as an Special Resource Management Area.

Special Designations:

No other Special Designations exist within the proposed boundaries of the ACEC.

Socioeconomic Resources:

Mitigation of coalbed fires at Welch Ranch will consider other resource values and should result in the least disruptive and surface disturbance possible.

IMPLEMENTATION DECISIONS

Implementation Decisions: (e.g., The land use plan decision may be to designate motorized travel areas while the supporting implementation decisions would address specific route designations)

Marketing: Provide maps and information at the field office. Directional signage present from Highway 339. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, International Migratory Bird Day, National Public Land Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. Riparian and upland range monitoring began in 2010. A green-line based riparian monitoring regime will be used to document changes in the riparian system through time. Upland transects were also established in 2010 to monitor changes in native v. non-native grass cover as well as rangeland health and will be monitored on at least a biennial basis. Riparian bird surveys (4 times per year) began in 2009 and will continue on at least a biennial basis.

Management: Signs present at key access points. Additional signage necessary to apprise public of coal seam fire hazards. Develop trailheads for foot, horse and bicycle travel. Increase river corridor accessibility for boaters and anglers.

Administrative:

Travel Management: The area will be managed as Limited to designated routes, with very few routes designated. Designated routes will be primarily to provide egress for administrative use.

Special Recreation Permits: Allowed with general stipulations.

Agreements: Maintain cooperative agreements with State Land Board and Wyoming Department of Game and Fish.

Partners: Sheridan Community Land Trust, Sheridan Public Land User Committee, Wyoming State Land Board and Wyoming Department of Game and Fish.

Other administration: Recreational target shooting is prohibited within developed recreation sites. The parking lots and trailheads are closed to camping. Dispersed camping is otherwise allowed.

S.2. Proposed Areas of Environmental Concern not Designated by Alternative D

S.2.1. Burnt Hollow

Background:
Burnt Hollow entails about 17,282 acres of public land 15 miles north of Gillette, Wyoming. The land was acquired by the Bureau of Land Management (BLM) through a land exchange completed in 2002 (BLM 2005f). The area is composed of gently rolling sagebrush/grasslands, scoria buttes and clayey escarpments. There are numerous cottonwood ephemeral drainages, with juniper and ponderosa pine covered slopes. Several areas are unroaded due to steep terrain and unstable soils.

The area meets relevance criteria for scenic value, and natural hazards due to steep erosive soils and flooding potential. The area meets the importance criteria for local significant qualities (recreational access); warrants protection to satisfy national priority concerns; and public or management concerns about safety and property.

The varied topography and diversity of vegetation communities provide habitat for numerous wildlife species including trophy class mule deer (*Odocoileus hemionus*). A few of the ephemeral drainages support ecologically important cottonwood (*Populus* spp.) riparian communities. The lands are presently used for livestock grazing and wildlife habitat; mineral development is limited to a few abandoned drill holes.

Cultural resources are also present in the area. Twenty-three cultural properties have been recorded in the vicinity. These sites include: 12 lithic scatters, 10 campsites or occupations, and one historic road, now the roadbed of Highway 59, and the Texas Trail. One occupation site has been determined Eligible to the National Register of Historic Places; another is of unknown eligibility. Other prehistoric and historic era sites are known to exist within Burnt Hollow, but have not yet been recorded.

Most importantly, the area is one of the largest blocks of contiguous public land in Campbell County, and one of the only parcels that is not developed or heavily roaded. The area is easily accessible to Gillette, approximately 15 miles to the south on Wyoming Highway 59.

Justification:
The area meets the relevance criteria for significant scenic value and presence of a natural hazard due to steep erosive soils and flooding potential. Burnt Hollow meets the importance criteria in that it has more than locally significant qualities (recreational access) which give it special worth and public or management concerns about safety and property.

Such a large block of accessible public land is rare in the Powder River Basin. The size and naturalness of Burnt Hollow accommodate primitive and unconfined nonmotorized recreational opportunities. The designation of a Special Recreation Management Area (SRMA) and route designations would be sufficient to prevent undue and unnecessary degradation from visitor use in the management area. If Alternative D is selected, the designation of Visual Resource Management (VRM) Class II, surface disturbance restrictions, and application of controlled surface use (CSU) stipulations to fluid minerals leases would result in adequate protection from mineral development. If Alternative D is chosen, current management would be sufficient to protect the relevant and importance criteria.

S.2.2. Cantonment Reno

Background:
The proposed Area of Critical Environmental Concern (ACEC) is the BLM-administered surface around Cantonment Reno (523 acres). Cantonment Reno was constructed as a military supply fort on the Bozeman Trail in October 1876. The fort measured 475 feet by 520 feet and contained quarters, kitchens, mess houses, a hospital, and storage buildings. It could hold more than 350 soldiers and had specialized facilities for cavalry, including three large stables. Most buildings were hastily constructed dugouts built with cottonwood logs and sod roofs. It was used as a supply depot for military campaigns, primarily against the Northern Cheyenne during the winter of 1876-1877. Due to the poor condition of the buildings and a lack of wood, the U.S. Army abandoned the cantonment in 1878.

The site retains well defined features (foundations), but no buildings remain standing. The site contains numerous buried artifacts and is noteworthy for the high amount of intact archeological information it contains. Hundreds of documents relating to the fort are on file at the National Archives, presenting numerous opportunities to answer research questions through site excavation. Although there is no public access, unauthorized excavation and collection have occurred at the site. The location is on a floodplain of the Powder River and might soon be exposed to erosion from an encroaching oxbow bend. The fluid minerals under the site have been leased, but a “no surface occupancy” stipulation exists for the entirety of the proposed ACEC.

Justification:
Cantonment Reno is the only military fort from the period of the Great Sioux Wars on BLM-administered surface in the nation. The site meets the relevance criteria since it is a rare and sensitive archeological resource. The site also meets the importance criteria since it is directly associated with nationally significant historic events (the Great Sioux War), has qualities which give it significant special worth and distinctiveness, and has qualities that make it fragile and vulnerable to adverse change.

Proposed management is sufficient to protect the relevance and importance criteria. In compliance with the National Historic Preservation Act, any impacts to the site as a result of a federal undertaking must be considered and adverse effects must either be avoided or mitigated. If Alternative D (specifically Cultural 005, 006, and 007) is selected, the creation of a Cultural Resource Project Plan, surface disturbance restrictions, and application of NSO and CSU stipulations to fluid minerals leases will result in adequate protection. If any or all these specific management actions are not selected, the site should be considered for designation as an ACEC.

S.2.3. Dry Creek Petrified Tree

Background:
The Dry Creek Petrified Tree area consists of a 2,567 acre parcel which includes a 40-acre environmental education site, located about 8 miles east of Buffalo, Wyoming. About 60 million years ago the surrounding red hills and sagebrush country were a jungle-like swamp with towering Metasequoia trees. A 0.8 mile interpretive loop trail winds its way past remnants of petrified trees. The site has public access, interpretive trail, outhouse, and a picnic shelter and tables. The area is popular with tourists, local schools, and hunters alike.

The area meets relevance criteria for unique geologic feature, and the importance criteria for local significance (used as an educational and tourist attraction). Currently, a 0.5-mile NSO buffer of the site prevents fluid mineral development; there has been no recorded interest expressed in mineral development within this buffer.

Justification:
The 40 acres containing the interpretive trail and developments remain closed to livestock grazing and motorized use in all alternatives. In Alternative D, the designation of an SRMA would include a recommendation for withdrawal from mineral entry, a designation of VRM Class II, and restrictions on surface disturbance. There is no potential for commercial forestry actions in the area. If Alternative D is selected, adequate protection will be provided for the site and the site would not be designated as an ACEC. If any or all these specific management actions are not selected, the site would be considered for designation as an ACEC.

S.2.4. Hole-in-the-Wall

Background:
The proposed ACEC includes 11,952 acres of BLM-administered surface around the Hole-in-the-Wall and the Red Wall in southern Johnson County. The Hole-in-the-Wall is approximately 40 miles southwest of Kaycee, Wyoming. It is a colorful and scenic red sandstone escarpment that is rich in legend of outlaw activity from the late 1800s, most notably Butch Cassidy and the Wild Bunch Gang. The "hole" is a gap in the Red Wall that, legend has it, was used by outlaws to move horses and cattle through. The area is primitive in nature, with no visitor services.

Justification:
Hole-in-the-Wall meets the relevance criteria for significant historical, cultural or scenic value. The site also meets the importance criteria for having more than locally significant qualities which give it special worth and distinctiveness, and has qualities that make it unique and the site warrants protection to meet national priority concerns. The BLM has not identified or documented any historic sites on BLM-administered surface. Many of the historic features are

located on private lands and several key artifacts have been removed and placed in regional museums. However, the area remains a popular destination for travelers from outside the region and for commercial tours due to the recognizable name, notoriety, and relevance in western lore.

The most difficult aspects of management at Hole-in-the-Wall are related to visitor and travel management. The designation of a SRMA and route designations would be sufficient to prevent undue and unnecessary degradation from visitor use in the management area. If Alternative D is selected, the designation of VRM Class II, surface disturbance restrictions, and application of CSU stipulations to fluid minerals leases would result in adequate protection from mineral development. There is little potential for forestry actions. There is potential for commercial wind energy in the Red Wall area which would threaten the important scenic values. Alternative D proposes to exclude renewable energy development within the southern Big Horn Mountains including the Hole-in-the-Wall area, which would be sufficient to protect the relevant and importance criteria. If any or all these specific management actions are not selected, the site should be considered for designation as an ACEC.

S.2.5. Sagebrush Ecosystems

SUPPORTING INFORMATION
The Notice of Intent for Bureau of Land Management (BLM's) National Greater Sage-Grouse Planning Strategy invited the public to nominate or recommend areas on public lands for Greater Sage-Grouse and their habitat to be considered as Areas of Critical Environmental Concern (ACECs). Through the scoping process, numerous nominations were presented, including a nomination for all Priority Habitat Area to be included. Greater Sage-Grouse are a management indicator species for sagebrush ecosystem health, meaning that they are dependent upon sagebrush ecosystems at a landscape scale for their survival and managing Greater Sage-Grouse habitat would conserve other sagebrush dependent species. Sage-Grouse populations have the greatest chance of persisting when landscapes are dominated by sagebrush and natural or human disturbances are minimal (Aldridge et al. 2008; Knick and Hanser 2011; Wisdom et al. 2011). The Buffalo Field Office identified for ACEC consideration all public lands within four miles of Greater-Sage-Grouse leks (occupied or undetermined) or winter concentration areas. Management within four miles of crucial habitat features is consistent with the National Technical Team recommendations (Taylor et al. 2012) for Greater Sage-Grouse conservation. Greater Sage-Grouse Priority Habitat Area was considered but eliminated from detailed analysis as the Viability Analysis for Conservation of Sage-Grouse Populations: Buffalo Field Office, Wyoming (Taylor et al. 2012) concluded that the northeastern Wyoming Core Population Area may not be sufficient to conserve long-term Greater Sage-Grouse population viability. A sagebrush ecosystem ACEC meets relevance characteristics for conserving wildlife resource values and natural systems. Sagebrush ecosystems provide essential habitat that support several BLM special status species including the Greater Sage-Grouse, an Endangered Species Act Candidate species. Additional BLM sensitive species dependent upon sagebrush ecosystems, and present within the planning area, include: Brewer's sparrow, sage sparrow, and sage thrasher. Sagebrush ecosystems are terrestrial plant communities that support multiple resources (soil, water, native vegetation, biodiversity, rare and sensitive species, etc.) and land uses (recreation, livestock grazing, etc.) for which BLM is responsible for sustainable management. A sagebrush ecosystem ACEC meets importance characteristics for protecting a natural system and for meeting national priorities. Sagebrush ecosystems are fragile and sensitive systems that provide essential habitat for several special status or rare species. Sagebrush ecosystems and the rare and sensitive species that they support are vulnerable to adverse change. Sagebrush ecosystems have been fragmented in the planning area by energy development particularly coalbed natural gas (CBNG). Greater Sage-Grouse conservation is a national priority, and the proposed ACEC has been recognized as appropriate to maintaining sustainable Greater Sage-Grouse populations. The Powder River Basin provides important genetic linkage between population strong holds in Montana (Management Zone 1) and the Wyoming basins (Management Zone 2).

A sagebrush ecosystem ACEC is a component of Alternative B, but is not included in other alternatives including Alternative D (the Preferred Alternative).

ACEC OBJECTIVE(S) DECISIONS

Objective Statement: To conserve a sufficient portion of the fragile sagebrush ecosystem within the Buffalo Field Office to sustain the rare and special status species dependent upon sagebrush ecoystems.

ACEC SETTING CHARACTERISTIC DESCRIPTIONS

Physical Characteristics: The sagebrush ecosystem ACEC would be comprised of 467,897 acres of BLM-administered surface and 2,248,685 acres of federal fluid minerals within four miles of Greater Sage-Grouse leks and winter concentration areas. The ACEC represents 60% of the BLM-administered surface and 66% of the federal fluid minerals within the planning area.

Relevance Characteristics:

1. Fish and wildlife resource: Sagebrush ecosystems provide essential habitat that support several BLM sensitive species including the Greater Sage-Grouse, an Endangered Species Act Candidate species. Additional BLM sensitive species dependent upon sagebrush ecosystems, and present within the planning area, include: Brewer's sparrow, sage sparrow, and sage thrasher.

2. Natural process or system: Sagebrush ecosystems are terrestrial plant communities that support multiple resources (soil, water, native vegetation, biodiversity, rare and sensitive species, etc.) and land uses (recreation, livestock grazing, etc.) for which BLM is responsible for sustainable management.

Importance Characteristics:

1. Sagebrush ecosystems are fragile and sensitive systems that provide essential habitat for several sensitive and rare species (identified above). Sagebrush ecosystems and the rare and sensitive species that they support are vulnerable to adverse change. Sagebrush ecosystems have been fragmented in the planning area by energy development particularly CBNG.

2. Greater Sage-Grouse conservation is a national priority, and the proposed ACEC has been recognized as appropriate to maintaining sustainable Greater Sage-Grouse populations. The Powder River Basin provides important genetic linkage between population strong holds in Montana (Management Zone 1) and the Wyoming basins (Management Zone 2).

ALTERNATIVE B MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Physical Resources:

Soils

Soil-1003: Prohibit surface-disturbing activities on soils with severe erosion hazard.
Soil-1005: Prohibit surface-disturbing activities on slopes 25% and greater.
Soil-1007: Prohibit surface-disturbing activities on soils with poor reclamation suitability.
Soil-1009: Prohibit surface-disturbing activities on badlands, rock outcrops, biologic crusts, and slopes susceptible to mass movement.

Water

Water-1013: Prohibit surface-disturbing activities within 500 feet of springs, non-CBNG reservoirs, water wells, or perennial streams and associated riparian habitat.
Water-1016: Require removal and reclamation of unneeded CBNG reservoirs for removal and reclamation.

Mineral Resources:

Coal

Coal-2001: Prior to leasing any proposed tract, a tract specific National Environmental Policy Act analysis will be completed, which will include a review of the four coal screens and opportunity for public comment.
Coal-2003: Close all coal lands outside the high development potential areas to coal exploration and leasing.

Fluid Minerals

O&G-2007: Within 4.0 miles of occupied or undetermined Greater Sage-Grouse leks and winter concentration areas are administratively unavailable for leasing.

Fire and Fuels Management:

Fire-3013: Use protection strategies in the following areas: where sensitive resources would be adversely affected by fire.

Fire-3015: Use wildland fire and other vegetation treatments to restore fire-adapted ecosystems and to reduce hazardous fuels.
Grazing-6021: Provide a minimum of two years rest from livestock grazing following prescribed burns and other vegetative treatments. Allow additional rest where necessary to achieve resource goals and objectives.

Biological Resources:
Grassland and Shrubland Communities
GS-4001: Manage vegetative communities (Map 19) in accordance with Wyoming Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming.
GS-4005: Manage grasslands and shrublands to protect, preserve, or enhance plant communities.
GS-4009: Work with landowners on split estate lands to reestablish disturbed sites to healthy plant communities in accordance with the ecological site potential.
GS-4010: Authorize only native plant species for all reclamation activities.
Riparian and Wetland Communities
Riparian-4003: Manage riparian and wetland systems to enhance forage conditions and improve water quality. Manage all riparian systems with sensitive species concerns to a succession stage appropriate for that system, including vertical as well as horizontal vegetative structure and composition.
Riparian-4004: Expand and enhance riparian/wetland systems and habitat in cooperation with stakeholders.
Riparian-4005: Prevent degradation, loss, or destruction of riparian/wetland habitat.
Riparian-4008: Prohibit surface-disturbing and disruptive activities within 500 feet of riparian/wetlands systems, aquatic habitats, and floodplains.
Riparian-4010: Identify and manage systems capable of achieving Desired Future Condition.
Riparian-4011: Restore vegetation in all CBNG supported wetland and riparian systems.
Invasive Species
Pest-4004: Use certified noxious weed seed-free products on all BLM-administered projects and lands.
Pest-4006: Require surface or vegetation disturbance areas, including areas formerly receiving or holding water, be treated for invasive species and revegeted.
Wildlife
WL-4002: Maintain or improve important wildlife habitats through vegetative manipulations, habitat improvement projects, livestock grazing strategies and the application of The Wyoming Guidelines for Managing Sagebrush Communities with Emphasis on Fire Management (Wyoming Interagency Vegetation Committee 2002) and Appendix J (p. 1743), Wyoming Game and Fish Department Strategic Habitat Plan (WGFD 2001), State Wildlife Action Plan, and similar guidance updated over time.
WL-4009: Construct new fences to avoid adverse impacts to wildlife and in accordance with BLM Fencing Handbook 1741-1 and WO IM 2010–012: Managing Structures for the Safety of sage-grouse, sharp-tailed grouse, and Lesser prairie chicken.
WL-4014: Require burial of all new low voltage utility lines and installation of BLM-approved anti-perch devices on all new high voltage utility lines.
Special Status Species
SSWL-4010: Develop avoidance areas, containing Greater Sage-Grouse nesting and brood-rearing habitats, for application of broad-spectrum pesticides.
SSWL-4011: Maintain seeps, springs, wet meadows, and riparian vegetation in a functional and diverse condition for young Greater Sage-Grouse and other species that depend on forbs and insects associated with these areas.
SSWL-4012: Restore Greater Sage-Grouse brood-rearing habitats in wetland/riparian areas.
SSWL-4013: Manage vegetation composition, diversity and structure, as determined by ecological site description, to achieve Greater Sage-Grouse habitat management objectives, in cooperation with stakeholders.
SSWL-4014: Minimize disturbances that would result in alterations to springs and riparian Greater Sage-Grouse habitat. In coordination with stakeholders, develop alternative water sources to replace natural sources that have been affected or destroyed.
SSWL-4015: Manage stored water to control mosquitoes and prevent the spread of West Nile Virus to Greater Sage-Grouse.
SSWL-4016: Design water facilities with protective features to reduce mortality of Greater Sage-Grouse from drowning or entrapment.
SSWL-4017: Design and locate fences to reduce impacts to identified important Greater Sage-Grouse habitat areas.
SSWL-4018: Use the Fire Management Plan to incorporate the most current sagebrush habitat information and to guide fire suppression priorities in sagebrush habitats.
SSWL-4019: Remove conifers where they have encroached upon Greater Sage-Grouse habitat in cooperation with stakeholders. Reduce the density of conifers that have encroached

into, but do not yet dominate, sagebrush plant communities.
SS WL-4020: Increase the visibility of existing fences within Greater Sage-Grouse habitat to reduce hazards to flying Greater Sage-Grouse, in cooperation with stakeholders.
SSWL-4021: Prohibit renewable energy projects within Greater Sage-Grouse nesting, brood-rearing and winter habitat.
SSWL-4022: Require anti-perching devices on existing and new powerlines in occupied Greater Sage-Grouse habitat to minimize raptor use of these poles.
SSWL-4023: Lease fluid minerals dependent upon Greater Sage-Grouse habitat suitability, population density, and development density. Adopt a minimum lease size of 640 acres. Within 4.0 miles of Greater Sage-Grouse lek sites (occupied or undetermined) or winter concentration areas are administratively unavailable for leasing.
SSWL-4025: Manage Greater Sage-Grouse habitat as follows: ● Prohibit surface-disturbing activities, disruptive activities, and occupancy within 4.0 miles of the perimeter of occupied or undetermined Greater Sage-Grouse leks and winter concentration areas (independent of habitat suitability). ● Prohibit surface-disturbing and disruptive activities within 4.0 miles of occupied and undetermined Greater Sage-Grouse leks from March 1 to July 15 (independent of habitat suitability). ● Prohibit surface-disturbing and disruptive activities in nesting and early brood-rearing habitat greater than 4.0 miles of occupied and undetermined Greater Sage-Grouse leks, from March 1 to July 15. ● Prohibit surface-disturbing activities, disruptive activities and occupancy within 4.0 miles of Greater Sage-Grouse winter concentration areas, from November 15 to March 14 (independent of habitat suitability). ● Prohibit surface-disturbing and, disruptive activities within winter habitat greater than 4.0 miles of Greater Sage-Grouse winter concentration areas, from November 15 to March 14. ● Allow no more than 1 disturbance and 3% total surface disturbance per 640 acres within the Disturbance Density Calculation Tool (DDCT) analysis area (4-mile buffer of occupied leks within 4 miles of proposed surface disturbance). ● Restore disturbed sagebrush communities on BLM-administered surface to full shrub density (DPost = [DPre * 1/(N+1)]) for all predisturbance shrub species and 5% minimum sagebrush canopy cover. A 90% confidence interval is required to demonstrate achievement of the standard. The standard must be demonstrated the last year of the responsibility period, and all planted shrubs shall have been in place for at least two years. Apply to all surface-disturbing activities on BLM-administered surface within nesting, brood-rearing, or winter habitat. Within 4.0 miles of lek perimeters (occupied or undetermined) or winter concentration areas: ● Exclude all rights-of-way (ROW) ● Recommend for locatable mineral withdrawal ● Prohibit mineral material sales ● Recommend for withdrawal ● Close grazing allotments. Within occupied habitat: ● Avoid ROWs ● Require full reclamation bonding specific to the site and sufficient to cover costs required for full reclamation ● Avoid constructed roads beyond 4 miles of occupied and undetermined Greater Sage-Grouse leks and winter concentration areas.

Heritage and Visual Resources: none

Land Resources:
Lands and Realty
L&R-6002: Consider land use authorizations (permits, leases, etc.) on a project specific basis consistent with other resource objectives.
L&R-6003: Consider withdrawals for surface and/or minerals on a project specific basis.
L&R-6007: Acquire private or state land or interest in land from willing sellers in coordination with other resource objectives.
L&R-6008: Retain lands having agricultural potential, water, or other natural resource value.
L&R-6009: Retain lands identified for disposal, but having important natural resource values.
L&R-6010: Consider all lands within the planning area for acquisition from interested parties without giving priority to major blocks of public land, and areas of high recreational potential.
Rights-of-Way
ROW-6004: The preferred location for new ROW will be in or adjacent to existing disturbed areas associated with existing ROW, constructed roads, or highways.
ROW-6008: Require co-location of new communication sites within designated areas.
ROW-6009: Authorize transmission lines only within identified corridor areas.
ROW-6010: Avoid placement of above ground facilities such as powerlines along major transportation routes to protect visual resources.
Transportation
Trans-6006: Base road or trail closures and abandonments on desired road or trail densities, demands for new roads, resource protection, and existing uses. Unless otherwise authorized, close and reclaim roads and trails if they are heavily eroded, washed out, or if other access roads in better condition are available.
Trans-6008: Within 5 years of the Record of Decision: Inventory all routes on public land and develop a transportation plan to identify roads/trails for closure or maintenance.

Trans-6014: Limit motor vehicle use to designated routes unless compelling reasons exist to classify parcels as open or closed, and is consistent with other resource values. Areas will no longer be classified as limited to existing routes.
Trans-6019: Close areas within habitat of special status species to motorized vehicle use, including activities related to fire suppression and geophysical exploration.
Trans-6025: Allow travel off designated routes only under a special use permit (grazing lessee, administrative use, etc.).

Livestock Grazing

Grazing-6001: Develop and implement appropriate livestock grazing management actions to achieve the Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming, to provide watershed protection, to improve forage for livestock, forage and habitat for wildlife, and enhance rangeland health.
Grazing-6004: Continue implementation of existing Allotment Management Plans (AMPs). Develop and implement new AMPs with grazing lessees and other stakeholders to achieve desired resource goals and objectives.
Grazing-6005: Manage livestock grazing to sustain riparian, wetland, mountain mahogany, specials status species, or other special habitats.
Grazing-6019: Locate livestock salt or mineral supplements a minimum of 0.5 mile away from water sources, riparian areas, and aspen stands.
Grazing-6021: Provide a minimum of two years rest from livestock grazing following prescribed burns and other vegetative treatments. Allow additional rest where necessary to achieve resource goals and objectives.

Special Designations: none

Socioeconomic Resources: none

ALTERNATIVE D MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Alternative D would implement the State of Wyoming's Greater Sage-Grouse Core Population Area Strategy (Wyoming Executive Order 2011–05). The BLM approach to Greater Sage-Grouse conservation in Wyoming is representative of the proactive planning and implementation of science-based conservation measures for long-term conservation of Greater Sage-Grouse and their habitats in Wyoming. Priority Habitat Areas in Wyoming represent 15 million acres of Greater Sage-Grouse habitats and approximately half those surface acres are on BLM public lands and approximately 10 million acres of Wyoming Priority Habitat Areas are federal mineral estate. The balanced management of BLM public lands and resources, including habitat for conservation of Greater Sage-Grouse and other resource uses represents the combined efforts of the State of Wyoming, the BLM, U.S. Forest Service, Natural Resources Conservation Service, U.S. Fish and Wildlife Service, and many other important local stakeholders and local governments to support multiple-use objectives and management of Greater Sage-Grouse within Wyoming.

Wyoming's Core Population Area support approximately 80% of the statewide population. The conservation strategy limits disturbance density and intensity within the Core Population Area. Surface disturbance from all regulated activities is limited to no more than 5% of the sagebrush habitat and mineral activity is limited to one disturbance location per 640 acres. There is a standardized calculation (DDCT) for estimating the area of disturbance. Management actions also address: surface occupancy, disruptive activities, seasonal use, transportation, transmission lines, noise, vegetation treatments, monitoring, and reclamation.

Greater Sage-Grouse and the sagebrush ecosystem upon which they depend would be adequately conserved across the State of Wyoming under Alternative D. If any or all the specific management actions within the Wyoming Core Population Area Strategy are not selected, the sagebrush ecosystem should be considered for designation as an ACEC.

Appendix T. Recreation Management Areas

Special Recreation Management Areas

Special Recreation Management Areas (SRMAs) are administrative units where a commitment has been made to prioritize recreation by managing for specific recreation opportunities and settings on a sustained or enhanced, long-term basis. For each SRMA the Bureau of Land Management (BLM) Buffalo Field Office has identified supporting information, established objective decisions, described recreation setting characteristics, identified management actions and allowable use decisions and, as necessary, identified implementation decisions.

Land use plan level recreation and visitor services objective decisions define intended activities and specific recreation opportunities to be offered. Objectives describe the intended recreation activities, experiences and benefits derived from those experiences. SRMAs may be subdivided into recreation management zones with discrete objectives.

SRMAs are managed:

(1) For their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation.

(2) To protect and enhance a targeted set of activities, experiences, benefits, and desired recreation setting characteristics (RSCs).

(3) As the predominant land use plan focus.

(4) To protect specific recreation opportunities and RSCs on a long-term basis.

T.1. Burnt Hollow Management Area

Supporting Information and Rationale

The Burnt Hollow SRMA is necessary to accommodate national visitor demand for semi-primitive nonmotorized recreational opportunities in semiarid sagebrush steppe ecoregions; this demand has been identified by local organizations, community involvement workshops, and through recreation research. Burnt Hollow is one of the largest contiguous parcels of BLM-administered land with public access in northeastern Wyoming. The area has abundant prairie wildlife, a nearly pristine Powder River Basin viewshed, and a high probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

BURNT HOLLOW SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Burnt Hollow SRMA, by the year 2016 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Burnt Hollow SRMA will offer opportunities for nonmotorized recreationists to engage in horseback riding, hiking, hunting, mountain biking, environmental education, and nature viewing. Within the management area, the existing natural and physical character of the landscape will be modified only by primitive trail developments.

Activities: Hunting, horseback riding, hiking, mountain biking, environmental education, camping, backpacking; user conflicts between horseback riding and mountain biking opportunities would be mitigated through travel management allocations on designated trails if demand increases and recreation assessments indicate the necessity to separate conflicting uses

Experiences: Developing skills and abilities, testing endurance, enjoying having access to hands-on environmental learning, enjoying having access to close-to-home outdoor amenities, savoring the total sensory experience of a landscape

Benefits: Greater freedom from urban living, improved understanding of this community's dependence and impact on public lands, greater retention of distinctive natural landscape features, improved physical fitness/better health maintenance

RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS

Physical Characteristics: Within a 0.5 mile of paved/primary roads and highways. The character of the natural landscape within the Highway 59 viewshed is partially maintained, with infrastructure and several ranch facilities visible. In the interior of the Burnt Hollow Management Area (BHMA), the character of the natural landscape is retained with few modifications contrasting (fences, two-tracks, etc.). Desired future conditions will include maintained and marked trails, simple trailhead developments and basic toilets.

Social Characteristics: From 2006 to 2010, the average annual estimated visitation was 729 visits and 1116 visitor days. During the peak use season (Sept. through Nov.) contacts are characterized by 3-6 encounters off travel routes and 7-15 encounters per day on travel routes. Outside of peak season, contacts are rare. Most groups consist of less than 3 people. Small areas of terrain alteration are present near major roads. The sounds of other people are rarely heard once out of the Highway 59 viewshed.

Operational Characteristics: Foot and horse travel and mechanized use (mountain bikes) are allowed; all public use must be nonmotorized. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots. Moderate use restrictions apply at trailheads and staging areas.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; closed to recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Other Programs: Closed to leasing. Recommend for withdrawal from mineral entry. Closed to solid and fluid mineral development. Salable mineral development and surface disturbance for administrative use only. Visual Resources Management (VRM) Class II. Renewable energy and rights-of-way (ROW) exclusion area. Travel limited to designated routes.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from both Highway 59 and Cow Creek Road. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points; additional informational signs present along trails.

Administrative:

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Travel Management: The area will be managed as limited to designated routes, with very few routes designated for administrative motorized use only. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails. Designated routes will be primarily for provision of access to inholdings within BHMA and to provide egress for administrative use.

Special Recreation Permits (SRPs):
SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Recreation area management plan will include criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Agreements: Establish cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

Partners: Burnt Hollow Coordinated Resource Management Working Group. Pursue partnerships with Campbell County School Districts and Gillette College to establish an outdoor classroom.

Other administration: Recreational target shooting is prohibited within developed recreation sites. Dispersed camping is allowed.

COW CREEK BREAKS RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Cow Creek Breaks RMZ of the Burnt Hollow Special Recreation Management Area (SRMA) will be sustained or enhanced for visitors to engage in hiking, horseback riding, and hunting (fall) so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Horse riding/packing • Hiking/backpacking • Mountain Biking • Hunting (fall season) • Nature Viewing	• Enjoying the sensory experience of a natural landscape • Enjoying ability to frequently participate in desired activities in preferred settings • Testing endurance • Being isolated and independent • Enjoying exploring on my own or in small groups • Enjoying nature • Feeling good about solitude • Developing skills and abilities • Escaping everyday responsibilities	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Feeling good about how natural resources and facilities are being managed Environmental: • Greater retention of distinctive natural landscape features. • Increased sense of stewardship for the resource Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits • Enhanced ability for visitors to find areas providing wanted recreation experiences and benefits

		• Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: On or near mechanized routes but at least one mile from improved roads, though they may be visible. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Developed trails made mostly of native materials. Structures are rare and isolated.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) should not exceed 5 encounters per day at staging areas, and 3 encounters per day on travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on trails. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; Closed to public motorized use.

BURNT HOLLOW FRONT COUNTRY RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Burnt Hollow Front Country RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, horseback riding, hiking, hunting and mountain biking. The Front Country RMZ will be promoted for environmental education opportunities. The Front Country RMZ of the Burnt Hollow Special Recreation Management Area (SRMA) will be sustained or enhanced for visitors to engage in hiking, hunting (fall), mountain biking and horseback riding, so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country and Middle Country settings.		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits

• Horse riding/packing • Hiking/backpacking • Mountain biking • Nature Viewing • Environmental Education • Hunting	• Enjoying the sensory experience of a natural landscape • Enjoying nature • Developing skills and abilities • Enjoying learning outdoor social skills	Personal: • Enjoying easy access to natural landscapes • Improved mental health • Improved physical health Community/Social: • More informed citizenry about where to go for different kinds of recreation experiences and benefits Environmental: • Greater retention of distinctive natural landscape features • Increased sense of stewardship for the resource Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within one mile of paved/primary roads and highways. *Naturalness:* Character of the natural landscape considerably modified. *Facilities:* Rustic facilities such as basic toilets, kiosks and interpretive displays.	*Contacts With Others:* Contact with others unlikely outside of peak season, except for cars passing on highway. During peak season, 3-6 encounters in parking lots are possible. *Group Size:* Group sizes are expected to be between 2-6 people per group. *Evidence of use:* Small areas of alteration prevalent. Surface vegetation gone with compacted soils. Sounds of people regularly heard.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on trails. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area. Place notification of target shooting restriction on sections containing and adjacent to developed recreation facilities.

Monitoring (and Evaluation)	● Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. ● Monitor recreation setting condition through onsite patrols during the environmental education high use season (early fall and late spring).
Interdisciplinary Support Actions	Visual Resource Management Class II; Closed to public motorized use.

T.2. Dry Creek Petrified Tree Management Area

Supporting Information and Rationale

The Dry Creek Petrified Tree SRMA is necessary to accommodate national visitor demand for nonmotorized recreational opportunities in semiarid sagebrush steppe ecoregions; this demand has been identified through focus groups, community involvement workshops, and through recreation research. Dry Creek Petrified Tree is a unique parcel of BLM-administered land in respect to its abundant paleontological resources. This parcel provides seamless recreational opportunities as it connects with additional public lands. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. The area has abundant prairie wildlife, a nearly pristine Powder River Basin viewshed, and a high probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

DRY CREEK/PETRIFIED TREE SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Dry Creek Petrified Tree SRMA, by the year 2015 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Dry Creek Petrified Tree SRMA will offer opportunities for recreationists to engage in picnicking, walking, nature viewing, and other forms of nonmotorized dispersed recreation in a partially modified physical recreation setting with predominantly nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation and interpretive facilities.
Activities: Picnicking, walking, nature viewing, environmental education, hunting, mountain biking *Experiences:* Enjoying having access to hands-on environmental learning, enjoying having access to close-to-home outdoor amenities, enjoying the closeness of friends and family *Benefits:* Greater retention of distinctive natural landscape features, increased appreciation of the area's geologic history.
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within a 0.5 mile of passenger vehicle routes. The character of the natural landscape within the Tipperary Road viewshed is partially maintained, with infrastructure and several ranch facilities visible. Desired future conditions will include maintained and marked trails, simple trailhead developments, a basic toilet and an interpretive display. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation was 956 visits and 110 visitor days (RMIS). Contacts with other groups are rare. Most groups consist of 2-5 people. Small areas of terrain alteration are present near the trailhead roads. The sounds of other people are rarely heard. *Operational Characteristics:* Foot travel is allowed; all use must be nonmotorized. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; developed site closed to recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Other Programs: Closed to leasing. Recommend for withdrawal from mineral entry. Closed to solid and fluid mineral development. Salable mineral development and surface disturbance for administrative use only. Visual Resources Management (VRM) Class II. Renewable energy and rights-of-way (ROW) exclusion area. Motorized travel prohibited in interpretive site; elsewhere travel is limited to designated routes.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from both TW Road and Tipperary Road at I-90. Develop interpretive signs at trailhead/parking area on general location, history, paleontology, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points; additional informational signs present along interpretive trail. Update interpretive trail signs as time and funding allow.

Administrative:

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Travel Management: The interpretive trail area is closed to motorized use (~20 acres). Limited to designated routes throughout the remainder of the SRMA. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails.

Special Recreation Permits (SRPs):
Commercial guiding for hunting and competitive events will be prohibited within the 22 acre exclosure. Elsewhere, SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Livestock Grazing: The 22-acre exclosure around the interpretive site is closed to grazing.

Agreements: Establish cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

Partners: Pursue partnerships with Johnson County School Districts to establish an outdoor classroom.

Other administration: Recreational target shooting is prohibited within the developed site. Standard 14-day camping limit applies.

INTERPRETIVE TRAIL RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Interpretive Trail RMZ will be sustained or enhanced for individuals or small groups of visitors to engage in nature and wildlife viewing, picnicking, environmental education and walking the interpretive trail so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:

TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits
• Environmental Education • Picnicking • Walking • Nature Viewing	• Enjoying the sensory experience of a natural landscape • Enjoying having access to hands-on environmental learning • Learning more about this specific area • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Greater retention of distinctive natural landscape features • Increased appreciation of the area's geologic history • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Feeling good about how natural resources and facilities are being managed Environmental: • Greater retention of distinctive natural landscape features. • Increased sense of stewardship for the resource • Greater protection of paleontological sites • Reduced looting and vandalism of historic/prehistoric sites Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits • Reduced negative human impacts such as litter, vegetative trampling, and unplanned trails

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of passenger vehicle routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups are rare for visiting members of the general public. *Group Size:* Group sizes are expected to remain small (less than 5 people per group), unless an organized school or community groups visits as part of a field trip. *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Foot travel is allowed on trails. Mechanized and motorized use are prohibited within the interpretive site. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions.

Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Limit travel to designated routes; close interpretive site to motorized and mechanized use.

RED HORSE ACCESS RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Red Horse Access RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, mountain biking and hiking so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Middle Country settings:		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits
● Hiking ● Mountain Biking ● Hunting	● Enjoying the sensory experience of a natural landscape ● Enjoying having access to close-to-home outdoor amenities ● Enjoying the closeness of friends and family	Personal: ● Enhanced awareness and understanding of nature ● Greater understanding of the importance of recreation and tourism in our community ● Increased appreciation of the area's geologic history ● Improved mental health ● Improved physical health ● Greater appreciation of the outdoor environment ● Greater sense of responsibility for own quality of life ● Greater appreciation for my public lands and how managers care for it Community/Social: ● More informed citizenry about where to go for different kinds of recreation experiences and benefits Environmental: ● Greater retention of distinctive natural landscape features ● Increased sense of stewardship for the resource Economic: ● Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits
DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational

Remoteness: Within a 0.5 mile of four-wheel drive vehicle routes. *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets.	*Contacts With Others:* Encounters with other groups are rare. *Group Size:* Group sizes are expected to remain small (less than 3 people per group) *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Mechanized travel is allowed on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

T.3. Hole-in-the-Wall Management Area

Supporting Information and Rationale

The Hole-in-the-Wall SRMA is necessary to accommodate national visitor demand for semi-primitive nonmotorized recreational opportunities in the Red Wall/southern Big Horns region; this demand has been identified by local organizations, community involvement workshops, and through recreation research. The area has abundant wildlife, a nearly pristine Red Wall viewshed, and a moderate probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

HOLE-IN-THE-WALL SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Hole-in-the-Wall SRMA, by the year 2017 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Hole-in-the-Wall SRMA will offer opportunities for nonmotorized recreationists to engage in hiking, horseback riding, and nature viewing and other forms of nonmotorized dispersed recreation. Within the management area, the existing natural and physical character of the landscape will be modified only by primitive trail developments and minimal associated recreation and interpretive facilities.
Activities: Hiking, horseback riding, nature viewing, interpretation of natural and cultural resources, hunting, camping *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape *Benefits:* Greater retention of distinctive natural landscape features; greater protection of area archaeological sites
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS

Physical Characteristics: Within a 0.5 mile of four-wheel drive routes. The character of the natural landscape within the viewshed is maintained, with a few modifications, such as ranch facilities visible. Desired future conditions will include maintained and marked trails, and simple trailhead developments, including interpretive panels.

Social Characteristics: Quantitative data related specifically to Hole-in-the-Wall does not yet exist. The majority of use is associated with commercially guided activities through neighboring ranches. During the peak visitation season (May. through Oct.) contacts are characterized by less than 3 encounters off travel routes and 3–6 encounters per day on travel routes. Outside of peak season, contacts are rare. Most groups consist of less than 3 people. Small areas of terrain alteration are present near major roads. The sounds of other people are rarely heard.

Operational Characteristics: Foot and horse travel are allowed cross-country; mechanized and motorized use is limited to designated routes. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots. Moderate use restrictions apply at trailheads and staging areas.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; prioritized for education efforts to mitigate recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements.

Other Programs: Closed to leasing. Recommend for withdrawal from mineral entry. Closed to solid and fluid mineral development. Salable mineral development and surface disturbance for administrative use only. Visual Resource Management (VRM) Class II. Renewable energy and rights-of-way (ROW) exclusion area. Travel limited to designated routes.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage necessary from TTT Road, Willow Creek Road, and NC 105. Develop interpretive signs at trailhead/parking area on general location, history, geology, cultural and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points; additional directional signs present along trails. High priority area for development of interpretive signs.

Administrative:

VRM: Class II

Travel Management: The area will be managed as limited to designated routes, with very few routes designated. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails. Designated routes will be primarily for provision of public access to Hole-in-the-Wall trailhead and to provide egress for administrative use.

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Oil & Gas Leasing/Minerals: Closed to Leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

Special Recreation Permits (SRPs):
SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Agreements: Maintain cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

Partners:

Other administration: Recreational target shooting is prohibited within developed recreation sites but allowed elsewhere so long as resource damage does not occur. Dispersed camping is allowed for up to 14 days.

HOLE-IN-THE-WALL RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Hole-in-the-Wall RMZ will be sustained or enhanced for visitors to engage in hiking, camping, horseback riding, and hunting (fall) so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Hiking/backpacking • Camping • Hunting (fall season) • Horse riding/packing • Nature Viewing	• Enjoying the sensory experience of a natural landscape • Developing skills and abilities • Testing endurance • Being isolated and independent • Enjoying exploring on my own or in small groups • Enjoying nature • Feeling good about solitude	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world, • Improved opportunity to view wildlife close-up • Improved mental health • Improved Physical health • Greater appreciation of the outdoor environment • Feeling good about how this attraction is being used and enjoyed Community/Social: none identified Environmental: • Greater retention of distinctive natural landscape features. • Increased sense of stewardship for the resource Economic: • Maintenance of community's distinctive recreation/tourism market niche or character • Reduced negative human impacts such as litter, vegetative trampling, and unplanned trails

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational
Remoteness: Within a 0.5 mile of four-wheel drive routes *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be fewer than 3 encounters off travel routes and 3–6 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS

Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	● Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. ● Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

BUFFALO CREEK RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Buffalo Creek RMZ of the Hole-in-the-Wall Special Recreation Management Area (SRMA) will be sustained or enhanced —for visitors to engage in camping, hiking, horseback riding, hunting (fall) and fishing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits
● Camping ● Fishing ● Hiking/backpacking ● Hunting (fall season) ● Horse riding/packing ● Nature Viewing	● Enjoying the sensory experience of a natural landscape ● Developing skills and abilities ● Testing endurance ● Enjoying exploring on my own or in small groups ● Enjoying nature ● Feeling good about solitude, isolation, and independence	Personal: ● Enhanced awareness and understanding of nature ● Closer relationship with the natural world, ● Improved opportunity to view wildlife close-up ● Improved mental health ● Improved physical health ● Greater appreciation of the outdoor environment ● Enlarged sense of personal accountability for acting responsibly on public lands Community/Social: none identified Environmental: ● Greater retention of distinctive natural landscape features. ● Increased sense of stewardship for the resource ● Reduced wildlife disturbance from recreation facility development Economic: ● Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits
DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational

Remoteness: Within 0.5 mile of four-wheel drive routes *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be less than 3 encounters off travel routes and 3–6 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.
SUPPORT ACTIONS		
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists	
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.	
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.	
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).	
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.	

T.4. Middle Fork Powder River Management Area

Supporting Information and Rationale

This SRMA is necessary to accommodate national visitor demand for semi-primitive nonmotorized recreational opportunities in the Red Wall/southern Big Horns region; this demand has been identified by local organizations, community involvement workshops, and through recreation research. The area has abundant wildlife, a nearly pristine Red Wall viewshed, and a moderate probability for solitude. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

MIDDLE FORK POWDER RIVER SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Middle Fork Powder River SRMA, by the year 2016 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Middle Fork Powder River SRMA will offer opportunities for nonmotorized recreationists to engage in fishing, hunting, horseback riding, hiking, mountain biking, nature viewing and appropriate related off-highway vehicle (OHV) use. Within the management area, the existing natural and physical character of the landscape will be modified only by primitive trail developments and minimal associated recreation and interpretive facilities.
Activities: Fishing, camping, hunting, horseback riding, hiking, mountain biking, interpretation of natural and cultural resources, backpacking, OHV use in conjunction with aforementioned activities *Experiences:* Developing skills and abilities, testing endurance, enjoying having a wide variety of environments within a single recreation area, savoring the total sensory experience of a landscape *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within a 0.5 mile of four-wheel drive routes in most of the region. The character of the natural landscape within the Middle Fork viewshed is largely maintained, with primitive routes and several ranch facilities visible. In the interior of the Middle Fork region, modification to the natural landscape is in harmony with surroundings. Desired future conditions will include maintained and marked trails, simple trailhead developments in the Ed O. Taylor Recreation Management Zone (RMZ) and rustic facilities such as campsites, basic toilets and interpretive displays in the Outlaw Cave RMZ. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation to the Middle Fork Region was 4701 visits and 4871 visitor days. During the peak use season (July through Oct.) contacts are characterized by 3-6 encounters off travel routes and 7-15 encounters per day on travel routes. Outside of peak season, contacts are rare. Most groups consist of less than 4–6 people. Small areas of terrain alteration are present near major roads. The sounds of other people are rarely heard. *Operational Characteristics:* Foot and horse travel and mechanized use (mountain bikes) are allowed; motorized use is limited to designated routes. Basic maps provided on trailhead kiosks, staff infrequently present to provide onsite assistance. Some regulatory and ethics signing is present in parking lots.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Standard 14-day camping limit applies; prioritized for education efforts to mitigate impacts from recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements. Other Programs: Closed to leasing. Recommend for withdrawal from mineral entry. Closed to solid and fluid mineral development. Salable mineral development and surface disturbance for administrative use only. Visual Resource Management (VRM) Class II. Renewable energy and rights-of-way (ROW) exclusion area. Middle Fork Canyon is closed to motorized use; elsewhere travel is limited to designated routes. Interim management under Manual 6400 applies to the portion of Middle Fork Powder River that is suitable and eligible for Wild and Scenic River (WSR) designation.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage present from Highway 191 and Barnum Road. Develop interpretive signs at entrance to management area and at Outlaw Cave Campground on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc. **Monitoring:** Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs present at key access points; additional directional signs present along trails. High priority area for development of interpretive signs. **Administrative:**

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Travel Management: The area will be managed as limited to designated routes. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails.

Special Recreation Permits (SRPs):
SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Livestock Grazing: Middle Fork Canyon is deemed unsuitable for grazing due to steep slopes.

WSRs: The canyon within 0.25 mile of the Middle Fork Powder River is managed under Manual 6400 – Wild and Scenic Rivers to protect outstandingly remarkable values.

Agreements: Maintain cooperative agreements with Wyoming State Land Board and Wyoming Department of Game and Fish.

Partners:

Other administration: Recreational target shooting is prohibited within developed recreation sites but allowed elsewhere so long as resource damage does not occur. Dispersed camping is allowed for up to 14 days.

OUTLAW CAVE RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Outlaw Cave RMZ of the Middle Fork Canyon Special Recreation Management Area (SRMA) will be sustained or enhanced for visitors to engage in fishing, camping, hiking, horseback riding, hunting (fall) and appropriate off-highway vehicle (OHV) use so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Camping • Fishing • Hiking/backpacking • Hunting (fall season) • Horse riding/packing • Nature Viewing • OHV Use	• Enjoying the sensory experience of a natural landscape • Developing skills and abilities • Testing endurance • Being isolated and independent • Enjoying exploring on my own or in small groups • Enjoying nature • Feeling good about solitude	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Increased appreciation of area's cultural history Community/Social: none identified Environmental: • Greater retention of distinctive natural landscape features. • Increased sense of stewardship for the resource Economic:

		• Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within 0.5 mile of four-wheel drive routes *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be approximately 3–6 encounters off travel routes and 7–15 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (4–6 people per group). *Evidence of use:* Small areas of alteration present. Surface vegetation showing wear with some bare soils. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Enhance the availability of dependable both potable and non-potable water sources for recreationists and packstock.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

ED O. TAYLOR RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Ed O. Taylor RMZ of the Middle Fork Canyon Special Recreation Management Area (SRMA) will be managed in cooperation with Wyoming Game and Fish Department for visitors to engage in fishing, camping, hiking, horseback riding, hunting (fall) and appropriate related off-highway vehicle (OHV) use so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in Back Country and Middle Country settings.		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits

• Camping • Fishing • Hiking/backpacking • Hunting (fall season) • Horse riding/packing • Nature Viewing • OHV Use	• Enjoying the sensory experience of a natural landscape • Developing skills and abilities • Testing endurance • Feeling good about solitude, isolation and independence	Personal: • Enhanced awareness and understanding of nature • Closer relationship with the natural world • Improved opportunity to view wildlife close-up • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment • Better understanding of wildlife's contribution to own quality of life Community/Social: none identified Environmental: • Greater retention of distinctive natural landscape features. • Increased sense of stewardship for the resource • Reduced wildlife harassment by recreation users • Reduced wildlife disturbance from recreation facility development Economic: • Enhanced ability for visitors and resident to find areas providing desired recreation experiences and benefits

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within 0.5 mile of four-wheel drive routes *Naturalness:* Natural setting may have modifications that would be noticed but not draw the attention of an observer wandering through the area. *Facilities:* Rustic facilities such as campsites, a basic toilet, small kiosks, basic trailheads and marked trails.	*Contacts With Others:* Average encounters per day during peak hunting use season (September - November) would be approximately 3–6 encounters off travel routes and 7–15 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (4–6 people per group). *Evidence of use:* Small areas of alteration present. Surface vegetation showing wear with some bare soils. Sounds of people infrequent.	*Mechanized Use:* Nonmotorized, mechanized use is allowed on designated trails. Due to the steep topography, mechanized recreation is prohibited within the canyon. Should conflicts arise between mechanized use and other nonmotorized recreationists, the recreation area management plan will be adapted via a public comment period. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained. Continue to enhance the availability of dependable non-potable water sources for recreationists
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.

Administration	Consider the use of a Memorandum of Understanding or other cooperative agreement between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	• Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies. • Monitor recreation setting condition through onsite patrols during the high use season (August-November).
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

T.5. Mosier Gulch Management Area

Supporting Information and Rationale

The Mosier Gulch SRMA is necessary to accommodate local visitor demand for nonmotorized recreational opportunities near the City of Buffalo; this demand has been identified through focus groups, community involvement workshops, and through recreation research. Mosier Gulch is located within 3 miles of the Buffalo City Limits. This parcel provides seamless recreational opportunities as it connects with the Buffalo Greenbelt and additional public lands. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. The area boasts excellent fishing opportunities and easy access to natural resource based recreational opportunities. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

MOSIER GULCH SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Mosier Gulch SRMA, by the year 2015 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Mosier Gulch SRMA will offer opportunities for recreationists to engage in jogging, hiking, mountain biking, fishing, hunting and nature viewing and other forms of nonmotorized dispersed recreation in a partially modified physical recreation setting with predominantly nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation and interpretive facilities.
Activities: Picnicking, access to trail system, jogging, walking, hiking, mountain biking, fishing, hunting and nature viewing *Experiences:* Enjoying frequent exercise, enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities. *Benefits:* Improved physical fitness and health maintenance, heightened sense of community sense of place, lifestyle improvement, increased desirability as a place to live or retire
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within 0.5 mile of paved/primary roads and highways; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments and basic toilet. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation was 2386 visits and 355 visitor days (RMIS). Approximately 5-8 encounters per day off travel routes (staging areas) and approximately 5 encounters on travel routes. Most groups consist of 2-5 people. Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. The sounds of other people are regularly heard. *Operational Characteristics:* Foot travel and mountain bikes are predominate, motorized use allowed only on main road. Basic information provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.

MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Standard 14-day camping limit applies; developed site closed to recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act ut may be evaluated if future investments in visitor services meet eligibility requirements.

Other Programs: Closed to leasing. Recommend for withdrawal from mineral entry. Closed to solid and fluid mineral development. Salable mineral development and surface disturbance for administrative use only. Visual Resource Management (VRM) Class II. Renewable energy and rights-of-way (ROW) exclusion area. Travel limited to designated routes.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from Highway 16. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points. Develop trailheads for foot, horse and bicycle travel.

Administrative:

Oil & Gas Leasing/Minerals: Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: Rights-of-Way (ROW) exclusion area

Special Recreation Permits (SRPs):
SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Travel Management: The area will be managed as limited to designated routes, with very few routes designated. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails. Designated routes will be primarily for provision of access to provide egress for administrative use.

Livestock Grazing: The picnic area is closed to grazing. The 120-acre parcel along Clear Creek Trail on Grouse Mountain is deemed unsuitable for grazing due to steep slopes.

Agreements: Maintain cooperative agreements with City of Buffalo, U.S. Forest Service and Johnson County.

Partners: City of Buffalo; U.S. Forest Service Powder River Ranger District, Johnson County Recreation District, Wyoming State Land Board and Wyoming Department of Game and Fish.

Other administration: Recreational target shooting is prohibited within developed recreation sites. The picnic area, parking lots and trailheads are closed to camping.

MOSIER PICNIC AREA RECREATION MANAGEMENT ZONE RMZ

Outcome Objective

The Mosier Gulch Picnic Area RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, picnicking and walking the interpretive trail so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
● Picnicking ● Fishing ● Nature Viewing	● Increased desirability as a place to live or retire ● Enjoying having easy access to natural landscapes ● Enjoying having access to close-to-home outdoor amenities ● Enjoying the closeness of friends and family	Personal: ● Closer relationship with the natural world ● Improved mental health ● Improved physical health ● Greater appreciation of the outdoor environment ● Greater awareness that this community is a special place ● Improved sense of personal responsibility for control of domestic pets Community/Social: ● Improved community integration ● Lifestyle improvement or maintenance ● Heightened sense of community satisfaction Environmental: ● Greater community ownership and stewardship of park, recreation, and natural resources Economic: ● Increased desirability as a place to live or retire ● Reduced negative human impacts such as litter, vegetative trampling, and unplanned trails

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

CLEAR CREEK TRAIL SYSTEM RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Clear Creek Trail System RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, walking and hiking the Clear Creek trail so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
● Jogging ● Mountain Biking ● Walking ● Hiking ● Nature Viewing	● Enjoying frequent exercise ● Enjoying having easy access to natural landscapes ● Enjoying having access to close-to-home outdoor amenities ● Enjoying the closeness of friends and family	Personal: ● Closer relationship with the natural world ● Improved mental health ● Improved physical health ● Greater appreciation of the outdoor environment ● Improved sense of personal responsibility for control of domestic pets Community/Social: ● Improved community integration ● Lifestyle improvement or maintenance ● Heightened sense of community satisfaction Environmental: ● Greater community ownership and stewardship of park, recreation, and natural resources ● Maintenance of distinctive recreation setting character Economic: ● Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER

Physical	Social	Operational
Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS

Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

NORTH RIDGE RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The North Ridge RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, hunting and fishing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country:		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits
● Hunting ● Nature Viewing	● Enjoying having easy access to natural landscapes ● Enjoying maintaining out-of-town country solitude	Personal: ● Closer relationship with the natural world ● Improved mental health ● Improved physical health ● Greater appreciation of the outdoor environment Community/Social: ● Heightened sense of community satisfaction Environmental: ● Greater community ownership and stewardship of park, recreation, and natural resources ● Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts Economic: ● Increased desirability as a place to live or retire
DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational

Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape retained. A few modifications contrast with character of the landscape (e.g., fences, primitive roads). *Facilities:* No structures. Foot/horse trails only.	*Contacts With Others:* Encounters with other groups average fewer than 3 encounters off of travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.
SUPPORT ACTIONS		
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.	
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.	
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.	
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.	
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.	

T.6. Welch Ranch Management Area

SUPPORTING INFORMATION

This SRMA is necessary to accommodate local visitor demand for nonmotorized recreational opportunities near the City of Sheridan; this demand has been identified through focus groups, community involvement workshops, and through recreation research. The Welch Ranch is located approximately 10 miles from Sheridan city limits. The Welch parcel offers public access to riparian areas, unique for BLM-administered lands in northeastern Wyoming. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. The area boasts excellent fishing opportunities and easy access to natural resource based recreational opportunities. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

WELCH RANCH SPECIAL RECREATION MANAGEMENT AREA (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Welch Ranch SRMA, by the year 2015 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Welch Ranch SRMA will offer opportunities for recreationists to engage in physical exercise, hiking, mountain biking, fishing, hunting and nature viewing and other forms of nonmotorized dispersed recreation in a partially modified physical recreation setting with predominantly nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation and interpretive facilities.
Activities: Picnicking, jogging, walking, hiking, mountain biking, fishing, hunting, wildlife/nature viewing, environmental education *Experiences:* Enjoying frequent exercise, enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities. *Benefits:* Improved physical fitness and health maintenance, a heightened sense of community sense of place, lifestyle improvement, greater freedom from urban living
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within 0.5 mile of paved/primary roads and highways at east entrance; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation was 1181 visits and 510 visitor days (RMIS). Contacts with other groups are not uncommon during high use seasons. Most groups consist of 2-4 people. Small areas of terrain alteration are present, but are attributed mostly to cattle operations. The sounds of other people are rarely heard. Approximately 1-2 encounters per day off travel routes (staging areas) and few encounters on travel routes. *Operational Characteristics:* Foot travel and mountain bikes are predominate, motorized use prohibited. Basic information provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires prohibited, camping prohibited in the parking areas; standard 14-day camping limit applies outside of parking areas; closed to recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements. Other Programs: Closed to leasing. Recommend for withdrawal from mineral entry. Closed to solid and fluid mineral development. Salable mineral development and surface disturbance for administrative use only. Visual Resource Management (VRM) Class II. Renewable energy and rights-of-way (ROW) exclusion area. Travel limited to designated routes.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage present from Highway 339. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc. **Monitoring:** Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs present at key access points. Develop trailheads for foot, horse and bicycle travel. **Administrative:** *Oil & Gas Leasing/Minerals:* Closed to leasing. Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only. *VRM:* Class II *Renewable Energy:* Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Special Recreation Permits (SRPs):
SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Travel Management: The area will be managed as limited to designated routes, with very few routes designated. Identify routes to close and reclaim. Modify appropriate routes into nonmotorized trails. Designated routes will be primarily for provision of access to provide egress for administrative use.

Areas of Critical Environmental Concern (ACEC): Welch Ranch ACEC values will be incorporated into an ACEC and/or Recreation Area Management Plan.

Agreements: Seek out cooperative agreements with interested organizations.

Partners: Sheridan Community Land Trust, Sheridan Public Land Users, Wyoming State Land Board and Wyoming Department of Game and Fish. Pursue partnerships with Sheridan County Schools and Sheridan College to establish an outdoor classroom.

Other administration: Designated ACEC. Closed to recreational target shooting. The parking lots and trailheads are closed to camping. Campfires are prohibited.

TONGUE RIVER RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Tongue River RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, fishing, hunting and foot and horse travel so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits
• Boating • Fishing • Environmental Education • Nature Viewing	• Enjoying frequent exercise • Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Closer relationship with the natural world • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Improved community integration • Lifestyle improvement or maintenance • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character • Reduced wildlife disturbance from recreation facility development • Improved soil, water, and air quality • Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Mechanized travel on designated trails. Motorized travel for administrative use only. Area of Critical Environmental Concern designation; discussed in Appendix S (p. 2121).

RIVER BOTTOM RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Bottom RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in nature and wildlife viewing, fishing, hunting and foot and horse travel so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits

• Jogging • Walking • Hiking • Environmental Education • Mountain Biking • Horseback Riding • Fishing • Nature Viewing • Hunting	• Enjoying frequent exercise • Enjoying having easy access to natural landscapes • Enjoying having access to close-to-home outdoor amenities • Enjoying the closeness of friends and family	Personal: • Closer relationship with the natural world • Improved mental health • Improved physical health • Greater appreciation of the outdoor environment Community/Social: • Improved community integration • Lifestyle improvement or maintenance • Heightened sense of community satisfaction Environmental: • Greater community ownership and stewardship of park, recreation, and natural resources • Maintenance of distinctive recreation setting character • Improved soil, water, and air quality • Greater protection of fish, wildlife, and plant habitat from growth, development, and public use impacts Economic: • Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of mechanized routes. *Naturalness:* Character of natural landscape partially modified but none overpower natural landscape. *Facilities:* Maintained and marked trails, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion & interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Mechanized travel on designated trails. Motorized travel for administrative use only. Area of Critical Environmental Concern designation; discussed in Appendix S (p. 2121).

UPLAND RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Upland RMZ will be sustained or enhanced for individuals or small groups of nonmotorized recreationists, to engage in horseback riding, hiking, camping, hunting and nature viewing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below:		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits
● Hiking ● Camping ● Hunting	● Enjoying having easy access to natural landscapes ● Enjoying having access to close-to-home outdoor amenities ● Enjoying maintaining out-of-town country solitude	Personal: ● Closer relationship with the natural world ● Improved mental health ● Improved physical health ● Greater appreciation of the outdoor environment Community/Social: ● Heightened sense of community satisfaction Environmental: ● Greater community ownership and stewardship of park, recreation, and natural resources ● Maintenance of distinctive recreation setting character Economic: ● Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a mile of paved/primary roads and highways. *Naturalness:* Character of natural landscape retained. A few modifications contrast with character of the landscape (e.g., fences, primitive roads). *Facilities:* No structures. Foot/horse trails only.	*Contacts With Others:* Encounters with other groups average fewer than 3 encounters off of travel routes. *Group Size:* Group sizes are expected to remain small (less than 3 people per group). *Evidence of use:* Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.

Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II. Mechanized travel on designated trails. Motorized travel for administrative use only. Area of Critical Environmental Concern designation; discussed in Appendix S (p. 2121).

T.7. Weston Hills Management Area

Supporting Information

This SRMA is necessary to accommodate local visitor demand for motorized recreational opportunities near the City of Gillette; this demand has been identified by community involvement workshops, and through recreation research. Weston Hills is located within 25 miles of the Gillette city limits. This parcel provides seamless recreational opportunities as it connects with Thunder Basin National Grassland and additional public lands. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand. SRMA management will sustain and enhance these amenities as well as accommodate the visitor demand.

WESTON HILLS SPECIAL RECREATION MANAGEMENT (SRMA) OBJECTIVES & DECISIONS
Objective Statement: Within the Weston Hills SRMA, by the year 2016 and thereafter, participants in recreation assessments will report an average 4.0 realization of the targeted experiences and benefits (4.0 on a probability scale, where 1.0 equals not realized and 5.0 equals totally realized) listed below. The Weston Hills SRMA will offer opportunities for recreationists to engage in off-highway vehicle (OHV) use, camping, hunting and nature viewing and other forms of dispersed recreation in a partially modified physical recreation setting with both motorized and nonmotorized public use. Within the management area, the existing natural and physical character of the landscape will be modified by recreational trail developments and associated recreation facilities.
Activities: OHV use, fishing, hunting, camping and nature viewing *Experiences:* Enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities. *Benefits:* Heightened sense of community sense of place, lifestyle improvement.
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS
Physical Characteristics: Within 0.5 mile of paved/primary roads and highways; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments and basic toilet. *Social Characteristics:* From 2006 to 2010, the average annual estimated visitation was 3920 visits and 2167 visitor days (RMIS). Most groups consist of 3-6 people. Approximately 3-6 encounters per day off travel routes (staging areas) and approximately 4-8 encounters on travel routes. Small areas of terrain alteration are prevalent near the trailhead and parking areas. Surface vegetation gone with compacted soils observed. The sounds of other people are regularly heard. *Operational Characteristics:* Motorized use predominates, motorized use allowed on designated routes. Basic information provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS

Recreation and Visitor Services Program: Campfires prohibited. Not a fee site; not currently suitable for Federal Lands Recreation Enhancement Act (FLREA). The site may be evaluated in conjunction with U.S. Forest Service under FLREA if additional amenities are provided in the future.

Other Programs: CSU for solid and fluid mineral development. Salable mineral development and surface disturbance for administrative use only. Visual Resource Management (VRM) Class II. Renewable energy and rights-of-way (ROW) exclusion area. Travel limited to designated routes.

IMPLEMENTATION DECISIONS

Marketing: Provide maps and information at the field office. Directional signage present from Highway 59. Develop interpretive signs at trailhead/parking area on general location, history, geology, and wildlife resources. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as Conservation and Outdoor Recreation Education, Take It Outside, National Public Lands Day, etc.

Monitoring: Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows.

Management: Signs present at key access points. Develop trailheads for foot, horse and bicycle travel.

Administrative:

Oil & Gas Leasing/Minerals: Lease fluid minerals with a Controlled Surface Use (CSU). Recommended for withdrawal from mineral entry. Salable mineral development for administrative use only.

VRM: Class II

Renewable Energy: Renewable energy exclusion area

Lands and Realty: ROW exclusion area

Travel Management: The area will be managed as limited to designated routes, with several routes designated. Routes will be classified by type of use (public or administrative), vehicle type (i.e. passenger vehicle, four-wheel drive, vehicles 50" or less) and maintenance level. Identify routes to close and reclaim.

Special Recreation Permits (SRPs):
SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate.

Agreements: Create and maintain cooperative agreements with U.S. Forest Service and other interested organizations.

Partners: U.S. Forest Service Douglas Ranger District, Campbell County, Wyoming State Land Board and Wyoming Department of Game and Fish.

Other administration: Standard 14-day camping limit applies.

THE LOOP RECREATION MANAGEMENT ZONE (RMZ)

Outcome Objective

The Loop RMZ will be sustained or enhanced for individuals or small groups of motorized recreationists, to engage in off-highway vehicle (OHV) use, camping and nature and wildlife viewing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country settings:

TARGETED OPPORTUNITIES & OUTCOMES

Activity Opportunities	Outcomes	
	Experiences	Benefits

● OHV use ● Camping	● Enjoying having easy access to natural landscapes ● Enjoying having access to close-to-home outdoor amenities ● Enjoying the closeness of friends and family	Personal: ● Improved mental health ● Improved physical health Community/Social: ● Lifestyle improvement or maintenance ● Heightened sense of community satisfaction Environmental: ● Greater community ownership and stewardship of park, recreation, and natural resources ● Maintenance of distinctive recreation setting character Economic: ● Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of passenger roads. *Naturalness:* Character of natural landscape considerably modified. *Facilities:* Maintained and marked routes, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Large areas of terrain alteration are prevalent near "the Loop" and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.
Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II

DISPERSED USE RECREATION MANAGEMENT ZONE (RMZ)		
Outcome Objective The Weston Hills Dispersed Use RMZ will be sustained or enhanced for individuals or small groups of motorized recreationists, to engage in off-highway vehicle (OHV) use, camping and nature and wildlife viewing so that participants in visitor assessments/surveys indicate a higher than average (mean average of 4.0 on a 5 point scale) realization of experience and benefit outcomes listed below in these Front Country and Middle Country settings:		
TARGETED OPPORTUNITIES & OUTCOMES		
Activity Opportunities	Outcomes	
	Experiences	Benefits
● Hunting ● Hiking ● Camping	● Enjoying having easy access to natural landscapes ● Enjoying having access to close-to-home outdoor amenities ● Enjoying the closeness of friends and family	Personal: ● Improved mental health ● Improved physical health Community/Social: ● Lifestyle improvement or maintenance ● Heightened sense of community satisfaction Environmental: ● Greater community ownership and stewardship of park, recreation, and natural resources ● Maintenance of distinctive recreation setting character Economic: ● Increased desirability as a place to live or retire

DESIRED FUTURE RECREATION SETTING CHARACTER		
Physical	Social	Operational
Remoteness: Within a 0.5 mile of four-wheel drive roads. *Naturalness:* Character of natural landscape partially modified. *Facilities:* Maintained and marked routes, simple trailhead developments and basic toilets. Interpretive displays may also be incorporated.	*Contacts With Others:* Encounters with other groups average 2-4 encounters per day in staging areas and fewer than 5 encounters on travel routes. *Group Size:* Group sizes are expected to remain small (less than 5 people per group). *Evidence of use:* Large areas of terrain alteration are prevalent near "the Loop" and parking areas. Surface vegetation gone with compacted soils observed. Sounds of other people common.	*Mechanized Use:* Mechanized travel is allowed only on designated trails. *Management Controls and Visitor Services:* On site controls and services are present but subtle. Offsite services and controls provided in the minimum amount necessary to reach management objectives.

SUPPORT ACTIONS	
Recreation Management Actions	Utilize adaptive management techniques to provide identified recreation opportunities (activities, experiences, and benefits) and reach desired future setting conditions. Special Recreation Permits will be allowed in this area so long as setting condition and outcome objectives can be maintained.
Information and Education (including promotion and interpretation)	Ensure targeted experiences and benefits as well as recreation setting information is included and explained in all visitor information. Existing offsite and onsite visitor orientation (kiosk, signs, and informational brochures) will be maintained and enhanced.
Administration	Continue Memorandum of Understanding and consider other cooperative agreements between the Bureau of Land Management and pertinent partners to maintain and enhance the area.

Monitoring (and Evaluation)	Solicit partnerships and cooperative agreements to: monitor outcome attainment and preferences through focus group interviews or visitor studies.
Interdisciplinary Support Actions	Visual Resource Management Class II; travel limited to designated routes.

T.8. Extensive Recreation Management Areas

Extensive Recreation Management Areas (ERMAs) are administrative units managed:

1. To address recreation use, demand, or existing Recreation and Visitor Services program investments.
2. To support and sustain the principal recreation activities and the associated qualities and conditions.
3. Commensurate with the management of other resources and resource uses.

The Preferred Alternative of this land use plan does not generally propose any special management restrictions (i.e. rights-of-way avoidance, closures to leasing, etc.) to protect the recreation values within ERMAs. The objectives of the recreation program within ERMAs will be considered commensurate with other resources and resource uses in site-specific analysis. Mitigation of impacts to recreation in ERMAs in subsequent site-specific National Environmental Policy Act documents will be an implementation level decision, subject to consideration of the objectives identified for each ERMA. ERMAs do overlap with management actions proposed for other resources and the "Management Actions and Allowable Uses" sections listed below reflect the management selected in the Preferred Alternative across all resources.

T.8.1. Cabin Canyon Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to user created motorized routes. This ERMA is also necessary to accommodate local visitor demand for motorized recreational opportunities near the City of Gillette; this demand has been identified by onsite customers, community involvement workshops, and through recreation research. Cabin Canyon is located within 25 miles of the Gillette city limits. ERMA management will accommodate visitor demand, minimize conflicts with other uses (i.e. mineral development) and prevent inadvertent trespass.

CABIN CANYON EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: Manage the Cabin Canyon ERMA for motorized recreationists to engage in off-highway vehicle (OHV) use, hunting and nature viewing so that they realize a "moderate" level of the targeted experience and benefit outcomes in the Front and Middle Country settings.
Activities: OHV use, hunting, camping and nature viewing *Experiences:* Enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities, improved respect for privately owned lands *Benefits:* Improved understanding of how this community's rural-urban interface impacts its quality of life; greater respect for private property and local lifestyles
RECREATION SETTING CHARACTERISTIC (RSC) DESCRIPTIONS

Physical Characteristics: Within 0.5 mile of paved/primary roads and highways; character of the natural landscape partially modified but none overpower the natural landscape; maintained and marked trails, simple trailhead developments. *Social Characteristics:* Quantitative visitor use data does not yet exist for the Cabin Canyon area. A few large areas of terrain alteration exist; largely associated with user created routes and campsites. Surface vegetation is absent in places with hardened soils observed. The sounds of other people are occasionally heard. *Operational Characteristics:* Motorized use predominates, motorized use allowed on designated routes. Basic information should be provided, staff infrequently present. Some regulatory and ethics signing, moderate use restrictions.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires prohibited, standard 14-day camping limit applies; prioritized for education efforts to mitigate recreational target shooting; currently not eligible for Federal Lands Recreation Enhancement Act but may be evaluated if future investments in visitor services meet eligibility requirements. Other Programs: Controlled Surface Use (CSU) for mineral development. Travel limited to designated routes. Visual Resources Management (VRM) Class IV.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Highway 59 and Bishop Road. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as National Public Lands Day, etc. **Monitoring:** Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *Oil & Gas Leasing/Minerals:* Lease fluid minerals with a CSU. Salable mineral development for administrative use only. *VRM:* Class IV *Lands and Realty:* ROW exclusion area *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. *Travel Management:* The area will be managed as limited to designated routes, with several routes designated. Identify routes to close and reclaim. *Agreements:* State of Wyoming *Partners:* *Other administration:* Prioritized for education efforts to mitigate recreational target shooting; recreational target shooting would be prohibited within any future developed recreation facilities.

T.8.2. Face of the Bighorns/North Fork Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The Face of the Bighorns/North Fork ERMA includes lands from the Poison Creek Trail area south along the Face of the Bighorns, the Horn, and the North Fork Wilderness Study Area (WSA). ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

FACE OF THE BIGHORNS/NORTH FORK EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2020, the Face of the Bighorns/North Fork ERMA will offer recreation opportunities, in a relatively unchanged physical recreation setting, that facilitate the visitor's freedom to participate in a variety of dispersed, nonmotorized/nonmechanized recreation activities.
Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Camping allowed, subject to 14-day limit. Other Programs: Overlaps the lands with wilderness characteristics (LWC) unit (6,864 acres) and the North Fork Wilderness Study Area (WSA) (10,089 acres). These areas have restrictions on surface disturbance. North Fork WSA and LWC unit are closed to motorized travel. Elsewhere, travel is limited to designated routes. Visual Resources Management (VRM) Class I, II, and III.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton Road. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *Oil & Gas Leasing/Minerals:* North Fork WSA and LWC unit are recommended for withdrawal from mineral entry, closed to oil and gas leasing and closed to salable mineral development. *VRM:* North Fork WSA is VRM Class I; remainder is Class II and III *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Lands and Realty:* North Fork WSA and LWC unit are rights-of-way exclusion areas. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. Ensure that SRPs include sufficient mitigation to protect WSAs and LWC. *Travel Management:* North Fork WSA and LWC unit and a 500-foot buffer of the Poison Creek Trail are closed to motorized travel. Elsewhere, travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. North Fork WSA is closed to motorized use.

WSA: North Fork WSA is managed under Manual 6330 to prevent impairment of wilderness characteristics. *Agreements:* State of Wyoming *Partners:* Wyoming Game and Fish Department *Other administration:* Recreational target shooting is prohibited within developed recreation sites. Currently, the Poison Creek trailhead is the only existing development.

T.8.3. Gardner Mountain Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The Gardner Mountain ERMA includes lands along and south of the Mayoworth-Slip Road and north of Barnum Mountain Road. The ERMA encompasses the Gardner Mountain Trail and the Gardner Mountain WSA. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

GARDNER MOUNTAIN EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2020, the Gardner Mountain ERMA will offer recreation opportunities, in a relatively unchanged physical recreation setting, that facilitate the visitor's freedom to participate in a variety of dispersed, nonmotorized/nonmechanized recreation activities.
Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires prohibited. Camping allowed, subject to 14-day limit. Other Programs: Overlaps the Gardner Mountain Wilderness Study Area (WSA) (6,423 acres). Controlled Surface Use for mineral development. Travel limited to designated routes. Visual Resources Management (VRM) Class I, II, and III.

IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton, Slip, Mayoworth, Brock and Barnum Roads. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *Oil & Gas Leasing/Minerals:* Gardner Mountain WSA is recommended for withdrawal from mineral entry, closed to oil and gas leasing and closed to salable mineral development. *VRM:* Gardner Mountain WSA is VRM Class I; remainder is Class II and III *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Lands and Realty:* Gardner Mountain WSA is a rights-of-way exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. Ensure that SRPs include sufficient mitigation to protect WSA. *Travel Management:* Gardner Mountain WSA and a 500-foot buffer of the Gardner Mountain Trail is closed to motorized travel. Elsewhere, travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *WSA:* Gardner Mountain WSA is managed under Manual 6330 to prevent impairment of wilderness characteristics. *Agreements:* State of Wyoming *Partners:* Wyoming Game and Fish Department *Other administration:* Recreational target shooting is prohibited within developed recreation sites. Currently, the Gardner Mountain trailhead is the only existing development.

T.8.4. Kaycee Stockrest Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to motorized use overlapping traditional livestock use. This ERMA is also necessary to accommodate local visitor demand for motorized recreational opportunities and recreational target shooting near the City of Kaycee; this demand has been identified by onsite evaluation and through recreation research. The Kaycee Stockrest ERMA is located within 1.0 mile of the Kaycee city limits. ERMA management will sustain and enhance recreation amenities to accommodate the visitor demand while honoring valid existing rights and preventing inadvertent trespass.

KAYCEE STOCKREST EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2018, the Kaycee Stockrest ERMA will provide recreational opportunities that meet the desires of local residents for nearby recreation opportunities while protecting human health and safety and minimizing conflicts between recreation and valid existing rights.
Activities: Off-highway vehicle use, hunting, camping and recreational target shooting *Experiences:* Enjoying having easy access to natural landscapes, enjoying having access to close-to-home outdoor amenities. *Benefits:* Heightened sense of community sense of place, lifestyle improvement. Protection of both public and private land resources through boundary marking and active management.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires prohibited. Camping prohibited in 200 acres encompassing stockrest, except under stock trailing permit. Camping allowed on 2,685-acre parcel north of state section, subject to 14-day limit. Pursue agreement with City of Kaycee and local organizations to actively manage recreational target shooting. Other Programs: Travel limited to designated routes. Visual Resources Management (VRM) Class II.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Highway 59 and Bishop Road. Provide stewardship information to help preserve the special landscape character. Make available for outreach programs such as National Public Lands Day, etc. **Monitoring:** Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *VRM:* Class II *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. *Travel Management:* Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *Agreements:* State of Wyoming *Partners:* City of Kaycee, Johnson County *Other administration:* Recreational target shooting is prohibited within developed recreation sites. Currently, no developments exist.

T.8.5. North Bighorns Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The North Bighorns ERMA includes lands along and south of the parcels in Sheridan County adjacent to the Bighorn National Forest.

ERMA management will promote coordination with the U.S. Forest Service and local organizations to meet community-driven recreation proposals and to facilitate seamless recreation opportunities.

NORTH BIGHORNS EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2020, the North Bighorns ERMA will provide seamless opportunities for recreation in conjunction with the Bighorn National Forest.
Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires prohibited. Camping allowed, subject to 14-day limit. Not a fee site; not currently suitable for Federal Lands Recreation Enhancement Act (FLREA). The site may be evaluated under FLREA if additional amenities are provided in the future. Other Programs: Controlled Surface Use for mineral development. Travel limited to designated routes. Visual Resources Management (VRM) Class II.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton Road. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *VRM:* Class II *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. *Travel Management:* Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *Agreements:* State of Wyoming *Partners:* U.S. Forest Service Bighorn National Forest, Wyoming Game and Fish Department *Other administration:* Recreational target shooting would prohibited within any future developed recreation sites. Currently, no development exists.

T.8.6. Powder River Basin Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

POWDER RIVER BASIN EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2018, the Powder River Basin ERMA will provide opportunities for recreationists to engage in hunting, camping and other dispersed recreational opportunities on accessible public lands while preventing inadvertent trespass onto adjacent private lands.
Activities: Hunting, hiking, camping, and nature viewing *Experiences:* Enjoying having access to close-to-home outdoor amenities, greater understanding of the importance of recreation and tourism in our community, improved understanding of this/our community's dependence and impact on public lands *Benefits:* Heightened sense of community sense of place, lifestyle improvement. Protection of both public and private land resources through boundary marking and active management.
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires subject to Wyoming Interagency Fire Restrictions. Camping allowed, subject to 14-day limit. Other Programs: Overlaps the Fortification Creek Wilderness Study Area (WSA) (12,419 acres) and the Fortification Creek Area of Critical Environmental Concern (ACEC) (32,602 acres). Travel limited to designated routes. Visual Resources Management (VRM) Class I-IV.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from exits along I-90. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *Oil & Gas Leasing/Minerals:* Fortification Creek WSA is recommended for withdrawal from mineral entry, closed to oil and gas leasing and closed to salable mineral development. *VRM:* Fortification Creek WSA is VRM Class I; remainder is Class II, III, and IV *Renewable Energy:* The majority of the ERMA falls within a renewable energy exclusion or avoidance area. *Lands and Realty:* Fortification Creek WSA is a rights-of-way exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. Ensure that SRPs include sufficient mitigation to protect WSA.

Travel Management: Fortification Creek WSA is closed to motorized travel. Elsewhere, travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *\ACEC:* Fortification Creek ACEC measures to protect elk habitat may include restrictions on access and travel management. *WSA:* Fortification Creek WSA is managed under Manual 6330 to prevent impairment of wilderness characteristics. *Agreements:* State of Wyoming *Partners:* Wyoming Game and Fish Department *Other administration:* Recreational target shooting would be prohibited within any future developed recreation sites. Currently, no developments exist.

T.8.7. South Bighorns Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The South Bighorns ERMA includes lands in southwestern Johnson County, south of Barnum Mountain Road, and generally west of Bar C Road that are not part of the Middle Fork Powder River or Hole-in-the-Wall SRMAs.

ERMA management will promote coordination with the Worland and Casper Field Offices, Wyoming Game and Fish Department, State of Wyoming, and local organizations to meet community-driven recreation proposals and to facilitate seamless recreation opportunities. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

SOUTH BIGHORNS EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2018, the South Bighorns ERMA will offer seamless recreation opportunities, in a relatively unchanged physical recreation setting, that facilitate the visitor's freedom to participate in a variety of dispersed, recreation activities. Motorized access across the region will be accommodated through limited routes and public motorized access between Outlaw Cave, Hole-in-the-Wall, and Hazelton Road will be pursued.
Activities: Hiking, hunting, fishing, camping, wildlife and nature viewing *Experiences:* Developing skills and abilities, testing endurance, savoring the total sensory experience of a landscape *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Camping allowed, subject to 14-day limit. Not a fee site; not currently suitable for Federal Lands Recreation Enhancement Act (FLREA). The site may be evaluated under FLREA if additional amenities are provided in the future. Other Programs: Travel limited to designated routes. Visual Resource Management (VRM) Class II and III.

IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Directional signage necessary from Hazelton Road. Provide stewardship information to help preserve the special landscape character. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *VRM:* Class II and III *Renewable Energy:* The entire ERMA falls within a renewable energy exclusion area. *Special Recreation Permits (SRPs):* SRPs will be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. *Travel Management:* Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *Wild and Scenic Rivers :* The canyon within 0.25 mile of Middle Fork Powder River is managed under Manual 6400 – Wild and Scenic Rivers to protect outstandingly remarkable values. *Agreements:* State of Wyoming *Partners:* Wyoming Game and Fish Department *Other administration:* Recreational target shooting would be prohibited within any future developed recreation sites.

T.8.8. Walk-in Area Extensive Recreation Management Area

Supporting Information and Rationale

This ERMA is necessary to accommodate multiple use mandates through reduction of user conflicts primarily related to limited legal access and protection of high-quality hunting and wildlife viewing opportunities. The Walk-in Area ERMA includes BLM-administered lands adjacent to Walk-in Areas with agreements that are negotiated between Wyoming Game and Fish Department (WGFD) and private landowners.

WGFD manages the Private Lands Public Wildlife Access program to improve public access for hunting and fishing opportunities. Walk-in agreements are negotiated between WGFD and private landowners for a specific period of time, usually several years, and thus the status of an access areas can change during the life of this plan. BLM-administered lands adjacent to Walk-in Areas provide additional access and hunting and fishing opportunities for recreationists. While the WGFD and the adjacent private landowner have authority over any lands enrolled in the program, the BLM can support the objectives of the Private Lands Public Wildlife Access program through collaborative management.

Several parcels adjacent to current or historic Walk-in Areas overlap portions of other SRMAs and ERMAs. The objectives of the Walk-in Area ERMA apply to any BLM-administered lands

that are adjacent to currently enrolled lands in the Private Lands Public Wildlife Access program and may be concurrently applied to parcels in an ERMA or SRMA.

ERMA management will promote coordination with the WGFD, State of Wyoming, and private landowners to promote public access to public lands and facilitate seamless recreation opportunities. ERMA management will promote development of additional public access and sustain and enhance recreation amenities to accommodate visitor demand while honoring valid existing rights and preventing inadvertent trespass.

WALK-IN AREA EXTENSIVE RECREATION MANAGEMENT AREA (ERMA) OBJECTIVES & DECISIONS
Objective Statement: By 2018, Bureau of Land Management-administered lands adjacent to Wyoming Game and Fish Department Walk-In Areas will provide seamless opportunities for the nonmotorized recreation, specifically hunting and fishing. Travel management, camping restrictions and fire restrictions may be negotiated to support additional public access to public lands through the Private Lands Public Wildlife Access program objectives.
Activities: Hunting, fishing, camping, wildlife and nature viewing *Experiences:* Greater community ownership and stewardship of recreation, and natural resources, improved understanding of how this community's rural-urban interface impacts its quality of life, improved understanding of this/our community's dependence and impact on public lands *Benefits:* Greater sense of adventure, greater retention of distinctive natural landscape features; improved skills for outdoor enjoyment
MANAGEMENT ACTIONS & ALLOWABLE USE DECISIONS
Recreation and Visitor Services Program: Campfires may be prohibited to facilitate negotiations with private landowners. Wyoming Interagency Fire Restrictions would be posted at access points. Camping may be allowed, subject to 14-day limit. Restrictions on camping would be analyzed on a case-by-case basis and permanent closures would require a land use plan amendment. Other Programs: Travel limited to designated routes. Visual Resources Management (VRM) Class II - IV.
IMPLEMENTATION DECISIONS
Marketing: Provide maps and information at the field office. Provide stewardship information related to outdoor ethics. **Monitoring:** Vehicle and trail counters with routine surveys and observation. Informal visitor surveys and formal focus groups as funding allows. **Management:** Signs needed at key access points. **Administrative:** *VRM:* Currently, Class II-IV *Special Recreation Permits (SRPs):* SRPs may be issued as a discretionary action for a wide variety of uses, consistent with resource/program objectives, and within budgetary/workload constraints. Develop criteria for potential limitations on issuance of SRPs to clarify when noncommercial activities may take place under a letter of agreement or to avoid saturation of commercial or organized use. Develop special stipulations for SRPs to protect the recreation setting as appropriate. *Travel Management:* Travel is limited to designated routes. A travel management plan will be developed to designate routes open for administrative or public use, to consider seasonal closures, and to identify routes to close and reclaim. *Agreements:* State of Wyoming *Partners:* Wyoming Game and Fish Department *Other administration:* Recreational target shooting would be prohibited within any future developed recreation sites.

Appendix U. Economic Impact Analysis Methodology

This appendix describes the methods and data that underlie the economic impact modeling analysis. Input-output models such as the Impact Analysis for Planning (IMPLAN) model, an economic impact analysis model, provide a quantitative representation of the production relationships between individual economic sectors. Thus, the economic modeling analysis uses information about physical production quantities and the prices and costs for goods and services. The inputs required to run the IMPLAN model are described in the following narrative and tables. The resulting estimates from the IMPLAN model, by alternative, can be found in the Economic Conditions section in Chapter 4. The first section of this appendix describes general aspects of the IMPLAN model and how it was used to estimate economic impacts. The remaining sections provide additional detailed data used in the analysis for oil and gas, livestock grazing, and recreation.

U.1. The IMPLAN Model

IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the ripple effect (also called the "multiplier effect") of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly impacted) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

This analysis used IMPLAN 2010; prior to running the model, all cost and price data were converted to a consistent dollar year using regional and sector-specific adjustment factors from the IMPLAN model. The values in this appendix are expressed in year 2011 dollars so that the earnings and employment estimates can be easily compared to the earnings and employment data from the Bureau of Economic Analysis (see Chapter 3).

The current IMPLAN model has 440 economic sectors, of which 184 are represented in the three planning area counties. This analysis involved direct changes in economic activity for 33 IMPLAN economic sectors, as well as changes in all other related sectors due to the ripple effect. The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area. As a result, the calibrated model generates multipliers and subsequent impacts that more accurately reflect the interaction between and among the sectors in the planning area compared to a model using unadjusted national coefficients. For instance, worker productivity in oil and gas production is higher in Wyoming than the national average. Key variables used in the IMPLAN model were filled in using data specific to Wyoming, including employment estimates, labor earnings, and total industry output.

U.2. Oil and Gas

The economic impacts analysis for oil and gas reflects drilling, completion, and production activities. The number of wells drilled and completed is based on the Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas (Stilwell et al. 2012) and the constraints applied

under each alternative. Total well numbers for each alternative are presented in Table U.1, "Oil and Gas Well Numbers (BLM-Administered Surface)" (p. 2180). Table U.2, "Projected Oil and Gas Production from New Wells (Federal Surface)" (p. 2180) presents the projected quantity of oil and gas produced on federal surface, and Table U.3, "Projected Oil and Gas Production from New Wells (Federal, State, and Fee Surface)" (p. 2181) presents the projected quantity of oil and gas produced from federal, state, and private (fee) surface.

Table U.1. Oil and Gas Well Numbers (BLM-Administered Surface)

Item	Conventional Infill (Vertical)	Coalbed Natural Gas	Horizontal	Total
Federal Surface				
Alternative A – Wells Drilled	366	903	1,462	2,731
Alternative A – Wells Completed	275	895	1,462	2,632
Alternative B – Wells Drilled	1	101	6	108
Alternative B – Wells Completed	1	100	6	107
Alternative C – Wells Drilled	398	5,280	1,592	7,270
Alternative C – Wells Completed	299	5,234	1,592	7,125
Alternative D – Wells Drilled	355	2,721	1,418	4,494
Alternative D – Wells Completed	266	2,698	1,418	4,382
Federal, State, and Fee Surface				
Alternative A – Wells Drilled	741	5,890	2,962	9,593
Alternative A – Wells Completed	556	5,839	2,962	9,357
Alternative B – Wells Drilled	376	5,088	1,506	6,970
Alternative B – Wells Completed	282	5,044	1,506	6,832
Alternative C – Wells Drilled	773	10,267	3,092	14,132
Alternative C – Wells Completed	580	10,178	3,092	13,850
Alternative D – Wells Drilled	730	7,708	2,918	11,356
Alternative D – Wells Completed	548	7,642	2,918	11,108
Source: Stilwell et al. 2012; Appendix G (p. 1671)				

Table U.2. Projected Oil and Gas Production from New Wells (Federal Surface)

Year	Alternative A		Alternative B		Alternative C		Alternative D	
	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
2009	0.8	0.2	0.0	0.0	2.2	0.2	1.4	0.2
2010	2.5	0.5	0.1	0.0	8.9	0.5	5.1	0.5
2011	5.8	0.9	0.4	0.0	23.6	1.0	13.0	0.9
2012	8.8	1.1	0.7	0.0	39.2	1.2	21.3	1.1
2013	9.5	1.1	0.8	0.0	44.7	1.2	24.0	1.0
2014	10.9	1.5	0.8	0.0	46.8	1.7	25.6	1.5
2015	11.4	1.8	0.8	0.0	47.7	1.9	26.2	1.7
2016	13.4	2.4	0.9	0.0	52.2	2.6	29.2	2.3
2017	14.1	2.4	1.0	0.0	56.4	2.6	31.3	2.3
2018	16.9	3.1	1.1	0.0	64.2	3.4	36.0	3.0
2019	19.0	3.5	1.3	0.0	72.8	3.8	40.8	3.4

Year	Alternative A		Alternative B		Alternative C		Alternative D	
	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
2020	21.7	4.0	1.5	0.0	83.9	4.3	47.0	3.8
2021	24.6	4.2	1.7	0.0	98.1	4.6	54.5	4.1
2022	28.4	4.8	2.0	0.0	113.2	5.3	62.9	4.7
2023	31.4	5.2	2.2	0.0	126.8	5.7	70.3	5.1
2024	34.5	5.8	2.4	0.0	138.8	6.3	77.0	5.6
2025	36.1	6.0	2.6	0.0	145.9	6.5	80.8	5.8
2026	37.8	6.5	2.6	0.0	150.2	7.1	83.5	6.3
2027	37.5	6.5	2.6	0.0	148.6	7.1	82.7	6.3
2028	37.1	6.9	2.4	0.0	142.0	7.5	79.6	6.7

Source: Stilwell et al. 2012; BLM 2013b; Appendix G (p. 1671). Includes coalbed and conventional gas.

BCF billion cubic feet
MMBO million barrels of oil

Table U.3. Projected Oil and Gas Production from New Wells (Federal, State, and Fee Surface)

Year	Alternative A		Alternative B		Alternative C		Alternative D	
	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
2009	2.9	0.4	2.1	0.2	4.3	0.4	3.4	0.4
2010	10.9	1.0	8.5	0.5	17.3	1.0	13.5	1.0
2011	28.0	1.8	22.7	0.9	45.8	1.9	35.3	1.8
2012	45.9	2.3	37.8	1.1	76.3	2.4	58.4	2.2
2013	51.7	2.2	43.0	1.1	86.8	2.3	66.2	2.1
2014	55.1	3.1	45.1	1.6	91.1	3.3	69.8	3.1
2015	56.5	3.6	45.9	1.8	92.8	3.7	71.3	3.5
2016	62.7	4.8	50.2	2.4	101.5	5.0	78.5	4.7
2017	67.3	4.9	54.2	2.5	109.6	5.1	84.5	4.8
2018	77.4	6.3	61.7	3.2	124.7	6.6	96.6	6.2
2019	87.7	7.1	70.0	3.6	141.5	7.4	109.5	7.0
2020	101.0	8.0	80.7	4.1	163.2	8.4	126.2	7.9
2021	117.3	8.5	94.4	4.3	190.8	8.9	147.2	8.4
2022	135.3	9.8	108.9	5.0	220.1	10.2	169.8	9.7
2023	151.2	10.6	122.0	5.4	246.5	11.1	190.0	10.4
2024	165.6	11.7	133.5	6.0	269.8	12.2	208.0	11.6
2025	173.8	12.2	140.3	6.2	283.6	12.7	218.6	12.0
2026	179.5	13.1	144.4	6.7	291.9	13.7	225.3	12.9
2027	177.8	13.2	142.9	6.7	289.0	13.8	223.0	13.0
2028	171.2	14.0	136.6	7.1	276.1	14.6	213.8	13.8

Source: Stilwell et al. 2012; BLM 2013b; Appendix G (p. 1671). Includes coalbed and conventional gas.

BCF billion cubic feet
MMBO million barrels of oil

The costs of drilling and completing wells and producing oil and gas are also relevant to the economic impact analysis. Table U.4, "Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion According to Well Type" (p. 2182) provides a summary of the costs of drilling, completion, and production for each well type (conventional infill, horizontal, and coalbed natural gas [CBNG]) used for the economic analysis.

Table U.4. Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion According to Well Type

Assumption	Well Type		
	Conventional Infill	Horizontal	Coalbed Natural Gas
Drilling Impacts			
Drilling Cost ($/well)	$957,320	$2,271,725	$102,100
Local Drilling Costs[1]	88%	50%	84%
Local Direct Impact ($/well)	$841,881	$1,135,863	$85,424
Local Total Impact ($/well)[2]	$1,073,510	$1,431,518	$108,357
Multiplier (total impact/direct impact)	1.28	1.26	1.27
Completion Impacts			
Completion Cost ($/well)	$797,303	$6,815,175	$204,200
Local Completion Costs[1]	61%	50%	55%
Local Direct Impact ($/well)	$489,324	$3,407,588	$112,341
Local Total Impact ($/well)[2]	$646,331	$4,526,294	$146,408
Multiplier (total impact/direct impact)	1.32	1.33	1.30

Source: Stilwell et al. 2012; BLM 2013c; Taylor 2013. Data are in 2011 dollars and are based on Authorizations For Expenditure provided by exploration and development companies.
[1]The local cost shares were based on the percent of total drilling or completion costs that would be spent on goods and services purchased from the local economy.
[2] Total impacts estimated using Impact Analysis for Planning (IMPLAN) include direct, indirect, and induced impacts.

Table U.5, "Assumptions for Analysis of Economic Impacts on Output for Oil and Gas Production" (p. 2182) provides the assumptions used to determine the economic impact associated with the production of oil and gas. For the analysis, the Bureau of Land Management (BLM) estimated a production cost (for gas) of $1.48 per thousand cubic feet (mcf), based on data from the Energy Information Administration (Taylor 2013).

Table U.5. Assumptions for Analysis of Economic Impacts on Output for Oil and Gas Production

Economic Impact	Oil Production (per million barrels)	Gas Production (per billion cubic feet)
Direct Economic Impact[1]	$86,785,000	$4,186,100
Indirect Economic Impact[4]	$7,439,499	$358,846
Induced Economic Impact[5]	$2,363,153	$113,987
Total Economic Impact	$96,587,652	$4,658,934
Multiplier (total impact/direct impact)	1.11	1.11

Note: All dollar values are in year 2011 dollars.
[1]Direct economic impact is the market value of output.
[2]Based on an oil price of $86.785 per barrel, which is an average of the prices for 2012-2018 projected by the Wyoming Consensus Revenue Estimating Group (2013) and adjusted to 2011 dollars.
[3]Based on a gas price of $4.186 per mcf, which is an average of the prices for 2012-2018 projected by the Wyoming Consensus Revenue Estimating Group (2013) and adjusted to 2011 dollars.
[4]Indirect impacts from Impact Analysis for Planning (IMPLAN) reflect increased demand in sectors that directly or indirectly provide supplies to the oil and gas industry.
[5]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

The forecasted number of wells and production used for estimating employment impacts is the same as for estimating impacts on labor earnings and output. Table U.6, "Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion According to

Well Type" (p. 2183) shows the direct and total employment impacts attributable to drilling and completion.

Table U.6. Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion According to Well Type

Employment Impact	Well Type		
	Vertical	Horizontal	Coalbed Natural Gas
Drilling Impacts			
Direct Employment (jobs/well)	4.2	5.8	0.6
Total Employment Impact (jobs/well)	6.2	8.5	0.8
Multiplier (Total Impact/Direct Impact)	1.48	1.47	1.41
Average Earnings per Job (2011 dollars)	$63,318	$64,983	$52,278
Completion Impacts			
Direct Employment (jobs/well)	2.9	20.6	0.7
Total Employment Impact (jobs/well)	4.3	30.72	1.0
Multiplier (Total Impact/Direct Impact)	1.47	1.49	1.47
Average Earnings per Job (2011 dollars)	$59,143	$58,446	$53,674

Source: Taylor 2013
Note: Direct and total employment impact and average earnings per job are calculated using Impact Analysis for Planning (IMPLAN).

Table U.7, "Assumptions for Employment Impact Analysis for Oil and Gas Production" (p. 2183) shows the direct and total employment impacts associated with production.

Table U.7. Assumptions for Employment Impact Analysis for Oil and Gas Production

Employment Impact (annual number of jobs)	Oil Production (per million barrels)	Gas Production (per billion cubic feet)
Direct Employment	19.4	0.1
Indirect Employment	32.7	0.2
Induced Employment	16.3	0.1
Total Employment	68.4	0.4
Multiplier (Total Impact/Direct Impact)	3.53	3.53
Average Earnings per Job (2011 dollars)	$67,276	$67,276

Source: Taylor 2013
Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using Impact Analysis for Planning (IMPLAN).

The analysis of potential changes in tax revenues is based on tax rates of 12.5% of taxable value for federal mineral royalties, 6% of taxable value for state severance taxes (Wyoming Department of Revenue 2001), and 6.5% of taxable value for local ad valorem production taxes (based on recent average tax rates for the counties of Campbell [6.0%], Johnson [7.0%], and Sheridan [6.6%]) (Wyoming Department of Revenue 2009; Wyoming Department of Revenue 2011). Taxable value refers to value of sales minus allowable deductions, including certain costs of production and transportation. For purposes of estimating tax revenues, taxable value was estimated based on the average taxable value per unit sold from the counties in the planning area for production year 2010–2011 using data from the Wyoming Department of Revenue (2011). Taxable value was estimated as $61.60 per barrel for oil, and $3.02 per mcf for natural gas (2011 dollars).

U.3. Livestock Grazing

Economic impacts due to changes in livestock grazing are a function of the amount of forage available and the economic value of the forage. For livestock grazing, long-term surface disturbance from actions listed in Appendix G (p. 1671) may affect available animal unit months (AUMs). In addition, land disposal actions may have economic impacts; however, those impacts were not analyzed quantitatively because it is difficult to predict the net change in AUMs as a result of land disposal. Subsequent landowners may continue to graze the land, leaving overall livestock production and output in the region unaffected.

The economic analysis of livestock grazing impacts is based on authorized use. The BLM's data indicate that authorized use in the Buffalo Field Office is 106,078 AUMs, which is the same as active use. (However, note that in some field offices, active and authorized use figures are not identical.) Whereas the 106,203 permitted AUMs include active and suspended non-use AUMs, active AUMs exclude suspended non-use AUMs. Authorized use represents AUMs billed for and paid for each year for a permit or lease. These AUMs are not the same as actual use AUMs, and may diverge from actual use AUMs depending on individual and climatic circumstances in a given year. Actual use represents the AUMs physically used on the ground. Actual use may be less than or equal to authorized use, but authorized use provides an upper bound for the actual use in a given year. The BLM adjusts authorized use on an annual basis to account for the forage value of the land in a given year, based on climatic conditions (e.g., drought), as well as taking into account the needs of the land and the ranch operators.

Reductions in land available for livestock grazing (e.g., via long-term surface disturbance) are based on active use AUMs, while financial conditions on a given ranch operation are determined by actual use (i.e., the actual forage value of the land that is used for livestock) and authorized use (e.g., bank loans that are based on the available forage value of federal leases held by the ranch operator). Thus, for this study, authorized use is an appropriate baseline from which to measure reductions in available AUMs due to surface disturbance or restriction on grazing land. If reductions were measured from a higher baseline, such as permitted use, economic impacts would be overstated (although in this case the difference would be minimal, as the permitted use is essentially equal to authorized use).

Table U.8, “Estimated Forage Availability (Animal Unit Months)” (p. 2184) provides a summary of initial AUMs and total AUMs that the BLM projects would be lost by 2028 due to surface-disturbing activities on BLM-administered lands. Based on current allocations of AUMs to cattle and sheep, 92% of the AUM reduction is allocated to cattle and the remainder is allocated to sheep, for the purpose of estimating changes in output and employment. (There are also some AUMs allocated to horse and yak grazing, but these comprise two percent and less than one percent, respectively. These AUMs are included in the analysis, but the assumption is that their economic value is comparable to that of cattle and sheep grazing.) Acres of surface disturbance were converted to AUMs using a conversion factor of 6 acres per AUM (BLM 2010h).

Table U.8. Estimated Forage Availability (Animal Unit Months)

Item	Alternative A	Alternative B	Alternative C	Alternative D
Initial AUMs (authorized use)	106,078	106,078	106,078	106,078
AUMs lost due to surface-disturbing activities (long-term disturbance)	16,690	13,025	21,770	21,348
AUMs lost due to surface-disturbing activities (estimated annual)	834	651	1,089	1,067

Item	Alternative A	Alternative B	Alternative C	Alternative D
Net AUMs in 2028 (authorized use)	89,388	93,053	84,308	84,730
Source: BLM 2010h; BLM 2012j AUM Animal Unit Month				

Due to price fluctuations, average per-AUM values for cattle and sheep are based on the 2002 to 2011 average value of production estimates from the U.S. Department of Agriculture, adjusted to 2011 dollars (Taylor 2013). The value for cattle is $49.67 per AUM and the value for sheep is $59.23 per AUM. Including indirect and induced impacts, the value of one AUM for cattle is $92.64 and for sheep $121.30. Table U.9, "Assumptions for Analysis of Impacts on Output for Livestock Grazing" (p. 2185) shows the economic impact assumptions for cattle and sheep. The direct economic impact is the estimated change in livestock output per AUM; IMPLAN generates the indirect and induced impacts.

Table U.9. Assumptions for Analysis of Impacts on Output for Livestock Grazing

Economic Impact	Cattle	Sheep
Direct Economic Impact ($/AUM)	$49.67	$59.23
Indirect Economic Impact ($/AUM)[1]	$28.14	$46.91
Induced Economic Impact ($/AUM)[2]	$14.83	$15.17
Total Economic Impact ($/AUM)	$92.64	$121.30
Multiplier (Total Impact/Direct Impact)	1.87	2.05
Source: Taylor 2013 Note: All dollar values are in 2011 dollars. [1]Indirect impacts reflect increased demand in sectors that directly or indirectly provide supplies to the livestock industry. [2]Induced impacts reflect increased demand in the consumer and government sectors. AUM Animal Unit Month		

Table U.10, "Assumptions for Analysis of Employment Impacts for Livestock Grazing" (p. 2185) provides a summary of the employment impacts assumed according to unit changes in livestock AUMs.

Table U.10. Assumptions for Analysis of Employment Impacts for Livestock Grazing

Employment Impact	Cattle	Sheep
Direct Employment (Jobs/1,000 AUMs)	0.558	0.980
Indirect Employment (Jobs/1,000 AUMs)	0.306	0.748
Induced Employment (Jobs/1,000 AUMs)	0.141	0.139
Total Employment (Jobs/1,000 AUMs)	1.006	1.868
Multiplier (Total Impact/Direct Impact)	1.73	1.72

Employment Impact	Cattle	Sheep
Average Earnings per Job (2011 dollars)	$32,747	$18,976

Source: Taylor 2013

Note: Direct, indirect, and induced employment impacts and average earnings per job are calculated using Impact Analysis for Planning (IMPLAN).

AUM Animal Unit Month

U.4. Recreation

The analysis of economic impacts considers only recreation expenditures of nonresidents of the planning area. This is based on the assumption that expenditures of residents would occur in the region regardless of the BLM's actions that impact recreational opportunities; however, changes in nonresident recreation patterns would alter the amount of money entering the local region.

Economic impacts from recreation are a function of recreation visitor days (RVDs) and expenditures per day. Future RVDs were estimated based on current RVDs, recent growth rates, and projected trends. Estimates of future RVDs were based on the professional judgment of BLM staff, as well as a United States Forest Service (USFS) study that provides forecasts of recreation activity for the Rocky Mountain region (Bowker et al. 1999) and contacts with neighboring BLM field offices. Table U.11, "Projected Growth Rates for Nonresident Recreation Visitor Days" (p. 2186) provides a summary of estimated annual growth rates.

Table U.11. Projected Growth Rates for Nonresident Recreation Visitor Days

Item	OHV	Hunting	Fishing	Other Dispersed
2009 RVDs	487	2,081	290	2,739
2013 RVDs	507	2,140	296	2,919
2018 RVDs	533	2,216	303	3,160
2023 RVDs	560	2,294	311	3,421
2028 RVDs	588	2,376	319	3,703
Projected Annual Growth Rate	1.0%	0.7%	0.5%	1.6%

Source: BLM 2010g

OHV Off-highway vehicle
RVD Recreation visitor day

The estimates for average expenditure per visitor day, in 2011 dollars, are $93.32 for fishing (WGFD 2008a; USFWS 2008a), $143.90 for hunting (Responsive Management 2004), $57.58 for OHV use (Foulke et al. 2006), and $35.80 for other dispersed recreation (Stynes and White 2005). Table U.12, "Assumptions for Analysis of Impacts on Output for Recreation Activities" (p. 2187) shows the direct, indirect, and induced output per RVD for each recreation activity.

Table U.12. Assumptions for Analysis of Impacts on Output for Recreation Activities

Economic Impact	OHV (per RVD)	Hunting (per RVD)	Fishing (per RVD)	Other Dispersed (per RVD)
Direct Economic Impact[1]	$57.58	$143.90	$93.32	$35.80
Indirect Economic Impact[2]	$5.79	$24.73	$10.16	$4.31
Induced Economic Impact[3]	$6.60	$23.54	$10.21	$3.84
Total Economic Impact	$69.97	$192.17	$113.69	$43.94
Multiplier (total impact/direct impact)	1.22	1.34	1.22	1.23

Sources: WGFD 2008a; USFWS 2008a; Responsive Management 2004; Foulke et al. 2006; Stynes and White 2005; Taylor 2010; Taylor 2013
Note: Detail may not add to total due to rounding.
[1]Direct economic impact is the average expenditure per visitor day.
[2]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide support for the recreation industry.
[3]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

IMPLAN Impact Analysis for Planning
OHV Off-highway vehicle
RVD Recreation visitor day

Table U.13, "Assumptions for Employment Impact Analysis for Recreation Activities" (p. 2187) provides a summary of employment impacts assumed according to unit changes in RVDs.

Table U.13. Assumptions for Employment Impact Analysis for Recreation Activities

Employment Impact (annual number of jobs)	OHV (per 1,000 RVDs)	Hunting (per 1,000 RVDs)	Fishing (per 1,000 RVDs)	Other Dispersed (per 1,000 RVDs)
Direct Employment	0.54	1.65	0.92	0.36
Indirect Employment	0.06	0.24	0.09	0.04
Induced Employment	0.06	0.21	0.09	0.04
Total Employment	0.65	2.10	1.11	0.44
Multiplier (Total Impact/Direct Impact)	1.22	1.27	1.20	1.20
Average Earnings per Job (2011 dollars)	$26,332	$25,097	$23,183	$22,883

Source: Taylor 2013

Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using Impact Analysis for Planning (IMPLAN).

OHV Off-highway vehicle
RVD Recreation visitor day