U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

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Final Programmatic EIS for Fuel Breaks in the Great Basin

Volume 3: Appendices B through N

Estimated Lead Agency Total Costs Associated with Developing and Producing this EIS

$2,300,000

The Bureau of Land Management'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.

Appendix B

Acronyms and Abbreviations, Literature Cited, and Glossary

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Appendix B. Acronyms and Abbreviations, Literature Cited, and Glossary

B.1 Acronyms and Abbreviations

Acronyms and Abbreviations	Full Phrase
ACHP	Advisory Council on Historic Preservation
AIM	Assessment, Inventory, and Monitoring
AML	appropriate management level
BCR	bird conservation region
BLM	Bureau of Land Management
BSU	biologically significant unit
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DDT	dichlorodiphenyltrichloroethane
DNA	determination of NEPA adequacy
DOI	Department of Interior
EA	environmental assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIAT	Fire and Invasives Assessment Tool
FLPMA	Federal Land Policy and Management Act
GHMA	general habitat management area
HMA	herd management area
IBA	important bird area
IHMA	important habitat management area
IM	Instruction Memorandum
ITA	Indian Trust Asset
MBTA	Migratory Bird Treaty Act
MOU	memorandum of understanding
$MtCO_{2e}$	metric tons of carbon dioxide equivalent
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIFC	National Interagency Fire Center
NRHP	National Register of Historic Places
NWCG	National Wildfire Coordination Group

OHMA	other habitat management area
OHV	off-highway vehicle
PAC	priority area for conservation
PEIS	programmatic environmental impact statement
PHMA	priority habitat management area
PILT	payment in lieu of taxes
PM_{10} and $PM_{2.5}$	particulate matter, 10 and 2.5 microns or smaller
PFYC	Potential Fossil Yield Classification
RMP	resource management plan
RMPA	resource management plan amendment
ROS	Recreation Opportunity Spectrum
ROW	right-of-way
RSC	Recreation Setting Characteristics
SHPO	State Historic Preservation Office
SRP	special recreation permit
TCP	Traditional Cultural Property
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WEG	wind erodibility group
WFM	wildland fire management
WUI	wildland-urban interface

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B.3 GLOSSARY

Advancing fire—A fire spreading or set to spread with the wind. Also called: head fire.

Airshed—A geographic area that, because of topography, meteorology, or climate, is frequently affected by the same air mass.

Analysis area—A subset of the project area boundary. It is defined, on the broad scale, by the current and historical presence of sagebrush on BLM-administered lands within the project area boundary. The analysis area was further refined by excluding riparian exclusion areas; Wilderness areas; Wilderness Study Areas; lands with wilderness characteristics that are managed to maintain or enhance those characteristics; Areas of Critical Environmental Concern; Visual Resource Management Class I areas; areas within a quarter-mile of a Wild and Scenic River (including rivers found eligible and/or suitable); National Scenic and Historic Trails; areas within mapped Canada lynx distribution and wolverine primary habitat; and native, sparsely vegetated areas or sparsely vegetated areas dominated by low sagebrush species (See **Section 2.2.1**). The analysis area covers approximately 38 million acres on BLM-administered lands within the project area boundary.

Anchor point—An advantageous location, usually a barrier to fire spread, from which to start constructing a fire line. Used to minimize the chance of being flanked by the fire while the line is being constructed (NWCG 2018).

Annual—A plant whose entire life cycle occurs within 1 year.

Adaptive management—A system of management practices based on clearly defined outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that will best ensure that outcomes are met or re-evaluated. (BLM 2008).

Back burn—A method to clear (an area of scrub, bush, etc) by creating a new fire that burns in the opposite direction to the line of advancing fire.

Backing fire—See back burn.

Bearing tree—A marked tree used as a corner accessory; its distance and direction from the corner being recorded. Bearing trees are identified by prescribed marks cut into their trunks; the species and sizes of the trees are also recorded.

Biological soil crust—(Also known as cryptogamic, microbiotic, cryptobiotic, or microphytic crusts). Communities of organisms living on the surface of the soil and are composed of cyanobacteria, blue-green algae, microfungi, mosses, liverworts, and lichens (Rosentreter et al. 2007).

Class I area—Defined by the Clean Air Act (see **Appendix C**), federal Class I areas include national parks larger than 6,000 acres and national wilderness areas larger than 5,000 acres that were in existence when the Clean Air Act was amended in 1977, national monuments, and wildlife refuges that have since been designated by federal regulation. All areas of the United States that are not designated as Class I are considered Class II.

Cooperating agency—Any federal, state, or local government agency or Native American tribe that enters into formal agreement with the lead federal agency to help develop an environmental analysis. Cooperating agencies and tribes work with the BLM, sharing knowledge and resources, to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks.

Crown fire—A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as running or dependent to distinguish the degree of independence from the surface fire (NWCG 2018).

Cultural resource—A location with evidence of past human activity that may or may not have ongoing, traditional, or religious use and significance to a specific group. Cultural resources may include archaeological and historic objects, sites, buildings, structures, or districts. These are identifiable through archaeological inventories, historical records searches, and oral histories. Historic properties are a subset of significant cultural resources (see definition below). For the purposes of this document, the term cultural resources also includes Tribal resources (see definition below).

Ethnographic—Relating to the scientific study and description of peoples and cultures with their customs, habits, and mutual differences.

Fire frequency—A general term referring to the recurrence of fire in a given area over time

Fire intensity—Refers to the rate at which a fire produces heat at the flaming front and should be expressed in terms of temperature or heat yield

Fire regime—Describes the role of fire in ecosystems and categorizes patterns of fire ignition, seasonality, frequency, type (crown, surface, or ground fire), severity, intensity, and spatial continuity (pattern and size) that occur in a particular area or ecosystem. Classifications are based on fire return interval patterns and fire severity.

Fire-return interval—The number of years between two successive fires for a given area

Fire severity—The effect of fire on the dominant overstory vegetation.

Flame length—The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally ground surface); it is an indicator of fire intensity (NWCG 2018).

Flanking fire—Rate or spread and intensity of a fire usually falling somewhere in between advancing and backing with spread lateral to the main direction of fire travel. Also called: lateral fire.

Fuel break—A strip or block of land on which the vegetation, debris and detritus have been reduced and/or modified to control or diminish the risk of the spread of fire crossing the strip or block of land (NRCS 2005). NWCG also defines a fuel break system as "[a] natural or manmade change in fuel characteristics which affects fire behavior so that wildfires burning into them can be more readily controlled" and as "[a] series of modified strips or blocks tied together to form continuous strategically located fuel breaks around land units" (NWCG 2018).

Fuel model—Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified (NWCG 2018).

Fuels reduction—Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and to lessen potential damage and resistance to control (NWCG 2018).

General habitat management area (GHMA)—BLM-administered greater sage-grouse habitat that is occupied seasonally or year-round and is outside priority habitat management areas.

Greenhouse gases—Compounds in the atmosphere that absorb infrared radiation from the earth's surface and radiate a portion of it back to the surface.

Historic properties — Cultural resources that are archaeological sites, districts, or Traditional Cultural Properties (TCPs) that are known to have or suspected to have significance for listing on the National Register of Historic Places (NRHP), as defined in 36 CFR 63. TCPs as defined in National Register Bulletin 38.

Head fire—A fire spreading or set to spread with the wind. Also called: advancing fire.

Hotshot crew—A team of the most highly trained firefighters in the country. They often respond to large, high-priority fires and are trained and equipped to work in remote areas for extended periods of time with little logistical support.

Important habitat management area (IHMA)—BLM-administered land in Idaho that provides a management buffer for and that connects patches of PHMAs. IHMAs encompass areas of generally moderate to high habitat value or populations but that are not as important as priority habitat management areas.

Invasive plant species—Plants that are not part of (if exotic),or are a minor component of (if native), the original plant community or communities that have the potential to become a dominant or co-dominant species on the site if their future establishment and growth is not actively controlled by management interventions, or are classified as exotic or noxious plants under state or federal law. Species that become dominant for only one to several years (e.g. short-term response to drought or wildfire) are not invasive plants (BLM 2008).

Jackpot burn— A prescribed fire to deliberately burn natural or modified concentrations (jackpots) of wildland fuels under specified environmental conditions, which allows the fire to be confined to a predetermined area and produces the fireline intensity and rate of spread required to attain planned resource Management Objectives (NWCG 2018).

Ladder fuel—Live or dead vegetation that allows a fire to climb up from the ground into the tree or shrub canopy.

Lateral fire—Rate or spread and intensity of a fire usually falling somewhere in between advancing and backing with spread lateral to the main direction of fire travel. Also called: flanking fire.

Manual treatment—The use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species.

Mean fire return interval—The average period between fires under the presumed historical fire regime in a designated area.

Mechanical treatment—The use of mechanized tools and equipment to cut, clear, or prune herbaceous and woody species.

Modified fuel breaks—Also known as mowed linear fuel breaks, this type of fuel break is used to compact and limit the vertical extent of the fuel bed, which may contain patches of intact sagebrush that can be retained. Vegetation is thinned such that fuel load is reduced without complete removal of vegetation. Such fuel breaks require regular mowing or targeted grazing to maintain the desired fuel height (Shinneman et al. 2018).

Native plant species—Species that historically occurred or currently occur in a particular ecosystem and were not introduced.

Nonnative plant species—Plant species that are introduced to an area by humans either intentionally or unintentionally and compete with resident native (indigenous) species. These plants are also known as alien, exotic, introduced, and non-indigenous.

Noxious weed—A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or non-native, new, or not common to the United States (BLM 2008).

Old growth pinyon and juniper woodlands—A forest that has achieved great age or maturity and thereby exhibits unique ecological features. In the Great Basin, old growth pinyon-juniper woodlands include trees established prior to 1870, prior to Eurasian settlement. As juniper and pinyon age, canopy morphology shifts from cone shaped to a rounded top. As age advances, the tree may also develop a combination of the following characteristics: broad nonsymmetric tops, deeply furrowed bark (primarily juniper), twisted trunks or branches, dead branches and spike tops, large lower limbs, trunks containing narrow strips of cambium (strip-bark) (mostly in juniper), hollow trunks (rare in pinyon), large trunk diameters relative to tree height (in wester juniper), and branches covered with a bright yellow green lichen (*Letharia* spp.) in both juniper and pinyon. Western and Utah junipers can exceed 1,000 years in age and pinyon can exceed 600 years (Miller et al. 1999). For photos and physical characteristics of old growth pinyon and juniper, see also Sink (2003).

Other habitat management area (OHMA)—BLM-administered land in Nevada and Northeastern California, identified as unmapped greater sage-grouse habitat that contains seasonal or connectivity habitat areas.

Paleontological resources—The remains, imprints, or traces of once-living organisms preserved in rocks, sediments, and caves that are of scientific interest and that provide information about the history of life. Also described as "fossils".

Particulate matter—A mixture of microscopic solids and liquid droplets suspended in the air.

Perennial—A plant that lives more than 1 year.

Permitted grazing—The BLM issues permits and leases to public land ranchers to graze livestock on BLM-administered lands that has been divided into allotments. The permits and leases include terms and conditions for livestock grazing and generally cover a 10-year period. Permits and leases are renewable if the BLM determines that the terms and conditions of the expiring permit or lease are being met.

Pinyon-juniper successional phases—(see also Pyke et al. 2018 for phases of pinyon-juniper in-filling of sagebrush shrublands based on tree characteristics)

Phase I – Trees are present but shrubs and grasses are the dominant vegetation that influence ecological processes (hydrologic, nutrient, and energy cycles) on the site (Tausch et. al 2009). Trees make up less than 10 percent of the canopy cover.

Phase II – Trees are co-dominant with shrubs and herbs, and all three vegetation layers influence ecological processes on the site (Tausch et. al 2009). Trees makes up 10 to 30 percent of the canopy cover.

Phase III – Trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site. Shrubs no longer dominate the understory (Tausch et. al 2009). Tree canopy cover is over 30 percent.

Potential Treatment Area—A "potential treatment area" was defined for each action alternative and is a subset of the analysis area.

The potential treatment area for Alternative B consists of a 500 ft corridor of existing interstates, state highways, county roads, and BLM-administered roads (Maintenance Level 5 roads) within the analysis area. High resistance and resilience areas are excluded from potential treatment under this alternative. The potential treatment area covers 529,000 acres for Alternative B.

The potential treatment area for Alternative C consists of a 500 ft corridor of existing interstates, state highways, county roads, BLM-administered roads (Maintenance Levels 3 and 5 roads), and BLM-administered ROWs within the analysis area. Fuel breaks could be constructed in highly resistant and resilient sites with high fire probability or where adaptive management habitat triggers have been tripped but not in other areas with high resistance and resilience. The potential treatment area covers 792,000 acres for Alternative C.

The potential treatment area for Alternative D consists of a 500 ft corridor of existing interstates, state highways, county roads, BLM-administered roads (Maintenance Levels 1, 3, and 5 roads), BLM-administered ROWs, and primitive roads within the analysis area. The potential treatment area covers 1,088,000 acres for Alternative D.

Pre-emergent herbicide—Herbicide that provides control of targeted plant species by inhibiting germination of seeds.

Prescribed fire—The application of fire as an ecological process, under specified conditions, in a designated area to achieve land management objectives. Prescribed fires are defined as any fire intentionally ignited by management action in accordance with applicable laws, policies, and regulations to meet specific objectives. A written approved prescribed fire plan must exist, and NEPA requirements be met, prior to ignition (NWCG 2018).

Primitive road—A linear route managed for use by four-wheel drive or high-clearance vehicles (e.g., two-track road). Primitive roads do not normally meet any BLM road design standards (BLM Manual 9115, Primitive Roads Manual).

Priority area for conservation (PAC)—An area identified in the USFWS Conservation Objectives Team report (USFWS 2013) as essential for greater sage-grouse conservation.

Priority habitat management area (PHMA)—BLM-administered land identified as having the highest habitat value for maintaining sustainable greater sage-grouse populations. PHMAs largely coincide with PACs.

Project Area Boundary—Includes portions of California, Idaho, Nevada, Oregon, Utah, and Washington. It includes all surface management and covers approximately 223 million acres; of these acres, BLM-administered lands cover 90 million acres.

Rate of fire spread—The relative activity of a fire extending horizontally (NWCG 2018). It is expressed as the rate of increase of the total fire perimeter, as the rate of forward fire spread, or as fire intensity (flame length). Usually it is expressed in terms of chains per hour or acres per hour for a specific period in the fire's history.

Recreation—Use of leisure time to freely engage in activities in a variety of settings that provide personal satisfaction and enjoyment and contribute to the renewal and refreshment of one's body, mind, and/or spirit.

Recreation experience—Immediate state of mind resulting from participation in recreation opportunities that result in benefits.

Recreation opportunities—The ability to participate in recreation activities that facilitate experiences and benefits within a specific geographic area.

Recreation setting—The collective distinguishing attributes (recreation setting characteristics) of a landscape.

Recreation setting characteristics—Derived from the recreation opportunity spectrum, these characteristics are categorized as physical, social, and operational components and are further subdivided into specific characteristics (attributes). These characteristics are categorized across a spectrum of classes that describe a range of qualities and conditions of a recreation setting, for example primitive to urban.

Replacement fuel breaks—Also known as a green strip, the goal of this type of fuel break is to replace more flammable and contiguous plant communities (particularly those dominated by nonnative annual grasses, such as cheatgrass) with perennial plants that retain moisture later into the growing season, often by using plants that grow as widely spaced, low-statured individuals that result in large, bare interspaces. Vegetation is typically first removed or altered with a plow, harrow, or chain, and often in combination with application of a broadly effective herbicide to control existing vegetation, with additional herbicide treatments to reduce invasive annual grasses. New species are then sown into the prepared strips, with ideal seeded species having relatively deep roots, forming persistent stands that provide some competitive pressure against nonnative annual invasion, and having relatively inexpensive seeds that germinate reliably (Shinneman et al. 2018).

Residence time—The time, in seconds, required for the flaming front of a fire to pass a stationary point at the surface of the fuel. The total length of time that the flaming front of the fire occupies one point (NWCG 2018a).

Resistance—Sites that are able to retain their fundamental structure, processes, and functioning when exposed to stresses, disturbances, or invasive species (Chambers 2014b).

Resilience—Sites that have the capacity to regain their fundamental structure, processes, and functioning when altered by stressors such as drought and disturbances such as inappropriate livestock grazing and altered fire regimes (Chambers 2014b).

Restoration—Implementation of a set of actions that promotes plant community diversity and structure that allows plant communities to be more resilient to disturbance and invasive species over the long term (BLM 2008).

Right-of-way (ROW)—A type of easement granted or reserved over the land for transportation purposes, this can be for a highway, public footpath, rail transport, canal, as well as electrical transmission lines, oil and gas pipelines.

Road—A linear route declared to be a road by the owner. It is managed for use by low-clearance vehicles having four or more wheels and is maintained for regular and continuous use (BLM Manual 1626, Travel and Transportation Management Manual).

Maintenance Level 1—Routes where minimum (low intensity) maintenance is required to protect adjacent lands and resource values. These roads may be impassable for extended periods of time.

Maintenance Level 3—Routes requiring moderate maintenance due to low volume use (for example, seasonally or year-round for commercial, recreational, or administrative access). Maintenance Intensities may not provide year-round access but are intended to generally provide resources appropriate to keep the route in use for the majority of the year.

Maintenance Level 5—Route for high (maximum) maintenance due to year-round needs, high volume of traffic, or significant use. Also may include route identified through management objectives as requiring high intensities of maintenance or to be maintained open on a year-round basis.

Safe separation distance—The distance between firefighters and flames that is necessary to reduce the risk of burn injury.

Safety zone—An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity (NWCG 2018).

Sagebrush obligate—A species that requires sagebrush for at least part of its life cycle.

Smoke-sensitive Receptors—Areas that are sensitive to smoke, including population centers, recreation areas, hospitals, airports, transportation corridors, schools, nonattainment areas, Class I areas, and restricted areas (NWCG 2017).

Soil aggregate—A collection of soil particles that bind to each other more strongly than to adjacent particles.

Soil horizon—A layer, approximately parallel to the surface of the soil, that is distinguishable from adjacent layers by a distinctive set of properties produced by the soil-forming processes. The term layer is used instead of horizon if the properties are inherited from the parent material, such as sedimentary strata. Horizons, in contrast, display the effects of paedogenesis, such as the obliteration of sedimentary strata and accumulation of alluvial clay.

Soil order—A single dominant characteristic affecting soils in a location, such as the prevalent vegetation (Alfisols and Mollisols) and the type of parent material (Andisols and Vertisols), or the climate variables, such as lack of precipitation (Aridisols) or the presence of permafrost (Gelisols). Also significant is the amount of physical and chemical weathering present (Oxisols and Ultisols) or the relative amount of soil profile development that has taken place (Entisols).

Soil quality—A soil's capacity to function. Healthy soils support plant and animal diversity and productivity, air and water quality, and human health (Soil Quality Institute 2001).

Spotting—Behavior of a fire producing sparks or embers that are carried by the wind and which start new fires beyond the zone of direct ignition by the main fire (NWCG 2018).

Stabilizer species—A grass species cultivated to rapidly establish at revegetation sites. Stabilizers are selected based on their seedling establishment, persistence, and seed production.

Supplemental feed—A feed which supplements the forage available from the public lands and is provided to improve livestock nutrition or rangeland management (43 CFR 4100.0-5).

Targeted grazing—The application of a specific species, class, and age of livestock to graze vegetation at a specific season, duration, and intensity to accomplish predefined vegetation objectives (Launchbaugh and Walker 2006).

Tilling—A generic term for a type of mechanical treatment that involves the use of angled disks (disk tilling) or pointed metal-toothed implements (chisel plowing) to uproot, chop, and mulch vegetation. Tilling clears most, if not all, existing vegetation from a fuel break footprint. Tilling is usually done with a brushland plow, which consists of a single axle with an arrangement of angle disks that covers about 10-foot swaths. An offset disk plow, consisting of multiple rows of disks set at different angles to each other, is pulled by a crawler-type tractor or a large rubber tire tractor. This method is often used for removal of sagebrush and similar shrubs. It works best on areas with smooth terrain, and deep, rock-free soils. Chisel plowing can be used to break up soils such as hardpan (BLM Handbook 1740-02 2008).

Tribal resources— A broad term for historic or traditional places, landscapes, sacred sites, religious practices, natural resource gathering locations, or other natural or heritage resources with significance to a Native American Tribe or Tribes. Such resources may be significant based on their importance for maintaining traditional, religious, and subsistence practices and are usually identified through government to government Tribal consultation. Treaty, non-trust, and reserved assets and rights may be involved (see BLM Manual 1780, Tribal Relations and Handbook H-1780-1 for further definitions and specific authorities).

Unvegetated fuel break—Also known as a brown strip, an unvegetated fuel break is a linear fuel break that is devoid of vegetation. It is typically installed along major thoroughfares (for example, paved highways) using a harrow or plow to clear or completely remove vegetation (that is, all fuels) down to bare mineral soil, typically in widths of 3– 6 m (and sometimes wider) (Shinneman et al. 2018).

Vegetation condition class (VCC)—A discrete metric that quantifies the amount of departure from the simulated historical vegetation reference conditions (historical fire regimes).

Volatilization—The evaporation or sublimation of a compound or chemical.

Wet line—A line of water, or water and chemical retardant, sprayed along the ground, that serves as a temporary control line from which to ignite or stop a low-intensity fire.

Wildland-urban interface (WUI)—The WUI is defined in the National Wildfire Coordinating Group (NWCG) Glossary as "the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels." It describes an area in or next to private and public property where mitigation actions can prevent damage or loss from wildfire (NWCG 2018). WUI communities are the following (Forest Service et al. 2001):

Interface community—Exists where structures directly abut wildland fuels. There is a clear line of demarcation between residential, business, and public structures and wildland fuels. Wildland fuels do not generally continue into the developed area. The development density for an interface community is usually three or more structures per acre, with shared municipal services. Fire protection is generally provided by a local government fire department, with the responsibility to protect the structure from both an interior fire and an advancing wildland fire. An alternative definition of the interface community emphasizes a population density of 250 or more people per square mile.

Intermix community—Exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside and in the developed area. The development density in the intermix ranges from those structures that are very close together to there being one structure per 40 acres. Fire protection districts funded by various taxing authorities normally provide life and property fire protection and may also have wildland fire protection responsibilities. An alternative definition of intermix community emphasizes a population density of between 28 and 250 people per square mile.

Occluded community—Generally exists in a situation, often in a city, where structures abut an island of wildland fuels, such as a park or open space. There is a clear line of demarcation between structures and wildland fuels. The development density for an occluded community is usually similar to those found in the interface community, but the occluded area is usually less than 1,000 acres. Fire protection is normally provided by local government fire departments.

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Appendix C

Major Authorizing Laws and Regulations

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Appendix C. Major Authorizing Laws and Regulations

Below is a list of major authorizing laws and regulations relevant to this PEIS. Note this is not a complete list and sources not listed may also be appropriate to reference.

C.1 Laws and Executive Orders

American Indian Religious Freedom Act of 1978—Protects the rights of Native Americans to exercise their traditional religions by ensuring access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

Archaeological Resources Protection Act of 1979—Provides for civil and criminal penalties for knowing excavation, removal, damage alteration or defacement of an archeological resource on public or Indian lands and on non-federal lands.

Clean Air Act of 1970—The primary authority for regulating and protecting air quality in the United States. Requires the Environmental Protection Agency to set health-based standards for ambient air quality, sets deadlines for the achievement of those standards by state and local governments, and requires the Environmental Protection Agency to set national emission standards for large or ubiquitous sources of air pollution, including motor vehicles, power plants, and other industrial sources. In addition, the Act mandates emission controls for sources of hazardous air pollutants, requires the prevention of significant deterioration of air quality in areas with clean air, requires a program to restore visibility impaired by regional haze in Class 1 areas (such as national parks and wilderness areas), and implements the Montreal Protocol to phase out most ozone-depleting chemicals. The Clean Air Act requires each state to identify areas that have ambient air quality in violation of national standards, using monitoring data collected through state monitoring networks. Areas that violate standards are in nonattainment for the relevant criteria air pollutants; areas that comply with standards are in attainment. For nonattainment areas, state air quality agencies must develop comprehensive plans to reduce pollutant concentrations to meet the standards.

Clean Air Act Amendments of 1990—Changes to the Act in 1990 included provisions to (1) classify most nonattainment areas according to the extent to which they exceed the standard, tailoring deadlines, planning, and controls to each area's status; (2) tighten auto and other mobile source emission standards; (3) require reformulated and alternative fuels in the most polluted areas; (4) revise the air toxics section, establishing a new program of technology-based standards and addressing the problem of sudden, catastrophic releases of toxics; (5) establish an acid rain control program, with a marketable allowance scheme to provide flexibility in implementation; (6) require a state-run permit program for the operation of major sources of air pollutants; (7) implement the Montreal Protocol to phase out most ozone-depleting chemicals; and (8) update the enforcement provisions so that they parallel those in other pollution control acts, including authority for the Environmental Protection Agency to assess administrative penalties.

Clean Water Act of 1972—Includes provisions which authorize federal financial assistance for municipal sewage treatment plant construction and establishes regulatory requirements that apply to industrial and municipal dischargers. Enforcement emphasis includes controlling discharges of conventional pollutants (e.g., suspended solids or bacteria that are biodegradable and occur naturally in the aquatic environment) and control of toxic pollutant discharges.

Endangered Species Act of 1973, as amended—The purpose of the Endangered Species Act is to ensure that federal agencies and departments use their authorities to protect and conserve endangered and threatened species. Section 7 of the Endangered Species Act requires that federal agencies prevent or modify any projects authorized, funded, or carried out by the agencies that are "likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species."

Federal Land Policy and Management Act of 1976—States that "the public lands will be managed in a manner that protect the quality scientific, scenic, historic, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural conditions that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use."

Fish and Wildlife Conservation Act of 1980—Authorizes financial and technical assistance to the States for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife.

Healthy Forests Restoration Act of 2003—Contains a variety of provisions aimed at expediting the preparation and implementation of hazardous fuels reduction projects on federal land and assisting rural communities, States and landowners in restoring healthy forest and watershed conditions on state, private and tribal lands. The Healthy Forests Restoration Act focuses on four types of land:

- The wildland-urban interfaces of at-risk communities,
- At-risk municipal watersheds,
- Where threatened and endangered species or their habitats are at-risk to catastrophic fire and where fuels treatment can reduce those risks, and
- Where windthrow or insect epidemics threaten ecosystem components or resource values.

Migratory Bird Treaty Act of 1918, as amended, and Executive Order 13186 (2001)—These federal laws identify the responsibilities of the federal agencies to protect migratory birds. In 2010, the BLM and US Fish and Wildlife Service signed BLM MOU-WO-230-2010-04 to promote the conservation of migratory birds. Specifically, the purpose is to strengthen migratory bird conservation by implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the parties: state, tribal and local governments. Among other commitments, the BLM shall "At the project level evaluate the effects of the BLM's actions on migratory birds during the NEPA process, if any, and identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors." Where the BLM finds negative impacts, it will implement approaches to lessen such take.

National Environmental Policy Act of 1970—Established a national policy for the protection and maintenance of the environment. It guides the broad planning process that requires all federal agencies to ensure that the federal agency has considered the effects of its actions (including any action involving federal funding or assistance) on the environment before deciding to fund and implement a proposed action; and to make available environmental information to public officials and citizens before making decisions and undertaking actions. NEPA directs the federal agencies to thoroughly assess the environmental consequences of "major federal actions significantly affecting the environment."

National Historic Preservation Act of 1966, as amended—Section 106 directs all federal agencies to take into account the impacts of their undertakings (actions and authorizations) on properties listed on or eligible for listing on the National Register of Historic Places. Eleven BLM states comply with section 106 according to a 1997 national programmatic agreement with the Advisory Council on Historic Preservation Office and National Conference of State Historic Preservation Officers. Section 110 of the National Historic Preservation Act sets inventory, nomination, protection, and preservation responsibilities for federally owned cultural properties.

Native American Graves Protection and Repatriation Act of 1990—Provides for the ownership or control of Native American cultural items (human remains and objects) excavated or discovered on Federal or tribal lands.

Paleontological Resources Preservation Act of 2009—Serves to preserve, manage, and protect paleontological resources on lands administered by the Bureau of Land Management, the Bureau of Reclamation, the National Park Service, and the U.S. Fish and Wildlife Service and ensure that these federally owned resources are available for current and future generations to enjoy as part of America's national heritage.

Public Rangelands Improvement Act of 1978—Established and reaffirmed the national policy and commitment to inventory and identify current public rangeland conditions and trends; manage, maintain and improve the condition of public rangelands so that they become as productive as feasible for all rangeland values in accordance with management objectives and the land use planning process; charge a fee for public grazing use which is equitable; continue the policy of protecting wild free-roaming horses and burros from capture, branding, harassment, or death, while at the same time facilitating the removal and disposal of excess wild free-roaming horses and burros which pose a threat to themselves and their habitat and to other rangeland values.

Reciprocal Fire Protection Act of 1955—Provides authority for Federal agencies to enter into mutual assistance agreements with foreign, State and local governments for combatting wildfires, and to provide emergency assistance when no agreement exists.

Regional Haze Rule of 1999—Promulgated by the EPA to protect and improve visual range in Class I areas. Without the effects of human-made air pollution, a natural visual range would be nearly 140 miles in the western United States; the current visual range is 35 to 90 miles (EPA 2018d). The law calls on states to establish goals for improving visibility in mandatory Class I areas and to develop long-term strategies for reducing emissions of air pollutants that impair the visibility in these areas.

Taylor Grazing Act of 1934—Provides for regulated grazing on federal public lands (exclusive of Alaska) to improve range conditions and stabilize the livestock industry in the American West.

Timber Protection Act of 1922—Authorizes the Secretary of Interior to protect timber on lands under the Department of Interior's jurisdiction from fire, disease and insects.

Wild Free-Roaming Horse and Burro Act of 1971—Provides legislation to protect wild horses and burros. The Act prohibits the use of a motor vehicle to hunt, for the purpose of capturing or killing, any wild horse, mare, colt, or burro running at large on public lands. The Act also prohibited the pollution of watering holes on public lands for the purposes of trapping, killing, wounding, or maiming any of these animals.

Wilderness Act of 1964—Directs the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System. In 1976, Congress directed the BLM to evaluate all of its land for the presence of wilderness characteristics, and identified areas became Wilderness Study Areas. The establishment of a Wilderness Study Area served to identify areas for Congress to consider for addition to the National Wilderness Preservation System.

Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations—To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

Executive Order 13175 – Consultation and Coordination With Indian Tribal Governments—Aims to strengthen the United States government-to-government relationships with Indian tribes. It establishes regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications. The BLM coordinates with all tribal governments, associated native communities, native organizations, and tribal individuals whose interests might be directly and substantially affected by activities on public lands.

Executive Order 13007 Indian Sacred Sites—Designed to protect and preserve Indian religious practices, this EO directs each federal agency that manages federal lands to "(1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites." This Executive Order also directs each federal agency to report to the President on "procedures implemented or proposed to facilitate with appropriate Indian tribes and religious leaders."

C.2 Handbooks

BLM Handbook H-1740-2 – Integrated Vegetation Management—Provides guidance on implementation of vegetation management planning and treatment activities to achieve the objectives set forth for the updated manual, 1740 Renewable Resource Improvements and Treatments.

BLM Handbook H-1742-1 – Burned Area Emergency Stabilization and Rehabilitation Handbook—Provides specific guidance for policies, standards, and procedures used in the Burned Area Emergency Stabilization and Rehabilitation programs.

BLM Handbook H-1780-1 – Improving and Sustaining BLM-Tribal Relations – This handbook addresses a broad range of legal authorities and agency programs of interest to tribes and also highlights BLM responsibilities. It incorporates current guidance derived from recent case law, new Secretarial orders and policies, Executive orders, and decades of experience working with tribes on a government-to-government basis.

BLM Handbook – H-6250 – National Scenic and Historic Trail Administration—Provides the BLM policy and program guidance on administering congressionally designated National Trails as assigned by the Department of the Interior within the National Landscape Conservation System and this manual describes the BLM's roles, responsibilities, agency interrelationships, and policy requirements for National Trail Administrators.

BLM Handbook H-8110 – Identifying and Evaluating Cultural Resources—Provides general guidance for determining the level of inventory or other identification of cultural resources, the types of inventory and data recovery that may be used, evaluating the significance of resources, categorizing uses, and maintaining data.

BLM Handbook H-8140 – Protecting Cultural Resources—Provides general guidance for protecting cultural resources from natural or human-caused deterioration; for making decisions about recovering significant cultural resource data when it is impossible or impractical to maintain cultural resources in a nondeteriorating condition; for protecting cultural resources from inadvertent adverse effects associated with BLM land use decisions, and for controlling unauthorized uses of cultural resources.

BLM Handbook H-8320-1 – Planning for Recreation and Visitor Services—Assists in the planning and management of recreation and visitor services on public lands and adjacent waters. This handbook provides planning guidance at the land use plan and implementation level.

BLM Handbook H-8342 – Travel and Transportation Handbook—Provides specific guidance for preparing, amending, revising, maintaining, implementing, monitoring, and evaluating BLM land use and travel management plans.

BLM Handbook H-9200 – Fire Program Management—Provides consistent fire program management direction and guidance to BLM users and managers. The objective of this direction and guidance is to guide the philosophy, direction and implementation of fire management planning, activities and projects on BLM lands, and to ensure compliance with Federal wildland fire management policy.

BLM Handbook H-9211-1 – Fire Planning Handbook—Provides guidance on how to meet the requirements of Federal Wildland Fire Management Policy, as well as BLM regulations and policy. It contains guidance on how to meet planning requirements and how to prepare fire management plans. This handbook recommends a course of action for accomplishing landscape-level fire planning and provides guidance supplemental to the BLM NEPA Handbook (H-1790-1) for fire management actions.

C.3 MANUALS

BLM Manual 1740 – Renewable Resource Improvements and Treatments—The purpose of this updated manual is for identifying objectives, policies and standards that are common and apply to planning, analyzing, constructing, maintaining, replacing and or modifying renewable resource improvements and treatments for the forestry, range management, riparian management, soil, water, air, fish, wildlife, threatened and endangered species, wild horse and burro, invasive species, hazardous fuels reduction, emergency stabilization, and burned area rehabilitation programs to achieve management objectives on BLM managed lands.

BLM Manual 1780 – Tribal Relations BLM Manual 1780 – Tribal Relations - Defines the policies, roles and responsibilities, and standards for BLM tribal relations and government-to-government tribal consultation within a comprehensive framework of those legal authorities affecting this relationship.

BLM Manual 6100 – National Landscape Conservation System (NLCS)—Provides general policy to BLM personnel on managing public lands in the National Landscape Conservation System. The NLCS was established in order to "conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values for the benefit of current and future generations." NLCS units are to be managed "in a manner that protects the values for which the components of the system were designated." Section 1.8 of this manual lists the designations identified in the Act as components of the NLCS. The BLM has additional manuals addressing policy specific to National Monuments, National Conservation Areas and Similar Designations, Wilderness, Wilderness Study Areas, Wild and Scenic Rivers, and National Scenic and Historic Trails.

BLM Manual 6280 – Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation—This manual provides policy for the management of National Scenic and Historic Trails.

BLM Manual 6330 – Management of BLM Wilderness Study Areas—This manual provides policy on the non-impairment standard to BLM personnel for use when managing Wilderness Study Areas.

BLM Manual 6400 – Wild and Scenic Rivers—Provides the line manager and program staff professional with policies and program guidance for conducting wild and scenic rivers studies within the land use planning process, environmental analysis, and legislative reporting and provides other related information. It also sets forth requirements for designated rivers, as well as river segments determined eligible or suitable for inclusion in the National Wild and Scenic Rivers System. It also expands upon the US Department of the Interior - US Department of Agriculture Final Revised Guidelines for Eligibility, Classification, and Management of River Areas.

BLM Manual 6840 – Special Status Species Management—This manual establishes policy and guidance for management of species listed or proposed for listing pursuant to the Endangered Species Act and Bureau sensitive species which are found on BLM-administered lands.

BLM Manual 8270—General Procedural Guidance for Paleontological Resource Management—This manual provides uniform policy and direction for the BLM's Paleontological Resources Management Program. Its purpose is to assure adequate and appropriate consideration and protection of paleontological resources on the public lands.

C.4 OTHER

Interim Air Quality Policy on Wildland and Prescribed Fires (EPA 1999)—Calls on states to develop smoke management programs and for federal land managers to participate in these programs (EPA 1998). Smoke management programs are intended to accomplish the following:

- Prevent the deterioration of air quality and the exceedance of national ambient air quality standards
- Address visibility impacts on Class I areas
- Mitigate nuisance and public safety impacts of prescribed fires

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Appendix D
Design Features

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Appendix D. Design Features

Table D-1
Fuel Breaks PEIS
Design Features by Alternative

[1] Resource codes:

GEN: General design feature that would benefit all resources
AIR: Air quality
CULT: Cultural, paleontological, and tribal resources
FF: Fire and fuels
FW: Fish and wildlife
LG: Livestock grazing
REC: Recreation
SD: Special designations
SOIL: Soil resources
SSS: Special status species
TM: Travel management
VEG: Vegetation resources
VIS: Visual resources
WR: Water resources
WHB: Wild horses and burros

#	Design Feature	Applicable Alternatives	Applicable Resources[1]
GENERAL			
1.	Where feasible, place equipment (e.g., vehicles and mechanical treatment equipment) in previously disturbed areas.	All action alternatives[2]	GEN
2.	When applicable, monitor to determine if objectives are being met for any affected resources.	All action alternatives	GEN
3.	Consider the maintenance or rehabilitation of existing fuel breaks before new fuel breaks are constructed.	All action alternatives	GEN
4.	Apply restrictions and design features in applicable land use plans and land use plan amendments. Develop resource-specific buffer distances and apply seasonal restrictions based on site-specific conditions, best available science, applicable land use plan guidance, and professional judgement. If any design features in this PEIS conflict with state or local BLM guidance, defer to state or local guidance.	All action alternatives	GEN
5.	Use best available science when designing and implementing fuel breaks.	All action alternatives	GEN
6.	As feasible to achieve objectives, keep disturbance commensurate with the scope of the fuel break.	All action alternatives	GEN
7.	Where feasible, fuel breaks would be constructed where vegetation disturbance by wildland fire or surface-disturbing activities has already occurred.	All action alternatives	GEN

#	Design Feature	Applicable Alternatives	Applicable Resources[1]
8.	Fuel breaks would be constructed in locations determined through interdisciplinary dialogue (including consultation and coordination with adjacent landowners), to best meet the goals of the local fire management plan, and can be effectively monitored and maintained. They would be placed in a way that is strategically appropriate for fire suppression, while minimizing short- and long-term impacts on other resources.	All action alternatives	GEN
9.	All project personnel would be required to attend an environmental training prior to initiating Project construction. The training would address environmental concerns and stipulations and requirements for compliance with the project.	All action alternatives	GEN
10.	Signs would be installed in treatment areas during activities for public safety.	All action alternatives	AIR, REC, TM
11.	During times of high fire danger, all equipment would be equipped with a functional spark arrestor. Operators would be required to have, at a minimum, a shovel and a working fire extinguisher on hand.	All action alternatives	FF
12.	During fuel break design and implementation, the location, such as topography for project screening, minimal disturbance, and consideration of visual contrasts with the surrounding landscapes, would be considered. For example, vegetation may be drill seeded in a serpentine pattern or using drill modifications, such as minimum-or-no-till drills, slick discs, and drag chains, so that drill rows are not apparent.	All action alternatives	SD, VIS
13.	Fuel breaks in a ROW must be compatible with the ROW holder's grant prior to construction of the fuel break.	All action alternatives	TM
14.	Applicable Standard Operating Procedures and Mitigation Measures from the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement and Record of Decision (BLM 2007, PEIS Table 2-8 and Record of Decision Appendix B) and the Final PEIS on using Aminopyralid, Fluroxypyr, and Rimsulfuron (BLM 2016, Table 2-5) would be required.	All action alternatives	GEN
PRESCRIBED FIRE			
15.	Prescribed fire operations would be conducted by qualified personnel when prescription parameters as defined in the burn plans are met.	C, D	GEN
16.	Debris piles created during fuel break implementation would be ignited when prescription burn conditions are appropriate—that is, when soils are either wet or frozen.	C, D	AIR, SD
17.	Through site-specific smoke analysis, the BLM would comply with their respective state department of environmental quality or other state air monitoring group to ensure that smoke emissions from treatments remain below the National Ambient Air Quality Standard for $PM_{2.5}$. The BLM would identify smoke-sensitive receptors at the site-specific project level.	C, D	AIR, SD
18.	Signs would be posted on primary roads accessing the area being burned to alert drivers of the potential for reduced visibility due to smoke.	C, D	AIR

#	Design Feature	Applicable Alternatives	Applicable Resources[1]
19.	Ensure atmospheric conditions are within prescriptions when a prescribed burn is ignited and monitor smoke throughout the fire.	C, D	AIR
20.	If smoke threatens unacceptable impacts on transportation safety or communities, ignition should cease, provided control of the burn is not compromised.	C, D	AIR
TARGETED GRAZING			
21.	Before targeted grazing begins, complete a targeted grazing plan that optimizes successful reduction of the target species, while avoiding damaging desired plants. The plan would include the following: 1. Objectives that specify target species, grazing duration, intensity, stocking level, type of livestock, and measurable outcomes 2. A monitoring plan 3. Stipulations, including the following: ● To minimize the risk of introducing or spreading invasive plant species through livestock manure, a quarantine period may be needed before livestock are turned out into an area for targeted grazing and when they are removed from such an area. ● Coordinate with applicable permittees, state agencies, or other landowners in advance of targeted grazing treatment. This is to identify and minimize any potential conflicts of targeted grazing with regularly permitted livestock grazing. In case-specific situations, rest from regularly permitted grazing may be necessary in order to accomplish targeted grazing objectives (Hendrickson and Olson 2006). ● Construct all fencing using proper wildlife specifications contained in BLM handbook 1741-1 Fencing and applicable approved land use plans. ● Consider on a project-by-project basis potential impacts on cultural resources from targeted grazing, including fences, corrals, and watering sites, per Section 106 of the NHPA and other cultural resource authorities. Compliance may include tribal and SHPO consultations, an archaeological inventory, and mitigation. ● Use of domestic sheep or goats for targeted grazing will not occur within 30 miles of Sierra Nevada bighorn sheep critical habitat. ● Use of domestic sheep or goats for targeted grazing would be avoided within 30 miles of bighorn sheep habitat. If targeted grazing is desired within this area, BLM would prepare a separation and response plan, included in the targeted grazing plan, coordinated with the appropriate state agency to provide sufficient separation to minimize the risk of contact and disease transmission of domestic sheep or goats from bighorn sheep (does not apply to Sierra Nevada bighorn sheep). USFWS would be consulted if listed bighorn sheep may be affected. ● Annually target-graze sites that are dominated by invasive annual grasses. Where there are substantial areas of desirable perennial herbaceous species, consider targeted grazing strategies that would maintain perennial plant vigor.	C, D	FW, LG, SD, SOIL, SSS, VEG

#	Design Feature	Applicable Alternatives	Applicable Resources[1]
	• Carefully consider using supplements for livestock during targeted grazing during site-specific planning. Supplements would be nontoxic to wildlife and would be placed to minimize impacts on wildlife or native vegetation. • Install wildlife escape ramps in temporary tanks to facilitate the use of and escape from livestock watering troughs by greater sage-grouse and other wildlife. • Placement and use of temporary watering facilities will be placed to meet site specific conditions and treatment objectives. They will be removed following the targeted grazing treatment.		
22.	Provide adequate rest from livestock grazing: to allow desired vegetation to recover naturally; in suitable habitat for threatened and endangered plants; and for seeded species in treated areas to successfully become established. All new seedings of grasses and forbs should not be grazed until, at least, after the end of the second growing season, or when fuel break objectives are met to allow plants to mature and develop robust root systems. This would stabilize the site, compete effectively against cheatgrass and other invasive annuals, and remain sustainable under long-term grazing management. Adjust other management activities to meet project objectives.	C, D	FW, LG, SD, SOIL, SSS, VEG
23.	Manage targeted grazing to conserve suitable habitat conditions for special status species, while implementing rangeland health standards and guidelines (BLM 2014).	C, D	SSS
24.	A Graduated Use Plan is included after this table.	C, D	FW, LG, SD, SOIL, SSS, VEG
SURVEY REQUIREMENTS AND RESOURCE PROTECTION			
VEGETATION AND INVASIVE AND NOXIOUS WEEDS			
25.	All prescribed soil disturbance would need to incorporate noxious and invasive weed management, including pre-work evaluation or avoidance.	All action alternatives	CULT, FW, SD, SSS, LG, VEG
26.	Noxious weeds and invasive plants would be monitored to track changes in populations over time, and corrective action would be prescribed where needed, in accordance with local weed programs. Thresholds and responses for noxious weeds and invasive plants (particularly invasive annual grasses) will be included in fuel break implementation and monitoring plans.	All action alternatives	CULT, FW, SD, SSS, LG, VEG
27.	Mowed fuel breaks would be re-mowed when grass has reached a height between 1 and 2 feet or exceeds the Tons Per Acre of the Grass Fuel Model 2 (GR2), as described in Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgan 2005).	All action alternatives	FF
28.	Locally adapted or genetically appropriate perennial forbs and grasses would be applied at jackpot and pile burn sites when appropriate to facilitate establishment of vegetation.	All action alternatives	SD, VEG, VIS
29.	Power wash all vehicles and equipment prior to allowing them to enter the project area and between sites where invasive and noxious weed species are different to minimize the introduction and spread of invasive plant species.	All action alternatives	CULT, FW, SD, SSS, VEG

#	Design Feature	Applicable Alternatives	Applicable Resources[1]
CULTURAL, TRIBAL, AND PALEONTOLOGICAL RESOURCES			
30.	Cultural and paleontological inventories and consultations appropriate to the scale and level of disturbance would occur in advance of project activities; the results would be used early in project planning to determine the need for project redesign or other mitigation.	All action alternatives	CULT
31.	Potential adverse effects on historic properties[3] would be avoided during ground-disturbing activities. A cultural resource specialist would identify avoidance areas before treatment begins, including subsequent retreatments. If protection of resources compromises the effectiveness of a given treatment and life, safety, or other resources are threatened, flexibility would be maintained to allow for project redesign, while protecting cultural resources. If historic properties could not be avoided without significantly compromising the success of a treatment, the effects would be minimized, in consultation with SHPO, ACHP, tribes, or interested members of the public.	All action alternatives	CULT
32.	Archaeological inventories and assessments of potential significance under the National Historic Preservation Act (NHPA) would be conducted in accordance with the National Programmatic Agreement between the Advisory Council of Historic Preservation (ACHP) and BLM, state protocol agreements with respective State Historic Preservation Offices (SHPOs), guidelines set forth in the BLM 8110 and 8040 Manuals, and according to other relevant authorities listed in the above documents, including Section 106 of the NHPA.	All action alternatives	CULT
33.	Potentially affected tribes would be consulted according to guidance set forth in BLM Manual and Handbook 1780, Department of Interior Manual 512 DM 3, and relevant authorities listed therein, before herbicide spraying or other treatments begin that are likely to affect the access or availability of resources or locations important to traditional lifeways, including subsistence, economy, ritual, and religion.	All action alternatives	CULT, VEG
34.	The need for a paleontological inventory would be determined based on criteria set forth in BLM Instruction Memorandum (IM) 2016-124, using potential fossil yield classification, if available, or geologic characteristics and previous study data, if not. Ground-disturbing and chemical treatments in areas with paleontological resources would be addressed on a site-by-site basis. Project activities at significant paleontological sites would be coordinated with the regional BLM paleontologist to determine mitigation or monitoring needs in areas with a high potential for fossil resources. This would be done to minimize adverse effects.	All action alternatives	GEN
35.	If cultural or paleontological resources are encountered during project implementation, all ground-disturbing activity in the vicinity of the find must cease until the resource is evaluated by an appropriate BLM resource specialist. The BLM would follow the procedures outlined in 36 CFR 800. If human remains or objects covered by the Native American Graves Protection and Repatriation Act are encountered, all work would cease and the BLM Authorized Officer would be contacted immediately by phone, with written follow-up, and other guidelines set forth in 43 CFR 10 would be followed.	All action alternatives	CULT

#	Design Feature	Applicable Alternatives	Applicable Resources[1]
SOIL AND WATER RESOURCES			
36.	Minimize ground-disturbing treatments in areas with highly erosive soils (see **Chapter 3** for highly erosive soil criteria).	All action alternatives	FW, SD, SOIL, SSS, VEG, WR
37.	Avoid or minimize ground-disturbing activities when soils are saturated.	All action alternatives	SSS
38.	Use best management practices and soil conservation practices during project design and implementation to minimize sediment discharge into streams, lands, and wetlands from such treatments as mowing, disking, and seeding. This is to protect designated beneficial uses.	All action alternatives	FW, SSS
39.	Soils, site factors, and timing of application must be suitable for any ground-based equipment used for creating a fuel break. This is to avoid excessive compaction, rutting, or damage to the soil surface layer. Equipment would be used on the contour, where feasible.	All action alternatives	SD, SOIL, VIS
40.	For safety and to protect site resources, treatment methods involving equipment generally would not be applied on slopes exceeding 35 percent.	All action alternatives	SD, SOIL
41.	Bare soil (disked) portions of fuel breaks adjacent to roadways would not exceed 25 feet on either side of the roadway.	All action alternatives	SSS
WILDLIFE AND SPECIAL STATUS SPECIES			
42.	If special status plant or animal populations and their habitats occur in a proposed treatment area, assess the area for habitat quality and base the need for treatment on special status species present. Conduct appropriately timed surveys within suitable or potential habitats for federally listed, proposed, and BLM special status species prior to treatment. Federally listed species and BLM special status species with the potential to occur in the project area are presented in **Appendix J**.	All action alternatives	SSS
43.	Implement restrictions and conservation strategies for special status species, including federally listed, proposed, candidate, and BLM sensitive species, as contained in approved recovery and conservation plans, cooperative agreements, and other instruments in whose development the BLM has participated. If none are available, coordinate with the USFWS and/or state wildlife agencies to develop appropriate restrictions.	All action alternatives	SSS
44.	Avoid creating new barriers to big game movement in migratory corridors.	All action alternatives	FW
45.	Aerial herbicide treatments would be designed to avoid chemical drift into the riparian exclusion area or other aquatic species-specific buffers.	All action alternatives	FW, SSS
46.	Prohibit fuel break construction and maintenance in sage-grouse breeding habitat during the breeding season.	Alternative B	SSS
47.	In sage-grouse Biologically Significant Units occurring within Priority and Important Habitat Management Areas, ensure that sagebrush treatments do not lead to a soft or hard habitat trigger trip.	All action alternatives	SSS

#	Design Feature	Applicable Alternatives	Applicable Resources[1]
48.	Restrict activities in big game habitat during the following periods, unless short-term exemption is granted by the BLM field office manager, in coordination with the appropriate state wildlife agency (dates may be determined based on local conditions): big game wintering; elk/deer calving/fawning; pronghorn calving/fawning; and bighorn sheep lambing.	All action alternatives	FW
49.	Manage domestic sheep grazing to minimize contact between domestic sheep and bighorn sheep, using the currently accepted peer-reviewed modeling techniques and best available data, such as the Bighorn/Domestic Sheep Risk of Contact Model, in accordance with BLM Manual 1730, Management of Domestic Sheep and Goats to Sustain Wild Sheep.	All action alternatives	FW, SSS
50.	Treatments in mule deer winter range would not reduce the total area having shrub cover suitable for browse below 70% of site-specific winter range areas (Cox et al. 2009).	All action alternatives	FW
51.	Complete surveys for migratory bird and raptor nesting activity and establish a seasonal buffer around raptor nests. Avoid fuel break construction and maintenance during the peak of the local nesting season in the project area for priority migratory land bird species (e.g., Birds of Conservation Concern, BLM sensitive species). Specific dates and buffer distances for the seasonal restrictions may be determined in coordination with the USFWS Migratory Bird Division and/or state wildlife management agency, and should be based on species, variations in nesting chronology of particular species locally, topographic considerations, such as an intervening ridge between the treatment activities and a nest, or other factors that are biologically reasonable.	All action alternatives	FW, SSS
52.	Aerial seeding treatments and aerial application of herbicides would be avoided within one mile of active American bald and ½ mile of active golden eagle nests during the nesting season. Avoidance distances would be determined by the amount of screening provided by vegetation or topographic features.	All action alternatives	SSS
53.	Avoid disturbance within 0.5 mile of communal bald eagle winter concentration sites during the winter roosting season.	All action alternatives	SSS
54.	Aerial treatment applications will be avoided within 0.5 mile of bald eagle winter concentration sites during the winter roosting season.	C, D	SSS
55.	Surveys would take place in potential known pygmy rabbit habitats (non-listed populations). Select fuel break routes with the least density of active burrows.	All action alternatives	SSS
56.	Design projects so facilitating practices (e.g. staging areas or travel routes) avoid affecting USFWS listed Threatened, Endangered or Proposed species.	All action alternatives	SSS
57.	Comply with any additional conservation measures developed during ESA Section 7 consultation for this PEIS (see Section D.2 below).	All action alternatives	SSS
58.	Avoid removal or disturbance to old growth trees, such as old growth pinyon-juniper.	All action alternatives	VEG
59.	No activities would occur in Sierra Nevada bighorn sheep critical habitat during lambing periods (April – July).	All action alternatives	SSS

Source: BLM interdisciplinary team input

[1] Resource codes

GEN: General design feature that is not resource-specific
AIR: Air quality
CULT: Cultural, Tribal, and paleontological resources
FF: Fire and fuels
FW: Fish and wildlife
LG: Livestock grazing
REC: Recreation
SD: Special designations
SOC: Socioeconomics
SOIL: Soil resources
SSS: Special status species
TM: Travel management
VEG: Vegetation resources
VIS: Visual resources
WR: Water resources
WHB: Wild horses and burros

[2] The action alternatives are Alternatives B, C, and D

[3] Historic properties are cultural resources that are archaeological sites, districts, or traditional cultural properties (TCPs) that are eligible for the National Register of Historic Places, as defined in 36 CFR 63; TCPs are defined in National Register Bulletin 38. Other significant cultural resources are those important historic or traditional places, landscapes, or resources with significance to Native American tribes and other cultural groups, according to authorities and guidance discussed in BLM Manual Series 8100 and 1780.

D.1 Graduated Use Plan

Because livestock are mobile, the BLM anticipates that some incidental grazing may occur beyond the fuel treatment zone in the graduated use area – a ½-mile buffer zone along the fuel break. Utilization caps for perennial grasses would be assigned in the graduated use area to ensure that targeted grazing does not impact regularly scheduled grazing, and to limit or eliminate the need for fencing to accomplish the treatment.

- Utilization respective to targeted grazing use will be limited to the following to ensure resource damage does not occur and permitted AUMs are not negatively impacted:

  1) No more than 30%[1] utilization (light use) of perennial grasses allowed within the ¼-mile graduated use area - the buffer from the edge of the 200-foot treatment area (i.e., fuel break) out to ¼ mile.
  2) No more than 16%[1] utilization (slight use) of perennial grasses between ¼ mile and ½ mile graduated use areas (Figure 2-1).

Diagram of Targeted Grazing Treatment Expectations

¼ to ½-mile graduated use area: ≤16% utilization
¼-mile graduated use area: ≤30% utilization
250-foot targeted grazing treatment area
Road
250-foot targeted grazing treatment area
¼-mile graduated use area: ≤30% utilization
¼ to-½ mile graduated area: ≤16% utilization

- If utilization standards are exceeded in graduated use areas, within 48 hours livestock must be removed or moved to another portion of the treatment area that has not exceeded utilization levels/has not yet met fuel break treatment objectives (i.e., 2-inch stubble height in treatment area).

- In instances where targeted grazing occurs in a pasture where authorized grazing (identified on a grazing permit) has already occurred per the current year's grazing schedule, utilization levels on perennial grasses within the graduated use area may exceed the 30% and 16% utilization levels, respectively, but will not exceed the utilization level identified in the existing grazing permit or land use plan.

- Temporary electric avoidance fencing may be utilized to protect sensitive resources (e.g., riparian areas) within the treatment area or graduated use area during targeted grazing, and will be removed once treatment is complete.

- Targeted grazing resource adaptive management triggers:

  – >30% utilization of perennial grasses in ¼-mile graduated use area (buffer from edge of treatment area out to ¼ mile); and/or

– >16% utilization of perennial grasses in ½-mile graduated use area (buffer from ¼ mile out to ½ mile from treatment).

[1] Utilization class interval midpoint for Key Species and Landscape Appearance Methods per Technical Reference 1734-03 “Utilization Studies and Residual Measurements.”

D.2 Conservation Measures from the Fuel Breaks Biological Assessment

Table D-2
Conservation Measures from the Fuel Breaks Biological Assessment

Conservation Measure Number	Conservation Measure Text
Conservation Measure Listed Species 1	Report to the appropriate USFWS office or state agency within 48 hours of the sighting any positive identification or sightings of federally or state-listed species during any phase of fuel break treatment activities, such as species surveys and pretreatment surveys, and during treatment activities and monitoring. cease treatment until a qualified biologist determines that treatments would result in no potential for harm to a federally listed species.
Conservation Measure Listed Species 2	All staff, contractors, and practitioners involved in implementing on-the-ground fuel break treatments will be trained on and provided information on (e.g., maps, photo…) listed, proposed species and critical habitat that may occur in the project area
Conservation Measure Listed Fish 1	Avoid all treatments within 400 meters from the edge of bonytail chub, Colorado pikeminnow, humpback chub, razorback sucker, June sucker critical habitat or occupied habitat and Lahontan cutthroat trout occupied habitat.
Conservation Measure Prairie Dog 1	Proposed treatments in suitable Utah prairie dog habitat would be surveyed by certified individuals in accordance with USFWS protocols and in coordination with BLM and USFWS before implementation.
Conservation Measure Prairie Dog 2	All staging areas for vehicles, trailers, and materials would be outside of a 350-foot disturbance buffer of Utah prairie dog habitat.
Conservation Measure Prairie Dog 3	Project related vehicles would not exceed a speed of 15 miles per hour in occupied Utah prairie dog habitat.
Conservation Measure Prairie Dog 4	A qualified Utah prairie dog biologist, approved by the BLM and USFWS, would be required to be on-site during all work in occupied Utah prairie dog habitat. The biologist would document compliance with design features and any take that may occur and would have the authority to halt activities that may be in violation of these stipulations.
Conservation Measure Prairie Dog 5	All vehicles would be maintained in maintenance facilities or, in the event of emergency, at least 350 feet from mapped Utah prairie dog habitat in previously disturbed areas. Precautions would be taken to ensure that contamination of maintenance sites by fuels, motor oils, and grease does not occur and that such materials are contained and properly disposed of off-site. Inadvertent spills of petroleum-based or other toxic materials would be cleaned up and removed immediately or on completion of the project. In coordination with USFWS and Utah Division of Wildlife Resources, habitat treatments in occupied Utah prairie dog habitat would occur during the extended active season (April 1 to September 30.

Conservation Measure Number	Conservation Measure Text
Conservation Measure Prairie Dog 6	All project employees would be informed of any Utah prairie dogs in the general area and the threatened status of the species. Employees would be advised of the definition of take and the potential penalties (up to $200,000 in fines and 1 year in prison) for taking a species listed under the ESA. Project personnel would not be permitted to have firearms or pets in their possession while on the project site. The rules on firearms and pets would be explained to all personnel involved with the project.
Conservation Measure Prairie Dog 7	If a dead or injured Utah prairie dog is located, initial notification must be made to the USFWS Division of Law Enforcement, Salt Lake City, Utah, at (801) 975-3330; to the Utah Division of Wildlife Resources at (435) 865-6100; and to the BLM Authorized Officer at (435) 865-3000. Instruction for proper handling and disposition of such specimens would be issued by the Division of Law Enforcement. Care must be taken in handling sick or injured animals to ensure effective treatment and care and in handling dead specimens to preserve biological material in the best possible state.
Conservation Measure Prairie Dog 8	Spot applications would be used to apply herbicides in Utah prairie dog habitat, where possible, to limit the probability of contaminating nontarget food and water sources and the elimination of vegetation necessary to support the species, especially vegetation over large areas.
Conservation Measure Desert Tortoise 1	No treatments will occur in occupied or potential desert tortoise habitat.
Conservation Measure Carson Wandering Skipper 1	No treatments would occur within 10 mi of known occupied Carson wandering skipper population sites during the adult flight season (late May to mid-July).
Conservation Measure Carson Wandering Skipper 2	No treatments would occur within 5 mi of known Carson wandering skipper population sites at any time of year
Conservation Measure Carson Wandering Skipper 3	Conservation Measures for Carson Wandering Skipper identified in Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Biological Assessment (BLM 2005, 6-15 to 6-16): Use an integrated pest management approach when designing programs for managing pest outbreaks. Survey treatment areas for threatened, endangered, or proposed (TEP) butterflies/moths and their host/nectar plants (suitable habitat) at the appropriate times of year. Minimize the disturbance area with a pre-treatment survey to determine the best access routes. Areas with butterfly/moth host plants and/or nectar plants should be avoided. Minimize mechanical treatments and OHV activities on sites that support host and/or nectar plants. In TEP butterfly/moth habitat, burn while butterflies and/or moths of concern are in the larval stage, when the organisms would receive some thermal protection. Wash equipment before it is brought into the treatment area. Use a seed mix that contains host and/or nectar plant seeds for road/site reclamation.

Conservation Measure Number	Conservation Measure Text
	To protect host and nectar plants from herbicide treatments, follow recommended buffer zones and other conservation measures for TEP plants species when conducting herbicide treatments in areas where populations of host and nectar plants occur. Do not broadcast spray herbicides in habitats occupied by TEP butterflies or moths; do not broadcast spray herbicides in areas adjacent to TEP butterfly/moth habitat under conditions when spray drift onto the habitat is likely. Do not use 2,4-D in TEP butterfly/moth habitat. When conducting herbicide treatments in or near habitat used by TEP butterflies or moths, avoid use of the following herbicides, where feasible: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, picloram, tebuthiuron, and triclopyr. If conducting manual spot applications of diquat, diuron, glyphosate, hexazinone, tebuthiuron, or triclopyr to vegetation in TEP butterfly or moth habitat, utilize the typical, rather than the maximum, application rate.
Conservation Measure Pygmy Rabbit 1	Survey all potential Columbia Basin pygmy rabbit habitat in areas considered for fuel break routes. Surveys will follow state survey protocols for establishing presence of pygmy rabbits and will be coordinated with the Washington Department of Fish and Wildlife (WDFW). No fuel breaks will be located within Recovery Areas (REAs plus a 5-mile buffer). Surveys will be conducted by a qualified biologist.
Conservation Measure Pygmy Rabbit 2	Use of prescribed fire would not occur within 1 mile of RAs or occupied pygmy rabbit habitat outside of RAs
Conservation Measure Pygmy Rabbit 3	Do not create fuel breaks within Columbia Basin pygmy rabbit Recovery Areas (REA buffered by 5 mi)
Conservation Measure Pygmy Rabbit 4	Have a qualified biologist conduct pre-treatment surveys for burrows within 14 days of treatment within potentially occupied habitat and in the range of Columbia Basin pygmy rabbits. If a burrow is discovered, an avoidance buffer of 1 mile will be established around the burrow.
Conservation Measure Pygmy Rabbit 5	Solicit and consider expertise and ideas from local landowners, working groups, and other federal, state, county, and private organizations during development of fuel break projects
Conservation Measure Pygmy Rabbit 6	Where applicable, incorporate roads and natural fuel breaks into fuel break design to minimize loss of or impacts on shrub steppe habitat
Conservation Measure Pygmy Rabbit 7	Incorporate key habitats or important restoration areas (such as where investments in habitat restoration have already been made or protection of the Columbia Basin pygmy rabbit Recovery Emphasis Area) into fuel break project design
Conservation Measure Pygmy Rabbit 8	Where applicable, design fuel break treatment objectives to protect sagebrush ecosystems, modify fire behavior, restore/maintain native plants, and create landscape patterns that most benefit pygmy rabbits
Conservation Measure Pygmy	Protect pygmy rabbit RAs, restoration areas, and previously restored areas by strategically placing and maintaining treated strips/areas by mowing and herbicide treatments

Conservation Measure Number	Conservation Measure Text
Rabbit 9	
Conservation Measure Pygmy Rabbit 10	Do not create fuel breaks within 1 mile of occupied burrows
Conservation Measure Pygmy Rabbit 11	Locate on-site work/project camps and staging areas 0.25 miles away from REAs and occupied burrows. Establish a temporary "no entry" zone to protect rabbits from human disturbance. Do not allow dogs in the camps. Monitor workers on-site to keep them out of occupied habitat
Conservation Measure Pygmy Rabbit 12	Power wash all vehicles and equipment, including dozers, discs, engines, water tenders, personnel vehicles, and all-terrain vehicles (ATVs) before deploying them in or near pygmy rabbit habitat areas, to minimize spread of noxious weeds
Conservation Measure Pygmy Rabbit 13	Use vegetation management prescriptions in fuel breaks that minimize undesirable effects on vegetation or soils; for example. minimize destruction of desirable perennial plant species and reduce risk of annual grass invasion by retaining biological crusts
Conservation Measure Pygmy Rabbit 14	In restoration projects, emphasize the use of native plant species
Conservation Measure Pygmy Rabbit 15	Use post-treatment control of annual grass and other invasive species
Conservation Measure Pygmy Rabbit 16	Conservation Measures for pygmy rabbits adapted from the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Biological Assessment (BLM 2005, 2007): Address pygmy rabbits in all management plans prepared for treatments within the range of the species' historical habitat Do not burn, graze, or conduct mechanical treatments within 1 mile of occupied Columbia Basin pygmy rabbit habitat Do not use 2,4-D, diquat, or diuron in occupied pygmy rabbit habitats; do not broadcast-spray these herbicides within a quarter-mile of occupied Columbia Basin pygmy rabbit habitat Where feasible, avoid use of the following herbicides in occupied pygmy rabbit habitat: bromacil, clopyralid, fluoridone, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr Where feasible, spot treat vegetation in occupied Columbia Basin pygmy rabbit habitat, rather than broadcast-spraying Do not broadcast-spray clopyralid, glyphosate, hexazinone, picloram, or triclopyr in occupied Columbia Basin pygmy rabbit habitat; do not broadcast-spray these herbicides within 0.25 miles of occupied habitat If broadcast-spraying bromacil, imazapyr, fluoridone, metsulfuron methyl, or tebuthiuron in or within 0.25 mi of occupied Columbia Basin pygmy rabbit habitat, apply at the typical, rather than the maximum, rate If conducting manual spot applications of bromacil, glyphosate, hexazinone, tebuthiuron, or triclopyr to vegetation in occupied Columbia Basin pygmy rabbit habitat, use the typical, rather than the maximum, application rate

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Conservation Measure Gray Wolf 1	Vegetation treatments would be designed and implemented to minimize noise disturbance or habitat modifications within one mile of wolf dens or rendezvous sites from mid-April until the end of June.
Conservation Measure Gray Wolf 2	Conservation measures for gray wolves adapted from the Vegetation Treatments BA (BLM 2005, some conservation measures have been adjusted to fit the needs of the proposed project). Avoid human disturbance or associated activities within 1 mile of a den site during the breeding period (as determined by a qualified biologist or by know den site information from state agencies and USFWS) Avoid human disturbance or associated activities within 1 mile of a rendezvous site during the breeding period (as determined by a qualified biologist or by know den site information from state agencies and USFWS) Do not use 2,4-D in dens and rendezvous sites; do not broadcast-spray within a quarter-mile of dens and rendezvous sites Where feasible, avoid use of the following herbicides in dens and rendezvous sites: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, and triclopyr Do not broadcast-spray clopyralid, diuron, glyphosate, hexazinone, picloram, or triclopyr in dens and rendezvous sites; do not broadcast-spray these herbicides next to dens and rendezvous sites under conditions when spray drift into the habitat is likely If broadcast-spraying bromacil, diquat, imazapyr, or metsulfuron methyl in or near dens and rendezvous sites, apply at the typical, rather than the maximum rate If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation in dens and rendezvous sites, use the typical, rather than the maximum, application rate
Conservation Measure Grizzly Bear 1	No targeted grazing would be allowed within grizzly bear habitat
Conservation Measure Grizzly Bear 2	Conservation measures specific to grizzly bears as identified in the Vegetation Treatments BA (BLM 2005): Ensure that all treatment activities adhere to interagency grizzly bear guidelines or local interagency grizzly bear standards for sanitation measures and storage of potential attractants Do not plant or seed highly palatable forage species near roads or facilities used by humans Take the following measures in recovery zones to minimize the likelihood that grizzly bears would suffer adverse health effects as a result of exposure to herbicides: Do not use 2,4-D in the zone, and do not broadcast-spray 2,4-D within a quarter-mile of the zone Where feasible, avoid use of bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, Overdrive, picloram, tebuthiuron, and triclopyr Do not broadcast-spray bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, Overdrive, picloram, or triclopyr in the recovery zone; do not broadcast-spray these herbicides in areas next to the recovery zone under conditions when spray drift into zone is likely If broadcast-spraying imazapyr, metsulfuron methyl, or tebuthiuron in or near the recovery zone, apply at the typical, rather than the maximum, application rate If conducting manual spot applications of glyphosate, hexazinone, imazapyr, metsulfuron

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	methyl, tebuthiuron, or triclopyr to vegetation in the recovery zone, use the typical, rather than the maximum, application rate
Conservation Measure Spotted Owl 1	Within 0.5 mile of project activity, habitat suitability will be assessed for nesting and foraging using accepted habitat models in conjunction with field reviews.
Conservation Measure Spotted Owl 2	Protocol level surveys will be required prior to activity unless species occupancy and distribution information is complete and available. All surveys must be conducted by qualified individual(s).
Conservation Measure Spotted Owl 3	Activities will be monitored for compliance with conservation measures throughout the duration of the project.
Conservation Measure Spotted Owl 4	All Mexican spotted owl final critical habitat will be avoided and buffered as determined by local conditions, a qualified biologist, and treatment method.
Conservation Measure Spotted Owl 5	Activity will not occur within 0.5 mile of an identified nest site or within a designated Protected Activity Center (PAC).
Conservation Measure Spotted Owl 6	Avoid noise-generating activity and permanent structures within 0.5 mi of suitable habitat unless surveyed and not occupied
Conservation Measure Spotted Owl 7	Reduce noise emissions (e.g., use hospital-grade mufflers, electric pump motors) to 45 dBA at 0.5 mile from suitable habitat, including canyon rims. Placement of permanent noise-generating facilities should be determined by a noise analysis to ensure noise does not encroach upon a 0.5 mile buffer for suitable habitat, including canyon rims.
Conservation Measure Spotted Owl 8	Limit disturbances to suitable habitat by staying on approved routes.
Conservation Measure Spotted Owl 9	Limit new access routes created by the project.
Conservation Measure Spotted Owl 10	Limit habitat loss by locating new facilities within existing rights of way.
Conservation Measure Spotted Owl 11	Additional measures to avoid or minimize effects to the Mexican spotted owl may be developed and implemented in consultation with the U.S. Fish and Wildlife Service.
Conservation Measure Bighorn Sheep 1	Conservation measures specific to bighorn sheep (and also applicable to Sierra Nevada bighorn sheep) as identified in the Vegetation Treatments BA (BLM 2005): Before treatment, survey suitable habitat for evidence of use by bighorn sheep Do not use domestic animals as a vegetation treatment in bighorn sheep habitat

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	When planning vegetation treatments, minimize the creation of linear openings that could result in permanent travel ways for competitors and humans Obliterate any linear openings constructed in bighorn sheep habitat in order to deter uses by humans and competitive species Where feasible, time vegetation treatments such that they do not coincide with seasonal use of the treatment area by bighorn sheep Do not broadcast-spray herbicides in key bighorn sheep foraging habitats Do not use 2,4-D in bighorn sheep habitat; do not broadcast-spray 2,4-D within a quarter-mile of bighorn sheep habitat Where feasible, avoid use of the following herbicides in bighorn sheep habitat: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, Overdrive, picloram, and tebuthiuron, and triclopyr Do not broadcast-spray bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, Overdrive, picloram, or triclopyr in bighorn sheep habitat; do not broadcast-spray these herbicides in areas next to bighorn sheep habitat under conditions when spray is likely to drift onto the habitat If broadcast-spraying imazapyr, metsulfuron methyl, or tebuthiuron in or near bighorn sheep habitat, apply at the typical, rather than the maximum, application rate If conducting manual spot applications of glyphosate, hexazinone, imazapyr, metsulfuron methyl, tebuthiuron, or triclopyr to vegetation in bighorn sheep habitat, use the typical, rather than the maximum, application rate
Conservation Measure Cuckoo 1	No treatments would occur within 0.5 mile of proposed yellow-billed cuckoo critical habitat.
Conservation Measure Cuckoo 2	Mechanical, chemical, or manual treatments would not occur during the yellow-billed cuckoo nesting season (June 1- August 31) within 0.5 mile of occupied suitable yellow-billed cuckoo habitat. Specific dates and buffer distances for the seasonal restrictions may be determined in coordination with the local USFWS Ecological Field Services Office, and should be based on species, variations in nesting chronology of particular species locally, topographic considerations, such as an intervening ridge between the treatment activities and a nest, or other factors that are biologically reasonable. Further, occupied suitable yellow-billed cuckoo habitat will be determined using the Utah Field Office August 2017 Guidelines for the identification and evaluation of suitable habitat for the western yellow-billed cuckoo.
Conservation Measure Cuckoo 3	Prescribed fire would not be used within 0.5 miles of suitable or proposed critical yellow-billed cuckoo habitat; suitable yellow-billed cuckoo habitat will be determined using the Utah Field Office August 2017 Guidelines for the identification and evaluation of suitable habitat for the western yellow-billed cuckoo.
Conservation Measure Cuckoo 4	Conservation measures specific to yellow-billed cuckoos adapted from conservation measures for riparian bird species identified in the Vegetation Treatments BA (BLM 2005): Closely follow all application instructions and use restrictions on herbicide labels. Do not use 2,4-D adjacent to yellow-billed cuckoo habitat; do not broadcast spray 2,4-D within ¼ mile of suitable yellow-billed cuckoo habitat. Avoid use of the following herbicides adjacent to suitable yellow-billed cuckoo habitat: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr. Do not broadcast spray clopyralid, diquat, diuron, glyphosate, hexazinone, picloram, or

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	triclopyr adjacent to suitable yellow-billed cuckoo habitat. If broadcast spraying imazapyr or metsulfuron methyl adjacent to suitable yellow-billed cuckoo habitat, apply at the typical, rather than the maximum, application rate. If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation adjacent to suitable yellow-billed cuckoo habitat, utilize the typical, rather than the maximum, application rate.
Conservation Measure Flycatcher 1	Aerial application of chemicals would not occur during the southwestern willow flycatcher breeding season (April 15 to August 15) within 0.5 mile of suitable southwestern willow flycatcher habitat
Conservation Measure Flycatcher 2	Mechanical treatments, ground-based broadcast application of herbicides, or cutting of noxious or invasive woody species would not occur during the southwestern willow flycatcher breeding season within 0.5 mile of suitable habitat southwestern willow flycatcher habitat.
Conservation Measure Flycatcher 3	Prescribed fire would not be used within 0.5 mile of suitable southwestern willow flycatcher habitat.
Conservation Measure Flycatcher 4	No targeted grazing will be implemented within 12 mi of suitable southwestern willow flycatcher habitat or final critical habitat during the southwestern willow flycatcher breeding season.
Conservation Measure Flycatcher 5	Avoid treatments in more than 25 percent of a suitable habitat patches for southwestern willow-flycatchers in any given year.
Conservation Measure Flycatcher 6	Conservation measures specific to southwestern willow flycatchers adapted from conservation measures for riparian bird species identified in the Vegetation Treatments BA (BLM 2005). Closely follow all application instructions and use restrictions on herbicide labels. Do not use 2,4-D in southwestern willow flycatcher habitat; do not broadcast spray 2,4-D within ¼ mile of southwestern willow flycatcher habitat. Avoid use of the following herbicides in or adjacent to southwestern willow flycatcher habitat: bromacil, clopyralid, diquat, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr. Do not broadcast spray clopyralid, diquat, diuron, glyphosate, hexazinone, picloram, or triclopyr in southwestern willow flycatcher habitat; do not broadcast spray these herbicides in areas adjacent to southwestern willow flycatcher habitat under conditions when spray drift onto the habitat is likely. If broadcast spraying imazapyr or metsulfuron methyl in or adjacent to southwestern willow flycatcher habitat, apply at the typical, rather than the maximum, application rate. If conducting manual spot applications of glyphosate, hexazinone, or triclopyr to vegetation in or adjacent to southwestern willow flycatcher habitat, utilize the typical, rather than the maximum, application rate.
Conservation Measure Listed Plants 1	Conservation measures for listed plants contained in the biological assessments for Vegetation Treatments using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (BLM 2007, pp. 4-129 to 4-130) and the 2016 Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr,

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	and Rimsulfuron on BLM Lands in 17 Western States (BLM 2015, Appendix B-2): Herbicide treatments should not be conducted in areas where TEP plant species may be subject to direct spray by herbicides during treatments. Applicators should review, understand, and conform to the "Environmental Hazards" section on herbicide labels (this section warns of known pesticide risks and provides practical ways to avoid harm to organisms or the environment). To avoid negative effects to TEP plant species from off-site drift, surface runoff, and/or wind erosion, suitable buffer zones[1] should be established between treatment sites and populations (confirmed or suspected) of TEP plant species, and site-specific precautions should be taken (refer to the guidance provided below). Follow all instructions and SOPs to avoid spill and direct spray scenarios into aquatic habitats that support TEP plant species. Follow all BLM operating procedures for avoiding herbicide treatments during climatic conditions that would increase the likelihood of spray drift or surface runoff. Additional, formulation-specific conservation measures are included in the biological assessments described above (BLM 2007, pp. 4-130 to 4-134; BLM 2015, pp. 15-16): **2,4-D** Because the risks associated with this herbicide were not assessed, do not spray within ½ mile of terrestrial plant species or aquatic habitats where TEP aquatic plant species occur. Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur. Assess local site conditions when evaluating the risks from surface water runoff to TEP plants located within ½ mile downgradient from the treatment area. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Aminopyralid** Ground Application If using a low boom at the typical application rate, do not apply within 100 feet of TEP terrestrial plants[2]. If using a low boom at the maximum application rate or a high boom at the typical application rate, do not apply within 400 feet of TEP terrestrial plants. If using a high boom at the maximum application rate, do not apply within 600 feet of TEP terrestrial plants. Aerial Application Over Non-Forested Land Do not apply by airplane at the typical application rate within 1,800 feet of TEP terrestrial plants. Do not apply by airplane at the maximum application rate within 2,000 feet of TEP terrestrial plants. Do not apply by helicopter at the typical application rate within 1,640 feet of TEP terrestrial plants. Do not apply by helicopter at the maximum application rate within 1,700 feet of TEP terrestrial plants. General In areas where wind erosion is likely, do not apply within 1.2 miles of TEP plant species (an alternative suitable buffer may be developed at the local level based on an analysis of site conditions). **Bromacil** Do not apply within 1,200 feet of terrestrial TEP plant species. If using a low boom at the typical application rate, do not apply within 100 feet of an

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	aquatic habitat in which TEP plant species occur. If using a low boom at the maximum application rate or a high boom, do not apply within 900 feet of an aquatic habitat in which TEP plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Chlorsulfuron** Do not apply by ground methods within 1,200 feet of terrestrial TEP species. Do not apply by aerial methods within 1,500 feet of terrestrial TEP species. Do not apply by ground methods within 25 feet of aquatic habitats where TEP plant species occur. Do not apply by aerial methods at the maximum application rate within 300 feet of aquatic habitats where TEP plant species occur. Do not apply by aerial methods at the typical application rate within 100 feet of aquatic habitats where TEP plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Clopyralid** Since the risks associated with using a high boom are unknown, use only a low boom during ground applications of this herbicide within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. Do not apply by ground methods at the typical application rate within 900 of [*sic*] terrestrial TEP species. Do not apply by ground methods at the typical application rate within ½ mile of terrestrial TEP species. Do not apply by aerial methods within ½ mile of terrestrial TEP species. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Dicamba** If using a low boom at the typical application rate, do not apply within 1,050 feet [*sic*] of terrestrial TEP plant species. If using a low boom at the maximum application rate, do not apply within 1,050 feet [*sic*] of terrestrial TEP plant species. If using a high boom, do not apply within 1,050 feet of terrestrial TEP plant species. Do not apply within 25 feet of aquatic habitats where TEP plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Diflufenzopyr** If using a low boom at the typical application rate, do not apply within 100 feet of terrestrial TEP plant species. If using a high boom, or a low boom at the maximum application rate, do not apply within 900 feet of terrestrial TEP plant species. If using a high boom, do not apply within 500 feet of terrestrial TEP plant species. Do not apply within 25 feet of aquatic habitats where TEP plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Diquat** Do not use in aquatic habitats where TEP aquatic plant species occur. Do not apply by ground methods within 1,000 feet of terrestrial TEP species at the maximum application rate. Do not apply by ground methods within 900 feet of terrestrial TEP species at the typical application rate. Do not apply by aerial methods within 1,200 feet of terrestrial TEP species. **Diuron** Do not apply within 1,100 feet of terrestrial TEP species. If using a low boom at the typical application rate, do not apply within 900 feet of

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	aquatic habitats where TEP aquatic plant species occur. If using a high boom, or a low boom at the maximum application rate, do not apply within 1,100 feet of aquatic habitats where TEP aquatic plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Fluridone** Since effects on terrestrial TEP plant species are unknown, do not apply within ½ mile of terrestrial TEP species. **Fluroxypyr** Ground Application If using a low boom at the typical application rate, do not apply within 100 feet of TEP terrestrial plants. If using a low boom at the maximum application rate, do not apply within 600 feet of TEP terrestrial plants. If using a high boom at the typical application rate, do not apply within 400 feet of TEP terrestrial plants. If using a high boom at the maximum application rate, do not apply within 700 feet of TEP terrestrial plants. Aerial Application Over Non-Forested Land Do not apply by airplane at the typical application rate within 1,100 feet of TEP terrestrial plants. Do not apply by helicopter at the typical application rate within 900 feet of TEP terrestrial plants. Do not apply by airplane or helicopter at the maximum application rate within 1,500 feet of TEP terrestrial plants. General In areas where wind erosion is likely, do not apply within 1.2 miles of TEP plant species (an alternative suitable buffer may be developed at the local level based on an analysis of site conditions). **Glyphosate** Since the risks associated with using a high boom are unknown, use only a low boom during ground applications of this herbicide within ½ mile of terrestrial TEP plant species. Do not apply by ground methods at the typical application rate within 50 feet of terrestrial TEP plant species. Do not apply by ground methods at the maximum application rate within 300 feet of terrestrial TEP plant species. Do not apply by aerial methods within 300 feet of terrestrial TEP plant species. **Hexazinone** the risks associated with using a high boom or an aerial application are unknown, only apply this herbicide by ground methods using a low boom within ½ mile of terrestrial TEP plant species and aquatic habitats that support aquatic TEP species. Do not apply by ground methods at the typical application rate within 300 feet of terrestrial TEP plant species or aquatic habitats that support aquatic TEP plant species. Do not apply by ground methods at the maximum application rate within 900 feet of terrestrial TEP plant species or aquatic habitats that support aquatic TEP plant species. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Imazapic** Do not apply by ground methods within 25 feet of terrestrial TEP species or aquatic habitats where TEP plant species occur. Do not apply by helicopter at the typical application rate within 25 feet of terrestrial

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	TEP plant species. Do not apply by helicopter at the maximum application rate, or by plane at the typical application rate, within 300 feet of terrestrial TEP plant species. Do not apply by plane at the maximum application rate within 900 feet of terrestrial TEP species. Do not apply by aerial methods at the maximum application rate within 300 feet of aquatic TEP species. Do not apply by aerial methods at the typical application rate within 100 feet of aquatic TEP species. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Imazapyr** Since the risks associated with using a high boom are unknown, use only a low boom for ground applications of this herbicide within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. Do not apply at the typical application rate, by ground or aerial methods, within 900 feet of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur. Do not apply at the maximum application rate, by ground or aerial methods, within ½ mile of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur. Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Metsulfuron Methyl** Since the risks associated with using a high boom are unknown, use only a low boom for ground applications of this herbicide within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. Do not apply at the typical application rate, by ground or aerial methods, within 900 feet of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur. Do not apply at the maximum application rate, by ground or aerial methods, within ½ mile of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Overdrive®** If using a low boom at the typical application rate, do not apply within 100 feet of terrestrial TEP plant species. If using a low boom at the maximum application rate, do not apply within 900 feet of terrestrial TEP plant species. If using a high boom, do not apply within 900 feet of terrestrial TEP plant species. Do not apply within 25 feet of aquatic habitats where TEP plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Picloram** Do not apply by ground or aerial methods, at any application rate, within ½ mile of terrestrial TEP plant species. Assess local site conditions when evaluating the risks from surface water runoff to TEP plants located within ½ mile downgradient from the treatment area. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Rimsulfuron** Ground Application

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	If using a low boom at the typical application rate, do not apply within 200 feet of TEP terrestrial plants. If using a low boom at the maximum application rate or a high boom at the typical application rate, do not apply within 400 feet of TEP terrestrial plants. If using a high boom at the maximum application rate, do not apply within 700 feet of TEP terrestrial plants. Aerial Application Over Non-Forested Land Do not apply by airplane at the typical application rate within 1,600 feet of TEP terrestrial plants. Do not apply by airplane at the maximum application rate within 1,900 feet of TEP terrestrial plants. Do not apply by helicopter at the typical application rate within 1,400 feet of TEP terrestrial plants. Do not apply by airplane or helicopter at the maximum application rate within 1,600 feet of TEP terrestrial plants. General In areas where wind erosion is likely, do not apply within 1.2 miles of TEP plant species (an alternative suitable buffer may be developed at the local level based on an analysis of site conditions). Do not use in watersheds where annual precipitation exceeds 50 inches. In watersheds where annual precipitation exceeds 10 inches, prior to use of rimsulfuron conduct a local-level analysis of site conditions and develop suitable conservation measures for protection of TEP plant species from surface runoff. **Sulfometuron Methyl** Do not apply by ground or aerial methods within 1,500 feet of terrestrial TEP species. Do not apply by ground methods within 900 feet of aquatic habitats where TEP plant species occur, or by aerial methods within 1,500 feet of aquatic habitats where TEP plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Tebuthiuron** If using a low boom at the typical application rate, do not apply within 25 feet of terrestrial TEP plant species. If using a low boom at the maximum application rate or a high boom at the typical application rate, do not apply within 50 feet of terrestrial TEP plant species. If using a high boom at the maximum application rate, do not apply within 900 feet of terrestrial TEP plant species. Do not apply within 25 feet of aquatic habitats where TEP plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Triclopyr Acid** Since the risks associated with using a high boom are unknown, use only a low boom during ground applications of this herbicide within ½ mile of terrestrial TEP plant species. Since the risks associated with using a high boom are unknown, use only a low boom during ground applications at the maximum application rate of this herbicide within ½ mile of aquatic habitats in which TEP plant species occur. Do not apply by ground methods at the typical application rate within 300 feet of terrestrial TEP plant species. Do not apply by aerial methods at the typical application rate within 500 feet of terrestrial TEP plant species. Do not apply by ground or aerial methods at the maximum application rate within ½

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	mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. If applying to aquatic habitats in which aquatic TEP plant species occur, do not exceed the targeted water concentration on the product label. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species. **Triclopyr BEE** Since the risks associated with using a high boom are unknown, use only a low boom for ground applications of this herbicide within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. Do not apply by ground methods at the typical application rate within 300 feet of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. Do not apply by aerial methods at the typical application rate within 500 feet of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. Do not apply by ground or aerial methods at the maximum application rate within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur. Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur. In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.
Conservation Measure Barneby Reed-Mustard 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Clay Phacelia 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Clay Phacelia 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas
Conservation Measure Clay Reed-Mustard 1	Site inventories would be conducted within suitable habitat to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat would be assessed and mapped for avoidance; in such cases, 300-foot avoidance buffers would be maintained between surface disturbance and avoidance areas. However, site specific distances would be approved by USFWS and BLM when disturbance would occur upslope of habitat. To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices would be incorporated into the project design.
Conservation Measure Clay Reed-Mustard 2	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Jones Cycladenia 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Kodachrome Bladderpod 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).

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Conservation Measure Kodachrome Bladderpod 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas
Conservation Measure Last Chance Townsendia 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Last Chance Townsendia 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure Pariette Cactus 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Pariette Cactus 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure San Rafael Cactus 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure San Rafael Cactus 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure Shrubby Reed-Mustard 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Shrubby Reed-Mustard 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure Slickspot Peppergrass 1	A qualified biologist would conduct pretreatment slickspot habitat surveys in accordance with slickspot peppergrass inventory guidelines (BLM 2010). If suitable or occupied slickspot habitat is identified, a treatment avoidance buffer of 1,640 feet, would be established to protect the microhabitat and potential seed bank. Fencing, flagging, signs or other methods to denote or exclude the avoidance buffer would be implemented. No treatments or actions would occur within the avoidance buffer.
Conservation Measure Slickspot Peppergrass 2	Within the potential range of slickspot peppergrass only native plant material would be used for revegetation.
Conservation Measure Slickspot	If prescribed fire treatments occur within the potential range of slickspot peppergrass, follow-up native seeding or revegetation would be implemented to suppress nonnative,

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Peppergrass 3	invasive species occupancy.
Conservation Measure Slickspot Peppergrass 4	All slickspot peppergrass proposed critical habitat will be avoided and buffered as per Conservation Measure Slickspot Peppergrass 1.
Conservation Measure Slickspot Peppergrass 5	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Slickspot Peppergrass 6	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from suitable and occupied habitat within the graduated use area for targeted grazing treatment areas.
Conservation Measure Spalding's Catchfly 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Spalding's Catchfly 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure Spalding's Catchfly 3	Where prescribed fire treatments are proposed in suitable habitat in the species range, treatments should mimic historical fire behavior to the extent that this is known. Prescribed burning should occur during times when Spalding's catchfly is typically dormant to prevent adverse effects on reproduction. Where invasive annual grasses are present in a prescribed fire treatment area in the species range, revegetation, weed control, and monitoring should be conducted to prevent invasive annual grass germination to the extent possible.
Conservation Measure Uinta Basin Hookless Cactus 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Uinta Basin Hookless Cactus 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure Webber's Ivesia 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Webber's Ivesia 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure Webber's Ivesia 3	All Webber's ivesia designated critical habitat will be avoided and buffered with an avoidance buffer of 1,640 feet, to protect the PCEs. Fencing, flagging, signs or other methods to denote or exclude the avoidance buffer would be implemented. No treatments

Conservation Measure Number	Conservation Measure Text
	or actions would occur within the avoidance buffer.
Conservation Measure Wright Fishhook Cactus 1	Establish a treatment avoidance buffer around individuals or populations to protect pollinator habitat. Individuals or populations would be avoided with a treatment buffer of 1,640 feet (Dawson 2012).
Conservation Measure Wright Fishhook Cactus 2	To protect this species from adverse effects from livestock grazing, temporary fencing to prevent livestock entry would be placed 1,640 ft from individuals or populations within the graduated use area for targeted grazing treatment areas.
Conservation Measure Sage Grouse 1	—No chemical, mechanical, prescribed fire, or targeted grazing treatments will be conducted within 0.8 mi of suitable Bi-State DPS breeding or nesting/ early brood-rearing habitat (areas with >10% sagebrush within the Bi-State DPS range) during the breeding (March 1–May 15) or nesting/early brood-rearing (mid-May–late June) seasons. When implementing targeted grazing outside of areas suitable for nesting, use temporary fencing to minimize livestock use in sage-grouse habitat.
Conservation Measure Sage Grouse 2	When working in areas within 3.1 miles of Bi State DPS leks during the lekking season, avoid noise-generating activities during times when noise exposure is most likely to affect greater sage-grouse—nights and mornings (i.e., 6 pm – 9 am; Patricelli et al. 2012). Avoid or minimize any disturbance within 6 miles of known lek and nest sites during the breeding (March 1–May 15) or nesting/early brood-rearing (mid-May–late June) seasons.
Conservation Measure Sage-Grouse 3	No mechanical treatment of sagebrush will be conducted within Bi-State DPS winter range during winter (November 1 to March 1).
Conservation Measure Sage-Grouse 4	Do not conduct treatments in proposed critical habitat that would destroy or adversely modify critical habitat PCEs.
Conservation Measure Ferret 1	Within the range of the black-footed ferret, proposed treatments in prairie dog habitat would be surveyed in accordance with USFWS protocols. Avoid activities in prairie dog habitat whenever possible. Otherwise, design activities to impact the smallest area possible and/or those areas with the lowest prairie dog densities.
Conservation Measure Ferret 2	Prohibit fuel break treatments within 1/8 mile of known home ranges of female ferrets during the "critical" period from May 1 through July 15. The home ranges will be determined from data obtained from radio-collared animals.
Conservation Measure Condor 1	Within the range of the California condor, survey potential habitat within 2 weeks prior to treatments and establish a buffer of 1/2 mile around roosting habitat and 1 mile around nesting habitat. This applies to Endangered and non-essential experimental populations.

[1] Treatment avoidance buffers are described in **Table 3-14** of the Biological Assessment, under Effects from Fuel Break Construction and Maintenance.

[2] Note that buffers for terrestrial plants may be appropriate for plant species that root in water but have foliage extending above the surface of the water (BLM 2015).

Appendix E
Additional Resources

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Appendix E. Additional Resources

Below is a list of additional resources that field staff can reference or tier to when undertaking fuel break projects. Note this is not a complete list and sources not listed may also be appropriate to reference.

E.1 NEPA Documents

Bureau of Land Management (BLM). 2007. Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement. BLM, Nevada State Office, Reno, NV. June 2007. Available online at: https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=103592.

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E.3 Guidance for Developing a Monitoring and Adaptive Management Plan

This document represents a guide for developing a monitoring and adaptive management plan for site specific fuel break projects. It provides suggestions and examples for developing an effective monitoring plan.

Maintenance and monitoring of fuel breaks is essential to their efficacy. The BLM anticipates that multiple offices within the project boundary would utilize this PEIS to develop fuel break systems. The specific maintenance cycles for each fuel break would be determined using an adaptive management approach, which relies upon implementation of a consistent and transparent monitoring plan.

Because the treatments would be implemented in phases over several years and multiple BLM administrative units, each district or unit would develop site-specific monitoring plans and sampling designs for each year of fuel break construction concurrently with delineation of treatment types and locations. A monitoring design worksheet would be completed in accordance with IM-FA2019-064, using the framework described below.

This monitoring plan guidance provides a framework for developing consistent, trackable monitoring designs for each phase of implementation across the project area. The indicators and monitoring objectives were selected to support progress towards the project's overarching management goals and objectives, which include:

- Expand opportunities for firefighters to safely attack and control wildfires.
- Provide advance fire lines to give firefighters more time to attack and control wildfires.
- Enhance firefighter and public safety,
- Protect intact sagebrush communities
- Protect habitat rehabilitation and restoration treatments
- Maintain or increase site resistance and resilience weed invasion and wildfire.

The monitoring framework described below addresses: 1) overall effectiveness monitoring of the fuel breaks project, 2) implementation monitoring, and 3) treatment objectives and ecological effects monitoring.

The final section of this appendix outlines the adaptive management actions that would be taken based on information collected through the three components of this monitoring framework, to ensure continued progress towards the management goals and objectives.

Monitoring Framework

1) Fuel breaks project effectiveness monitoring:

Effectiveness of the constructed fuel breaks would be monitored to determine progress towards the overarching goals and objectives over the long term, by answering the following questions:

- Are the constructed fuel breaks in concert with firefighters successfully modifying fire behavior and reducing average wildfire size?
- Are fuel breaks maintaining a gap in existing fuel loads?
- Is firefighter access to existing fuel breaks adequate to allow prompt engagement of wildfires?
- Are burned areas and restored areas attaining desired sagebrush cover without reburning.

Effectiveness monitoring would focus on, but not be limited to:

- **Fuel Treatments and Wildfire Interactions**
  The Forest Service maintains an interagency fuel treatment effectiveness monitoring (FTEM) database to allow federal agencies to document whether fuel treatments on public land were effective in stopping or slowing a fire. Should a wildfire start in or burn into or through the treated area, the BLM would evaluate fuel break effectiveness using the FTEM database per BLM Fire and Aviation Instruction Memorandum No. FA IM-2015-001 or future policy. This instruction memorandum requires BLM to document and evaluate all wildfires that intersect

fuels treatments on BLM-administered land to assess whether the treatment changed fire behavior and/or aided in control of the fire.

- **Fuel loading within existing Fuel Breaks**

Regular monitoring of fuel loading within and adjacent to established fuel breaks would inform offices of when maintenance is necessary.

- **Restored and Recovered areas**

  To assess the habitat protection provided by the fuel break network, BLM staff would monitor acres of sage-grouse habitat burned within the project area using existing sources of data systematically collected by the BLM and other federal and state agencies.

2) Implementation Monitoring and Treatment Mapping

Treatment implementation monitoring is the inspection of operations during treatment implementation to document adherence to applicable design features. Implementation monitoring documents resource conditions, equipment issues, resolutions, and any necessary adjustments to the prescribed designs during implementation. Information derived through implementation monitoring would be used to improve future fuel break project design.

Pre-implementation site evaluations would be conducted to delineate the locations for each treatment type and develop the monitoring design for each project phase (See section 3). If implementation differs from the planning information used for the monitoring design, it is important to update the monitoring design worksheet to ensure that it reflects the actual types, locations and timing of treatments, and adjust the monitoring methods and schedules accordingly.

The treatment footprint would be mapped immediately post-implementation using global positioning system (GPS) technology and incorporated into BLM Vegetation Treatment Geodatabases (VTG). The resulting Geographic Information System (GIS) shapefile would define the physical extent of the treatments, and aid in determining movement of plant species outside of the treatment boundaries. If final treatment boundaries differ from the initial boundaries used for the monitoring design and pre-treatment data collection, it may be necessary to re-visit the monitoring design and ensure that the selected plots fall within the treatment perimeter, and the correct indicators are applied at each monitoring location.

3) Treatment Objectives and Ecological Trends Monitoring

Treatment objectives monitoring consists of determining when, and to what extent, the treatment or treatments that have been implemented in a given fuel breaks segment have met the stated fuels reduction objectives. Ecological trends monitoring characterizes how the treatments affect vegetation and soils conditions over time, as compared to pre-treatment (baseline) condition. Because these two types of monitoring overlap to a large extent, they are usually planned and implemented within the context of one integrated monitoring plan and sample design.

Once the treatment types and locations have been identified for an implementation phase, a monitoring design worksheet would be prepared to identify the appropriate indicators to be monitored, sampling locations and data collection schedule, as described in Incorporating Assessment, Inventory and Monitoring (AIM) for Monitoring Fuels Project Effectiveness Guidebook (BLM 2018), in accordance with Instruction Memorandum FA IM 2019-012.

A) Monitoring Objectives

Monitoring objectives and requirements should be identified by first articulating the questions that the monitoring data should be able to answer. For construction of fuel breaks, these questions can be divided into two general categories:

1. Ecological trend monitoring questions. Monitoring ecological trend for fuel breaks will help BLM better understand how soils and vegetation are affected by the treatments over time and determine if unintended or unexpected impacts are occurring.
2. Objectives-based monitoring questions (treatment effectiveness). Monitoring for the stated quantitative fuels management objectives will help BLM apply the most effective treatment methods and implement timely maintenance and re-treatment.

The primary ecological trend questions and treatment objectives that should be addressed in the monitoring design for each project phase are listed below. Other site-specific ecological trend questions and objectives-based questions may be identified within each phase of the project and incorporated into each monitoring design on an as-needed basis.

Table 1 - Ecological trend monitoring questions and indicators for each treatment type.

Monitoring question	Indicator(s)	Treatment Types								
		Mowing	Hand-cutting	Thinning	Targeted grazing	Disking	Non-native seeding	Native seeding	Noxious weed treatment*	Broadcast herbicide
Has cover of invasive species changed following treatment(s)?	Vegetation cover	X	X	X	X	X	X	X		X
How has ground cover (including litter, bare ground and biological soil crusts) changed from pre to post-treatment?	Ground cover	X	X	X	X	X	X	X	P	X
Has soil susceptibility to erosion changed from pre to post-treatment?	Soil aggregate stability	X			X	X	X	X		P
Have seeded non-native species expanded beyond the treatment footprint (and/or affected SSP buffer areas)?	Species occurrence						X			

Monitoring question	Indicator(s)	Treatment Types								
		Mowing	Hand-cutting	Thinning	Targeted grazing	Disking	Non-native seeding	Native seeding	Noxious weed treatment*	Broadcast herbicide
Has composition of native or seeded species, particularly perennial bunchgrasses, changed from pre to post-treatment?	Vegetation cover	**X**	**X**	**X**	**X**				**P**	**X**

*Assumes targeted or spot treatments. Broader noxious weed treatments should apply the broadcast herbicide treatment criteria.

X = question is applicable to the treatment; P = question is potentially applicable, depending on treatment specifications.

Table 2. Objectives-based monitoring questions and indicators for each treatment type

Monitoring question	Indicator(s)	Treatment Types								
		Mowing	Hand-cutting	Thinning	Targeted grazing	Disking	Non-native seeding	Native seeding	Noxious weed treatment*	Broadcast herbicide
Is average height of vegetation or stubble within the desired range?	Vegetation height Stubble height	**X**	**X**		**X**					
What is the density of seeded species?	Plant density						**X**	**X**		
Do established seeded species have adequate reproductive capability?	Flower or seed production						**X**	**X**		
What is the cover for specific vegetation classes?	Vegetation cover	**P**	**P**	**P**	**P**		**X**	**X**		**X**
Have noxious weeds been effectively	Species occurrence								**X**	

Monitoring question	Indicator(s)	Treatment Types								
		Mowing	Hand-cutting	Thinning	Targeted grazing	Disking	Non-native seeding	Native seeding	Noxious weed treatment*	Broadcast herbicide
controlled?										
Is fuel continuity in fuel breaks within an acceptable range?	Canopy gap	**P**	**P**	**P**	**P**	**P**	**P**	**P**		**P**

*Assumes targeted or spot treatments. Broader noxious weed treatments should apply the broadcast herbicide treatment criteria.
X = question is applicable to the treatment; P = question is potentially applicable, depending on treatment specifications.

B) Treatment Objectives

The objectives and initial benchmarks for each treatment type are presented in Table 3. Additional treatment objectives and benchmarks may be applied as needed on a site-specific basis.

Targeted Grazing

- Cover of invasive weeds is not increasing over time.
- Noxious weeds are absent, or if present, are controlled, as described for noxious weed treatment objectives.
- Targeted grazing treatment objective in annual and/or non-native perennial grass dominated sites:
  - ≤2-inch median stubble height in treatment area
- Targeted grazing treatment objective in perennial grass dominated sites:
  - 6- to 12-inch mean residual perennial grass height

Mowing and Hand Cutting

- 90% of woody vegetation height does not exceed 10 inches immediately after treatment
- Woody vegetation height is maintained below xx inches.

Thinning

- Objectives for thinning treatments are usually density and/or cover of the target species. Benchmarks would be set on a site-specific basis.

Seedbed Preparation Treatments

- Seedbed preparation treatments may include disking, herbicide and/or targeted grazing application to reduce competition from invasive species. Objectives for seed bed preparation would be monitored prior to seeding. Specific benchmarks would depend upon the species being seeded, and elevation and precipitation zone of the treatment area. The indicators of meeting seedbed preparation objectives would include:

- Invasive species cover does not exceed the identified threshold for the planned seeding.
- Litter or "thatch" does not exceed depth (thickness) and cover thresholds identified for the planned seeding.

Prostrate Kochia Fuel Break Objectives

Prostrate kochia fuel breaks would be monitored for establishment of prostrate kochia and presence of non-native invasive annual grasses and forbs. Prostrate kochia treatments would also be monitored annually for five years following implementation to assess spread at the margin of special status plant (SSP) buffers. Monitoring protocols are provided in Ott et al. 2017; in addition, if kochia seeding is implemented in proximity to slickspot peppergrass habitat, guidance provided in "Vegetative fuel break planning guidance for the long term protection of the sagebrush steppe and slickspot peppergrass habitats of Southwestern Idaho" (BLM 2012) will be followed.

Treatment objectives are:

- ≥ Four (4) prostrate kochia plants per square meter;
- Prostrate kochia are not spreading beyond the treatment footprint;
- <10% grass cover in kochia interspaces; and
- ≥50% of prostrate kochia plants are producing seed.

Seeded Fuel Break (other than kochia) Objectives

Treatment objectives are:

- ≥Four (4) seeded plants per square meter;
- <10% cover of invasive annual grass in interspaces; and
- ≥50% of seeded species are producing seed.

Monitoring Methods

Once the appropriate monitoring questions and objectives for a project phase are identified, the monitoring methods would be documented in the monitoring design worksheet. BLM core methods would be used when appropriate to answer the relevant monitoring questions in accordance with current policy. The core and supplemental methods that would be used to collect data to evaluate the treatment objectives and ecological trends data are included in Table 3. Certain modifications to methods used to monitor for treatment objectives may be applied to increase efficiency. However, the standardized core methods protocol would be implemented periodically to assess trends in ecological effects. It is expected that quantitative data collection would be completed in conjunction with qualitative observations as appropriate to determine attainment of treatment objectives.

Table 3. Ecological and treatment objectives indicators and field methods.

Measured Indicator	Quantitative Method	Potential method modifications for rapid treatment objectives monitoring.
Vegetation height	Line-point intercept (LPI) with height[1]	Pace transect measurements, using core height measurement.
Fuel continuity	Canopy gap[1]	If appropriate for treatment objectives, canopy of specific life forms may be included or excluded (e.g. annuals, perennials, shrubs)
Vegetation and ground cover	LPI[1]	Cover recorded by life-form or class (i.e. seeded or invasive species)
Plant density	Density plots[2]	Density classes, when large numbers of individual plants are present.
Flower or seed production	Recorded as a supplemental method in conjunction with LPI	Photos or step-point for rapid assessment.
Herbaceous stubble height	Residual Stubble Height [3]	N/A

[1]Herrick et al. 2018 Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems Volume 1: Core Methods. Second Edition

[2] Herrick et al. 2009 Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems. Volume II: Design, supplementary methods and interpretation.

[3] United States Department of the Interior, Bureau of Land Management. 1999. Utilization Studies and Residual Measurements.

Integration of remote sensing and high-resolution imagery

Monitoring for certain ecological trend and treatment objective indicators may be accomplished in part by leveraging remote sensing products and high-resolution imagery. These approaches can increase efficiency and reduce costs but would not completely replace use of field monitoring methods. Quantitative data collected at GPSed plot locations can be used to train remote sensing and enable accuracy assessments for indicators that are estimated using imagery. Many remote sensing products are widely available at regular intervals, while high-resolution imagery is generally only collected on an as-needed basis for a specific project, and thus needs to be incorporated into the monitoring workload and funding plan.

Remote sensing – for purposes of this monitoring plan, remote sensing products are those that are produced routinely along timelines that are relevant for monitoring fuel break conditions. Examples include NAIP imagery, Worldview, Landsat 8 and Sentinal 2. The advantage of remote sensing products is that they usually provide continuous coverage across potential treatment areas and are produced on a regular schedule, which may allow more continuous monitoring across time and space. However, most products are on a somewhat coarse scale that may limit how applicable they are to monitoring conditions along linear fuel breaks; our current ability to generate reliable estimates for indicators of interest from these datasets may be limited. For example, it may not be possible to accurately estimate the amount of cheatgrass cover if it is obscured by a shrub overstory. Additionally, some remote sensing products may not be available timely enough to allow for adaptive management during the field season.

High resolution imagery – for purposes of this monitoring plan, high-resolution imagery includes imagery generated using unmanned aerial systems (UAS) or imagery collected using a systematic ground-based method (e.g. repeated plot photos taken a set distance from the ground). These products could further inform degree of variability in vegetation composition/structure across fuel break segments.

Monitoring Schedule

The monitoring schedule for each treatment phase would be included in the monitoring design worksheet. The frequency of monitoring indicators is dependent upon timeframes for potential re-treatment needs, project maintenance, and containment or control of noxious and invasive species.

Treatment objectives-based monitoring would be conducted to evaluate whether treatment objectives were met and to determine appropriate re-treatment or maintenance timeframes. The methods used to collect baseline data should also be repeated periodically to assess the biotic and abiotic ecological effects as identified above. Where appropriate, BLM's terrestrial core methods would be used to quantify both ecological trend and treatment effectiveness indicators as described in Table 1 and Table 2. Quantitative measurements at designated monitoring plots may be augmented by field observations and ocular estimates along the fuel breaks. Remote sensing products and fine-scale imagery may be integrated with the methods identified in Table 1 as identified in the following section, when they are available within the appropriate spatial and temporal scales to answer the relevant monitoring questions.

The basic monitoring schedule appropriate for each treatment type is presented in Table 4. If less frequent monitoring is needed, based on site conditions, and confidence in treatment outcomes, any changes to the monitoring schedule would be documented, along with the rationale, in the monitoring design worksheet.

Table 4. Monitoring frequency by treatment type.

Basic Monitoring Schedule		
Treatment Type	**Ecological Effects**	**Post-Implementation Objectives monitoring**
Targeted grazing	Prior to treatment, years 5 and 10	Weekly
Mowed and hand cut	Prior to treatment, years 5 and 10	Years 1, 2, 3, 5 and 10
Thinning	Prior to treatment, years 5 and 10	Year 1, then as appropriate to target species
Seedings	Prior to treatment, years 5 and 10	Annually until seeding is established
Prostrate kochia seeding near SSP occurrences	Annually for the first 5 years; every 3-5 years thereafter	Annually for the first 5 years; every 3-5 years thereafter
All treatment areas: noxious weeds	Pre-treatment	Years 1, 2 and 3*
All treatment areas: invasive annual grasses	Prior to treatment, years 5 and 1	Years 1, 2 and 3*
Seedbed prep treatments (disking, herbicide)	Prior to treatment, years 5 and 10	Prior to seeding

*unless control is achieved earlier.

Adaptive Management Responses

Within the context of fuel breaks treatments, the adaptive management cycle would be applied continuously to maximize treatment success while minimizing undesirable resource impacts. The adaptive management responses for treatments are described below.

Targeted Grazing

Targeted grazing fuel breaks would be monitored to determine when fuels objectives are met, and to monitor the ecological effects to soils and vegetation. Monitoring for objectives attainment would be conducted at least weekly during treatment application (grazing) using residual fuel height (stubble) transects and photo points to ensure that cattle are moved or removed as soon as objectives are met. Targeted grazing practices may be modified or discontinued if the treatment areas do not meet designated objectives, or if unacceptable levels of erosion, weed invasion, or other ecological impacts occur as a result of repeated treatments.

Mowing and Hand Cutting

Re-treatment of mowed and hand-cut fuel breaks is expected to be necessary on a 3-5 year cycle. Other treatment types may be applied over time to meet fuel break objectives as vegetation changes occur. Adaptive management of invasive and noxious weeds would be applied to mowed and hand-cut areas as described below.

Seedbed Preparation

Seedbed preparation treatments may include disking and/or herbicide application to reduce competition from invasive species. Seeding would not be implemented until identified seedbed preparation objectives as a whole are met in order to optimize the likelihood of successful seedling establishment.

Prostrate Kochia Fuel Breaks

Prostrate kochia fuel breaks would be monitored for establishment of prostrate kochia and presence of non-native invasive annual grasses and forbs. Prostrate kochia treatments would also be monitored annually for five years following implementation to assess spread at the margin of special status plant (SSP) buffers. If prostrate kochia spreads into the SSP buffer areas, an interdisciplinary team would review the data and recommend control treatments if necessary and the type of treatments to employ. If no spread is detected within five years, monitoring would continue but at greater intervals (e.g., 3-5 years). Reseeding would occur if composition of desired perennial plants is not adequate to effectively suppress non-native annual grasses and other vegetation that would compromise fuel break effectiveness. Adaptive management of invasive and noxious weeds would be applied to prostrate kochia fuel breaks as described below.

Seeded Fuel Breaks (other than kochia)

Seeded fuel breaks would be monitored annually for establishment of seeded species and presence of non-native invasive annual grasses and forbs. Reseeding would occur if composition of desired perennial plants is not adequate to effectively suppress non-native annual grasses and other vegetation that would compromise fuel break effectiveness. Adaptive management of invasive and noxious weeds would be applied to seeded fuel breaks as described below.

Invasive Species

Treatment plans for invasives would be developed based upon species, morphology, location, and infestation size to respond to an increase in cover of invasive annual grasses from baseline conditions or other acceptable benchmark levels (i.e. 10% in fuel breaks). Treatment may include any combination of seeding and seedbed preparation methods (e.g., disking and herbicide followed by a seeding) to reduce infestation size.

Management responses would evaluate the following factors, at a minimum:

- Changes in the distribution, amount, and proportion of invasive plant infestations resulting from treatments,
- Success of treatment methods, either separately or in combination for a particular species.

The treatment plan may be altered in response to effectiveness monitoring as needed.

Noxious Weeds

Treatment areas would be monitored annually for noxious weeds for at least 3 years after treatment unless control is achieved earlier. Noxious weeds encountered within or adjacent to the project area would be recorded and provided to the District Weeds Specialist. An appropriate treatment plan would be implemented based upon species, morphology, location, and infestation size, and annual monitoring would continue until control is achieved based on evaluating the same factors described above for invasive plant infestations.

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Appendix F
Vegetation Framework and Methodology

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Appendix F. Vegetation Framework and Methodology

This document shows the process used to develop vegetation states and conifer phases for the purpose of the two programmatic environmental impact statements, Fuel Breaks and Rangeland Restoration & Fuels Reduction. Each vegetation state relates to a relative amount of shrub, perennial grass/forb, and annual invasive grass foliar cover. The conifer phase relates to the successional stages of pinyon pine and juniper forests and areas of sagebrush that are adjacent to these forests (considered encroachment areas). This framework is expected to be useful for the PEIS NEPA analysis of the affected environment and environmental consequences of a variety of potential fuels treatments, fuels reduction and restoration, as well as for guiding project development at the field level.

F.1 Methods for Vegetation States

Vegetation was partitioned into three common plant categories found within sagebrush communities: invasive annual grasses (IAG), perennial grasses and forbs (PGF), and sagebrush (SB). The percent cover of each category was divided into low, moderate, and high cover classes for IAG and PGF; percent cover of SB was divided into low, intermediate, moderate, and high cover classes. The range for each cover class is identified in **Table F-1**. Percent cover breakpoints within each vegetation type were derived from the five invasion states listed in Mealor et al. (2013) for IAG, Chambers et al. (2014) for PGF, and Connelly et al. (2000), Connelly et al. (2003), and Hagen et al. (2007) for SB. The following is a crosswalk depicting how the cover classes in this PEIS align with the Mealor et al. (2013) cover classes:

- Invasion free 0%/Trace 1-5% = Low IAG 0-5%
- Mild 6-25% = Moderate 6-25%
- Moderate 26-50%/Invasion dominated state 51-100% = High 26%+

Table F-1
Sagebrush and Grassland Habitat Classes with Cover Breakpoints

Vegetation Type	Code	Percent Cover Class
low sagebrush cover	LSB	0-5
intermediate sagebrush cover	ISB	6-14
moderate sagebrush cover	MSB	15-25
high sagebrush cover	HSB	26+
low invasive annual grass cover	LIAG	0-5
moderate invasive annual grass cover	MIAG	6-25
high invasive annual grass cover	HIAG	26+
low perennial grass & forb cover	LPGF	0-5
moderate perennial grass & forb cover	MPGF	6-19
high perennial grass & forb cover	HPGF	20+

GIS Datasets to support vegetation categories and treatment methods:

1. Historical vegetation layer from Landfire, called Biophysical Settings (BPS) was used to identify the extent of sagebrush by extracting the sagebrush and associated habitats that occurred historically on the landscape. This layer was chosen over the Existing Vegetation (EVT) in order to capture areas historically supporting sagebrush communities.
2. Vegetation cover was identified using the provisional USGS National Cover Database Shrubland products (Homer et al. 2015) which is a percentage-based set of raster datasets covering a majority of the project area. For the purposes of this exercise, percent sagebrush and two subsets of percent herbaceous (annual and perennial) were used to develop the vegetation categories. While other shrubs may add a few additional percentages of cover, the BLM used sagebrush cover alone because it is the most important shrub type for management purposes.

   A newer version for the USGS National Cover Database Shrubland products has since been published which has a wider extent and different values for the percent cover. This is a result of an increase in plot data and a refinement in the model that determines cover estimates. The provisional dataset was the best available information at the time the Draft PEIS was prepared. While the newer dataset may yield slightly different acreages, the relative acreages of the vegetation states are not likely to change substantially given the scale of the project area. As such, and due to time limitations for the PEIS document, the process has not been repeated with the newer version to derive the vegetation states.

The IDT then aggregated the vegetation cover classes into seven 'vegetation states' based on relative amounts of each cover class (dominant and subdominant cover types). This was accomplished by creating a decision tree (**Figure F-1**) that combined the three classified layers and assigned a vegetation state to each of the possible combinations. The conclusions from **Figure F-1** are distilled in **Table F-2**. The GIS datasets do not separate perennial grass areas dominated by native versus nonnative plant material. As such, the vegetation states with perennial grasses include those dominated by both native and nonnative plant material.

Table F-2
Description of the Vegetation States

Vegetation State (Combine Classes)	Percent Cover by Vegetation Type			Description
	Shrubs	Perennial Grasses and Forb	Invasive Annual Grasses	
Other	0-5 (low)	0-5 (low)	0-5 (low)	Rock, playas and open water
Invasive Annual Grasses (IAG)	0-5 (low)	0-5 (low)	6+ (moderate to high)	Sites dominated by invasive annual grasses (may include poa spp.)
Invasive Annual Grasses and Shrubs (IAG/Shrub)	6-25 (low-moderate)	0-5 (low)	6+ (moderate to high)	Shrub overstory with invasive annual grass understory
Perennial Grasses and Forbs (PGF)	0-5 (low)	6+ (moderate to high)	0-5 (low)	Sites dominated by perennial grasses and forbs (including nonnative seedings)

Vegetation State (Combine Classes)	Percent Cover by Vegetation Type			Description
	Shrubs	Perennial Grasses and Forb	Invasive Annual Grasses	
Perennial Grasses, Forbs, and Shrubs (PGF/Shrub)	6+ (intermediate to high)	6+ (moderate to high)	0-5 (low)	Intact vegetation and similar to reference state
Perennial Grasses, Forbs, and Invasive Annual Grasses (PGF/IAG)	0-5 (low)	6+ (moderate to high)	6+ (moderate to high)	Perennial grassland with invasive annual grasses filling interspaces
Shrubs, Perennial Grasses, Forbs, and Invasive Annual Grasses (Shrub/PGF/IAG)	6+ (intermediate to high)	6+ (moderate to high)	6+ (moderate to high)	Intact vegetation with invasive annual grasses filling interspaces
Shrubs with Depleted Understory	15+ (moderate to high)	0-5 (low)	0-26+ (low to high)	Shrub-dominated vegetation

F.2 METHODS FOR CONIFER PHASES

Priority areas for conifer treatment were first identified using a 6.2 mile buffer on sage-grouse leks and mule deer winter habitat. Tree-encroached sagebrush habitats were divided into classes based on tree density and fire history (Miller et al. 2014) (**Table F-3**). A tree canopy layer was obtained from the National Land Cover Database website to determine break points by phase.

Table F-3
Conifer Habitat Classes with Cover Breakpoints

Classes	Percent Tree Cover
Phase 1 (unburned)	0-9
Phase 1 (recently burned)	0-9
Phase 2	10-30
Phase 3	31+

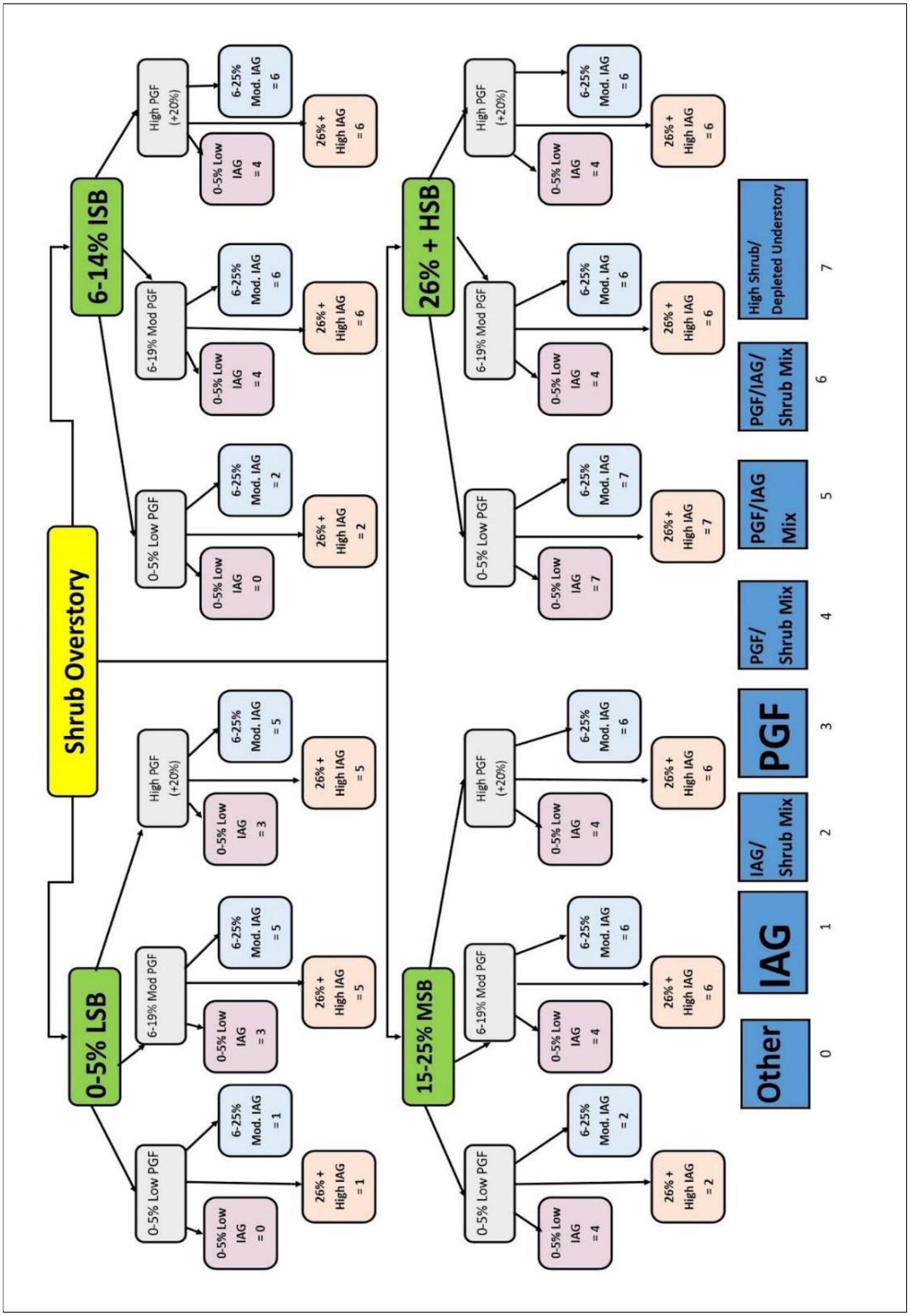

Figure F-1. This diagram shows the combinations of relative cover types resulting in each vegetation state. Abbreviations: LSB (low sagebrush), ISB (intermediate sagebrush), MSB (moderate sagebrush), HSB (high sagebrush), IAG (invasive annual grass), PGF (low perennial grass & forb).

The percent tree canopy layer does not differentiate tree species, therefore Landfire EVT was used to parse out where pinyon pine and juniper (PJ) communities are located. Additional phase I areas were added to this layer from a conifer encroachment dataset obtained from the Landscape Approach Data Portal website. This encroachment layer includes other plant communities besides PJ, mainly sagebrush communities that are adjacent to conifers. Finally, BLM fire history (using burn years 2008-2017) was overlaid with the phases to identify the recently burned phase 1 areas.

F.3 LITERATURE CITED

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Appendix G

Impact Topics with Less than Significant Impacts

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Appendix G. Impact Topics with Less than Significant Impacts

Table G-1
Impact Topics with Less than Significant Impacts

<table>
<tr><th>Impact Topic</th><th>Not Present</th><th>Present, Not Affected</th><th>Present, May be Affected (+/-)</th><th>Rationale</th></tr>
<tr><td>Visual Resources</td><td></td><td></td><td>-
+</td><td>Visual Resource Management (VRM) classes are established through the RMP process for all BLM-administered lands. Visual management objectives are established for each class. Objectives for VRM classes are as follows:
Class I Objective. The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective. The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. 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 Objective. The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objectives. The objective of this class is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.
The objectives for the VRM classes provide the visual management standards for the design and development of future projects and for rehabilitation of existing projects.</td></tr>
</table>

Impact Topic	Not Present	Present, Not Affected	Present, May be Affected (+/-)	Rationale
Visual Resources *(continued)*			- +	No fuel breaks are being proposed in VRM Class I in this PEIS but would be allowed in VRM Classes II through IV. The BLM will not install fuel breaks that do not meet class objectives. The visual resource contrast rating process (Manual Section 8431) provides a systematic means to evaluate proposed projects and determine whether these projects conform with the approved VRM class objectives. It also provides a means to identify mitigating measures that can be taken to minimize adverse visual impacts. The VRM system, therefore, provides a means to provide timely inputs into proposed surface disturbing projects to ensure that these objectives are met. At the site-specific level, the visual resource contrast rating process (Manual Section 8431) is used as a visual design tool in project design and as a project assessment tool during environmental review. Contrast ratings are required for proposed projects in highly sensitive areas or high impact projects, but may also be used for other projects where it would appear to be the most effective design or assessment tool. The visual resource contrast rating process needs to be performed at the site-specific level, because it is necessary to know the specific landscape characteristics at the proposed treatment location and the VRM class(es) for that location, the specific type of proposed treatment, and the process for implementing the proposed treatment. Short-term impacts on visual resources could occur from installing fuel breaks in VRM Classes II, III, and IV. Visual design considerations shall be incorporated into all surface disturbing projects regardless of size or potential impact. Emphasis shall be placed on providing these inputs during the initial planning and design phase so as to minimize costly redesign and mitigation at later phases of project design and development. Project monitoring efforts include timely and thorough compliance evaluations, especially during the construction phase, to ensure that visual management provisions are effectively carried out. Design features can be developed at the field office level if needed.
Noise Resources			- +	The only impact fuel breaks will have on noise resources will occur during construction, which, in some cases, will involve sound generated from mechanical treatment methods like chainsaws and mowers. Additionally, the intensity of noise generally dissipates as it travels away from the source, resulting in a decrease in loudness. Generally, a doubling of distance from the noise source results in an approximately 6-decibel reduction in sound pressure level. If a chainsaw has a typical sound intensity of 100 dBA, the sound will attenuate to moderate levels (around 60dBA) at 0.3 miles (American Academy of Audiology 2013). Accordingly, potential impacts on noise resources will be localized, temporary, and short-term. Finally, under all alternatives, fuel breaks would be constructed along existing roads: interstates, state highways, county roads, BLM-administered roads, and primitive roads, as well as along developed ROWs. In these areas, acceptable noise levels are higher given the expected impacts

Impact Topic	Not Present	Present, Not Affected	Present, May be Affected (+/-)	Rationale
				from traffic noise. Generally, the difference in noise levels between automobile traffic and lawn and power tools is small (according to the American Academy of Audiology, the difference is around 20 dBA (2013)). Accordingly, the potential maximum noise level generated during construction of fuel breaks, will only occur in areas with expected higher noise levels such that impacts, if any, will not have a significant effect on noise resources.
Wilderness Areas		X		No effects on Wilderness are expected because no fuel breaks are proposed in Wilderness in this PEIS.
Wilderness Study Areas		X		No effects on wilderness study areas are expected, since no fuel breaks are proposed in wilderness study areas in this PEIS.
National, Scenic, and Historic Trails		X		No effects on National, Scenic, and Historic Trails are expected, since no fuel breaks are proposed in these corridors in this PEIS.
Lands with Wilderness Characteristics Managed to Protect those Characteristics		X		No effects on lands with wilderness characteristics managed to maintain or enhance those characteristics are expected, since no fuel breaks are proposed in these areas within the Fuel Breaks PEIS.
Wild and Scenic Rivers		X		No effects on Wild and Scenic Rivers are expected, since no fuel breaks are proposed within 0.25 mile from Wild and Scenic Rivers in this PEIS.
Areas of critical environmental concern		X		Areas of critical environmental concern are areas where it has been determined that special management attention is required to protect relevant and important values. Relevant and important values are described on BLM Manual 1613, Areas of Critical Environmental Concern (Section 1). Management of ACECs is provided in the applicable RMP or ACEC activity plan. While no specific management direction is provided in BLM policy, it is assumed that all management for ACECs would maintain or enhance relevant and important values.
Other Special Designations Areas		X		The Fuel Breaks PEIS does not propose treatments in NCAs or National Monuments. It is assumed that most of these areas have management direction regarding treatments and ground disturbance.
Lands and Realty		X		The FLPMA of 1976 directs the BLM to manage public lands to protect their resource values, and to develop resource management plans consistent with those of state and local governments. Management actions on BLM-administered lands are guided by land use plans, which establish goals and objectives for resource management. The BLM's Lands and Realty Program manages a

Impact Topic	Not Present	Present, Not Affected	Present, May be Affected (+/-)	Rationale
				wide range of public land transactions, such as purchases and acquisitions; sales and exchanges; withdrawals; leases and permits; and right-of-way authorizations. Land authorizations in the decision area include those for roads, electrical transmission lines, water facilities, communication sites, and oil and gas distribution lines. This PEIS is a regional-level programmatic analysis. It contains broad regional descriptions of resources, provides a broad environmental impact analysis, and provides Bureau wide decisions on fuel breaks. Impacts on land uses have not been identified at the programmatic level on purchases and acquisitions; sales and exchanges; withdrawals; leases and permits; and right-of-way authorizations.
Water Resources		X		No significant effects on water quality or water quantity are expected, since this PEIS does not propose the creation of fuel breaks within riparian exclusion areas, and buffers around surface water would protect water resources from sedimentation. Over the long term, the creation of fuel breaks would reduce impacts from large-scale fire events on water resources.
Livestock grazing		X		No significant effects on livestock grazing are expected, since this PEIS does not propose any changes to permitted grazing. Fuel breaks may require short-term exclusions of livestock grazing from certain areas, but best management practices would reduce these impacts to less than significant. Over the long term, the creation of fuel breaks would reduce impacts to livestock forage from large-scale fire events. See below for more information regarding livestock grazing in the project area.
Wild horses and burros		X		No significant effects on wild horses and burros are expected, since this PEIS does not propose any changes to Herd Management Areas or to the management of wild horses and burros. Fuel breaks may require short-term exclusions of wild horses from certain areas, but best management practices would reduce these impacts to less than significant. Over the long term, the creation of fuel breaks would reduce impacts to wild horse and burro forage from large-scale fire events. See below for more information regarding wild horses and burros in the project area.
Comprehensive Travel and Transportation Management		X		No effects on comprehensive travel and transportation management are expected, since this PEIS would be in conformance with Field Office guidance and travel planning. This PEIS does not propose changes to travel management.

[1] Indicates whether effects would be beneficial or adverse. If both "-" and "+" are shown, there may be some beneficial and some adverse effects.

G.1 LIVESTOCK GRAZING

Management of livestock grazing is authorized and enforced through both permits and leases and is commonly carried out through the development and implementation of allotment management plans or terms and conditions of the grazing permit or lease. Allotment management plans further outline how livestock grazing is managed to meet multiple use, sustained yield, and other needs and objectives, as determined through land use plans.

Grazing permits and leases outline the kind and number of livestock allowed, the period of use (seasonal), the allotment to be used, and the amount of use in AUMs. An AUM is the amount of forage necessary for the sustenance of one cow or its equivalent for 1 month, and an allotment is an area of land designated and managed for grazing of livestock (43 CFR 4100.0-5).

Table G-2, below, identifies the total number of AUMs assigned for each state in the project area.

Table G-2
AUMs by State in the Project Area

State	AUMs
Idaho	1,050,237
Nevada	1,245,897
Northeast California	134,218
Oregon and Washington	852,948
Utah	703,289

Sources: BLM 2017; BLM GIS 2018

As stated in **Section 2.2.4**, the alternatives would not change permitted grazing including, for example, animal unit months (AUMs), season of use, numbers and types of livestock, and temporary non-renewable use.

Grazing success depends on the quality and amount of forage available during the grazing season. Wildland fire removes potential forage in the short term and can change forage composition in the long term, leading to inefficient grazing. In particular, wildland fire alters sagebrush habitat. Sagebrush can take years or decades to regenerate, and invasive annual grasses, such as cheatgrass, are adapted to frequent wildfire. In the absence of a robust perennial grass component, invasive annual grasses are likely to dominate these systems following wildfire (NTT 2011).

G.2 WILD HORSES AND BURROS

The BLM protects, administers, and controls wild horses in accordance with the Wild Free-Roaming Horses and Burros Act of 1971 (Public Law 92-195, as amended). The act's purpose is to "manage wild horses and burros within herd management areas (HMAs) designated for their long-term maintenance, in a manner designed to achieve and maintain a thriving natural ecological balance and multiple use relationships."

The FLPMA directs the BLM to administer wild horses and burros as one of numerous multiple uses. Under the Wild Free-Roaming Horses and Burros Act, the BLM identified herd areas as places used as habitat by a herd of wild horses at the time the act was passed. To carry out its duties under the act, the BLM evaluated each herd area to determine if it had adequate food, water, cover, and space to sustain healthy and diverse wild horse and burro populations over the long term. It then designated the areas that met those criteria as HMAs, where horses or burros can be viably managed as a component of the BLM-administered lands.

The BLM designated an appropriate management level (AML) for each HMA. An AML is defined as the number of adult horses or burros (expressed as a range, with an upper and lower limit) to be managed within an HMA (BLM 2010). It is based on available forage and other resources necessary to sustain the horse or burro populations, as well as resource objectives and other designated uses of the BLM-administered lands.

Wild horse herds grow at an average rate of 20 percent annually. The BLM seeks to control horse and burro populations so that their numbers do not exceed the carrying capacity of the land. This is done primarily by gathering animals periodically so that numbers are near the AML. Fertility control is being used in some HMAs as a means to reduce the population growth rate. When horse and burro populations begin to exceed the AML, excess animals are gathered and offered to the public through periodic adoption.

Table G-3, below, identifies the total number of HMAs, acres, estimated wild horse and burro population, and high AMLs for each state in the project area.

Table G-3
Herd Management Areas

State	Total Number of HMAs	Acres	Estimated Population[1]	High AMLs
Idaho	6	383,895	580 (h)	617
Nevada	83	14,032,947	40,394 (h), 3,623 (b)	11,987 (h) 824(b)
Northeast California	13	1,206,400	5,336 (h) 487 (b)	1,513 (h) 116(b)
Oregon and Washington	18	2,733,5777	4,682 (h) 49 (b)	2,666 (h) 24 (b)
Utah	19	2,154,458	4,848 (h) 344 (b)	1,786 (h) 170 (b)

Sources: BLM 2018c; BLM GIS 2018

[1] (h) = wild horse; (b) = burro

Appendix H
Fuel Models in the Project Area

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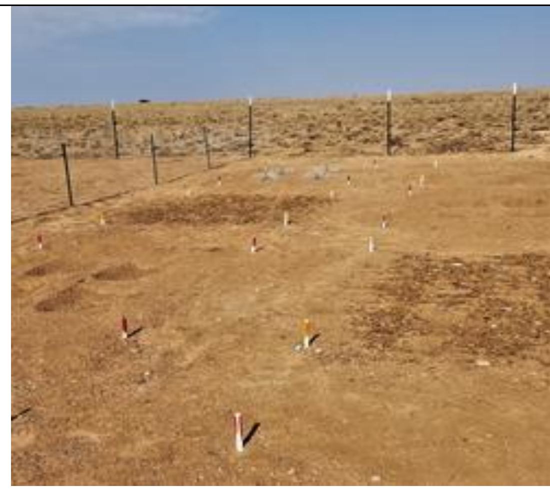
Appendix H. Fuel Models in the Project Area

H.1 Project Area Fuel Models

The general fuel models in the project area are the following (Scott and Burgan 2005 and Stebleton and Bunting 2009):

- Bare Ground (NB9)—Land devoid of enough fuel to support wildland fire spread. These areas may include gravel pits, arid deserts with little vegetation, sand dunes, or rock outcroppings.

- Grass 1 (GR1)—Short, Sparse, Dry Climate Grass. The primary carrier of fire is sparse grass with small amounts of fine dead fuel. Grass is generally short, either naturally or from being grazed, and may be sparse or discontinuous.


- Grass 2 (GR2)—Low Load, Dry Climate Grass. The primary carrier of fire is grass, though small amounts of fine dead fuel may be present. Fuel loading is greater than GR1, and the fuel bed may be more continuous. Shrubs, if present, do not affect fire behavior.

- Grass 4 (GR4)—Moderate Load, Dry Climate Grass. The primary carrier of the fire is continuous, dry climate grass. Load and depth are greater than GR2; the fuel bed is about 2 feet deep.

- Grass 7 (GR7)—High Load, Dry Climate Grass. The primary carrier of fire is continuous dry climate grass. Load and depth are greater than GR4. Grass is about 3 feet tall.

- Grass-Shrub 1 (GS1)—Low Load, Dry Climate Grass-Shrub. The primary carrier of fire is grass and shrubs combined. Shrub cover is up to 50 percent. Shrubs are about 1 foot high and grass load is low.

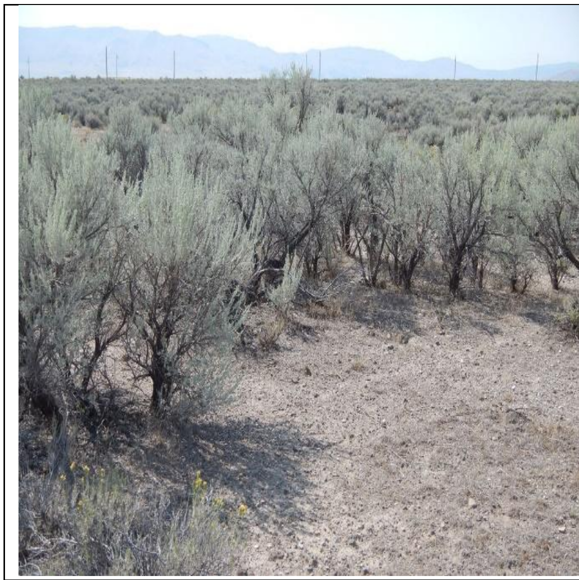
- Grass-Shrub 2 (GS2)—Moderate Load, Dry Climate Grass-Shrub. The primary carrier of fire is grass and shrubs combined. Shrub cover is up to 50 percent. Shrubs are 1 to 3 feet high and grass load is moderate.

- Shrub 1 (SH1)—Low Load, Dry Climate Shrub. The primary carrier of fire is woody shrubs and shrub litter. Shrub cover is greater than 50 percent. Low shrub fuel load and fuel bed is about 1 foot deep; some grasses may be present.

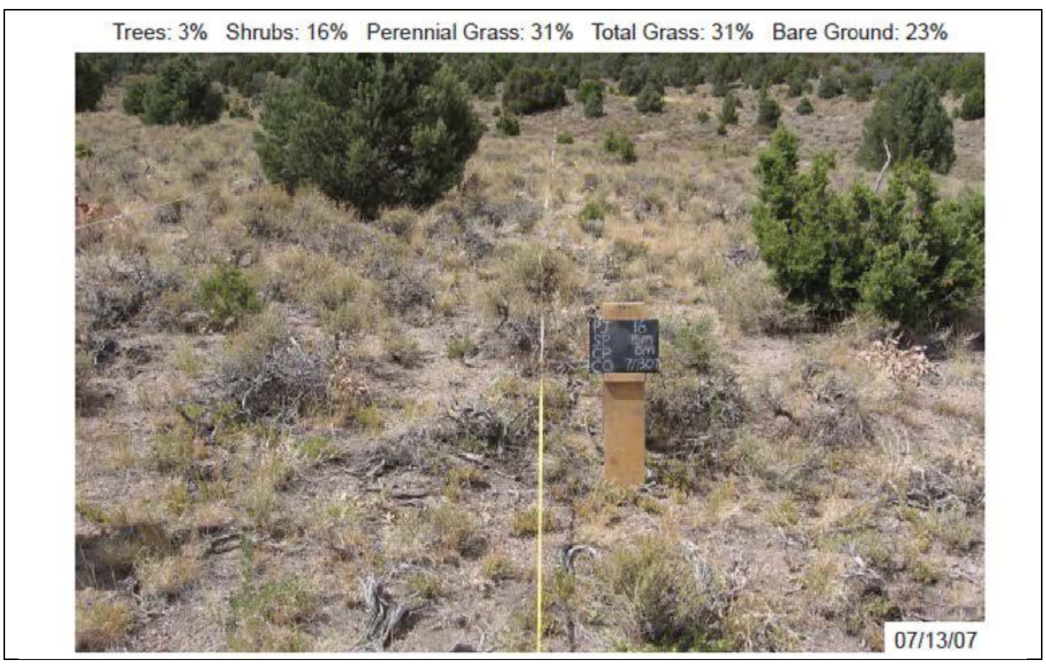
- Shrub 2 (SH2)—Moderate Load, Dry Climate Shrub. The primary carrier of fire is woody shrubs and shrub litter. Moderate fuel load (higher than SH1), fuel bed is about 1 foot deep, and no grass fuel is present.

- Shrub 5 (SH5)—High Load, Dry Climate Shrub. The primary carrier of fire is woody shrubs and shrub litter. Shrubs are between 4 and 6 feet high and cover is over 50 percent, grass is sparse to nonexistent.

- Shrub 7 (SH7)—Very High Load, Dry Climate Shrub. The primary carrier of fire is woody shrubs and shrub litter. Shrubs are between 4 and 6 feet high and cover is over 50 percent, grass is sparse to nonexistent. Conditions are similar to SH5, but SH7 has a higher fuel loading.



- Timber-Understory 1 (TU1)—Low Load, Dry Climate, Timber-Grass Shrub. The primary carrier of fire is low load grass or shrub with litter or both.



Timber-Understory 1 (TU1); Phase 1 Pinyon-Juniper Woodland

Trees: 20% Shrubs: 8% Perennial Grass: 3% Total Grass: 3% Bare Ground: 55%

Timber-Understory 1 (TU1): Phase II Pinyon-Juniper Woodland

Trees: 41% Shrubs: 5% Perennial Grass: 1% Total Grass: 1% Bare Ground: 40%

Timber-Understory 1 (TU1): Phase III Pinyon-Juniper Woodland

H.2 FUEL BREAK DESIRED CONDITION FUEL MODEL CROSSWALK

Desired conditions for fuel breaks as represented by a fuel model would be as follows:

- GR1 fuel model would represent a mowed or targeted, grazed fuel break; represents a desired condition for a fuel break
- SH1 fuel model would represent a green strip, composed of short stature, widely spaced, and discontinuous vegetation; represents a desired condition for a fuel break
- NB9 fuel model would represent vegetation removal, such as found in brown strips; represents a desired condition for a fuel break

The following are the potential fuel models that can be found in the project area and the desired condition and fuel model of the fuel break if one were created in that vegetation state:

- NB9: Bare Ground—Land devoid of enough fuel to support wildland fire spread. These areas may include gravel pits, arid deserts with little vegetation, sand dunes, or rock outcroppings. This is a desired condition and may occur naturally in the project area, and no treatments would be necessary.
- GR1: Short, Sparse, Dry Climate Grass—This is a desirable condition that represents sparse perennial bunchgrass or other sparse grass vegetation. There may be some fuel breaks established in these areas, especially if they are not common and have native vegetation that needs to be preserved or in areas with a moderate to low resistance/resilience (R&R) rating where, if burned, cheatgrass or other invasive annuals could outcompete the natives. This is a desired condition for the fuel breaks.
- GR2: Low Load, Dry Climate Grass—This condition represents a perennial bunchgrass understory. Fuel breaks established in these areas would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. These areas can also be used to protect areas of suitable sagebrush communities or areas with a moderate to low R&R rating where, if burned, cheatgrass or other invasive annuals could outcompete natives. The desired fuel break condition would be GR1 or SH1.
- GR4: Moderate Load, Dry Climate Grass—This condition represents a continuous, annual, invasive grass fuel bed, such as cheatgrass. Fuel breaks established in these areas would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. The desired fuel break condition would be GR1, SH1, or NB brown strip.
- GR7: High Load, Dry Climate Grass—This condition represents a continuous, annual, invasive grass fuel bed, such as cheatgrass. Fuel breaks created under these fuel conditions would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. The desired fuel break condition would be GR1, SH1, or NB brown strip.
- GS1: Low Load, Dry Climate Grass-Shrub—This condition represents a grass-shrub mix, with low 1-foot-high shrubs and a scattered herbaceous layer (scattered perennial grasses); shrub cover is up to 50 percent. Fuel breaks established in these areas would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. These fuel breaks can be used to protect areas of suitable sagebrush communities or areas with

a moderate to low R&R rating; if these areas burn, cheatgrass or other invasive annuals could outcompete natives. The desired fuel break condition would be GR1 or SH1.

- GS2: Moderate Load, Dry Climate Grass-Shrub—This condition represents a grass-shrub mix, with shrubs between 1 and 3 feet high and a continuous herbaceous layer (perennial bunchgrass understory with native or nonnative invasive annuals); shrub cover is up to 50 percent. Fuel breaks established in these areas would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. These fuel breaks can be used to protect areas of suitable sagebrush communities or areas with a moderate to low R&R rating where, if burned, cheatgrass or other invasive annuals could outcompete natives. The desired fuel break condition would be GR1 or SH1.
- SH1: Low Load, Dry Climate Shrub—This condition represents a grass-shrub mix, with low stature shrubs (about 1-foothigh), with some grasses present (sparse perennial bunchgrass understory, native or nonnative invasive annuals), and where shrub cover is greater than 50 percent. Fuel breaks established in these areas would help reduce fire size and increase opportunities for safe engagement by firefighters. The desired fuel break condition would be GR1 or SH1 green strip.
- SH2: Moderate Load, Dry Climate Shrub—This condition represents an area dominated by shrubs, with a depleted understory. Shrub cover is over 50 percent. Fuel breaks established in these areas would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. The desired fuel break condition would be GR1 or SH1.
- SH5: High Load, Dry Climate Shrub—This condition represents an area dominated by shrubs, with a depleted understory. Shrub cover is over 50 percent, and there may be sparse grasses. Fuel breaks established in these areas would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. The desired fuel break condition would be GR1 or SH1.
- SH7: Very High Load, Dry Climate Shrub—This condition represents an area dominated by shrubs, with a depleted understory. Shrub cover is over 50 percent, and there may be sparse grasses. Fuel breaks established in these areas would help reduce fire size and decrease fire behavior, thereby increasing opportunities for safe engagement by firefighters. The desired fuel break condition would be GR1 or SH1.

If juniper is growing within the footprint of the fuel break, removing or modifying (limbing) the trees and treating the understory would increase the fuel break effectiveness. This would result in a desired condition, as described above.

Additional fuel models that are not included above and describe Pinyon Juniper encroachment are as follows:

- Pinyon-Juniper Phase 1 Recently Burned— Tree canopy cover is between 0 and 9 percent or standing dead remains on site. Understory vegetation will determine the primary carrier of the fire, which can be described as UB9, GR1, GR2, GR4 or GS1. Along with conifer or standing dead treatments, if needed, the desired fuel break condition of the understory vegetation would be either GR1 or SH1.

- Pinyon-Juniper Phase I Unburned—Tree canopy cover is between 0 and 9 percent, and fuel models can be described as GS1, SH1, SH2, or TU1. Understory vegetation will determine the primary carrier of the fire. Along with pinyon juniper treatment, the understory desired fuel break condition would be GR1 or SH1.
- Pinyon-Juniper Phase II—Tree canopy cover is between 10 and 30 percent. Fuel models can be described as SH1 or TU1, depending on the percent conifer cover. Along with conifer treatment as described in Table 2-2 the understory, desired fuel break condition would be GR1 or SH1.
- Pinyon-Juniper Phase III, which occurs as small inclusions in Phase 1 and Phase 2—These areas have a conifer cover of 31 percent or higher; there is limited understory vegetation. It can be described as TU1. Conifer treatment would be as described in Table 2-2. In this vegetation state there is limited understory vegetation, but if one does exist and treatment determined to be needed, identify the dominant vegetation state to determine preferred fuel break type and reference treatment as described in Table 2-2., desired fuel break condition would be GR1 or SH1.

H.3 Fire Behavior

Under the driest fuel conditions, the flame length and rate of spread for the potential fuel models within the analysis area, along with fuel models of the fuel breaks are depicted in the following graphs.

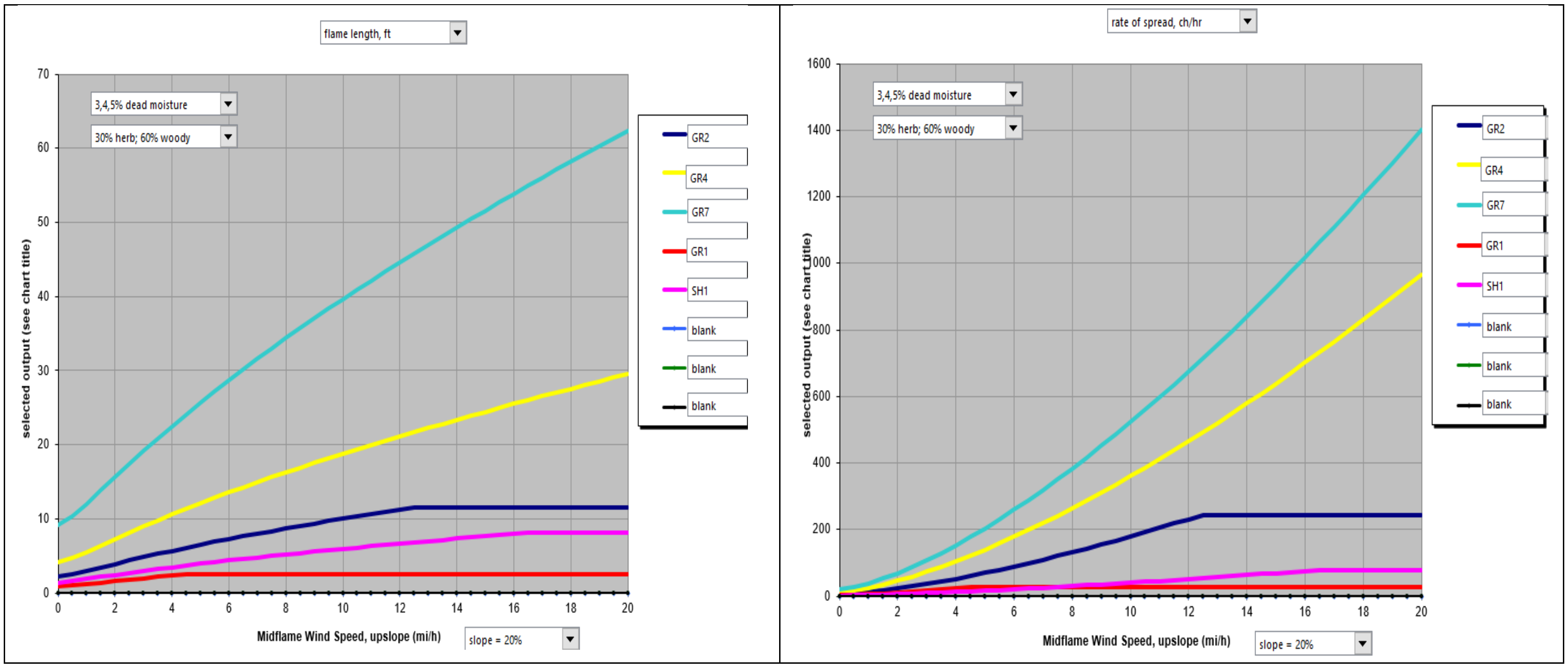


Figure H-1: Flame Lengths and Rates of Spread for grass fuel models under weather and fuel conditions as described in Table 4-3 and 20% slope. Includes the flame lengths and rates of spread of desired fuel models (GR1 and SH1) within fuel breaks.

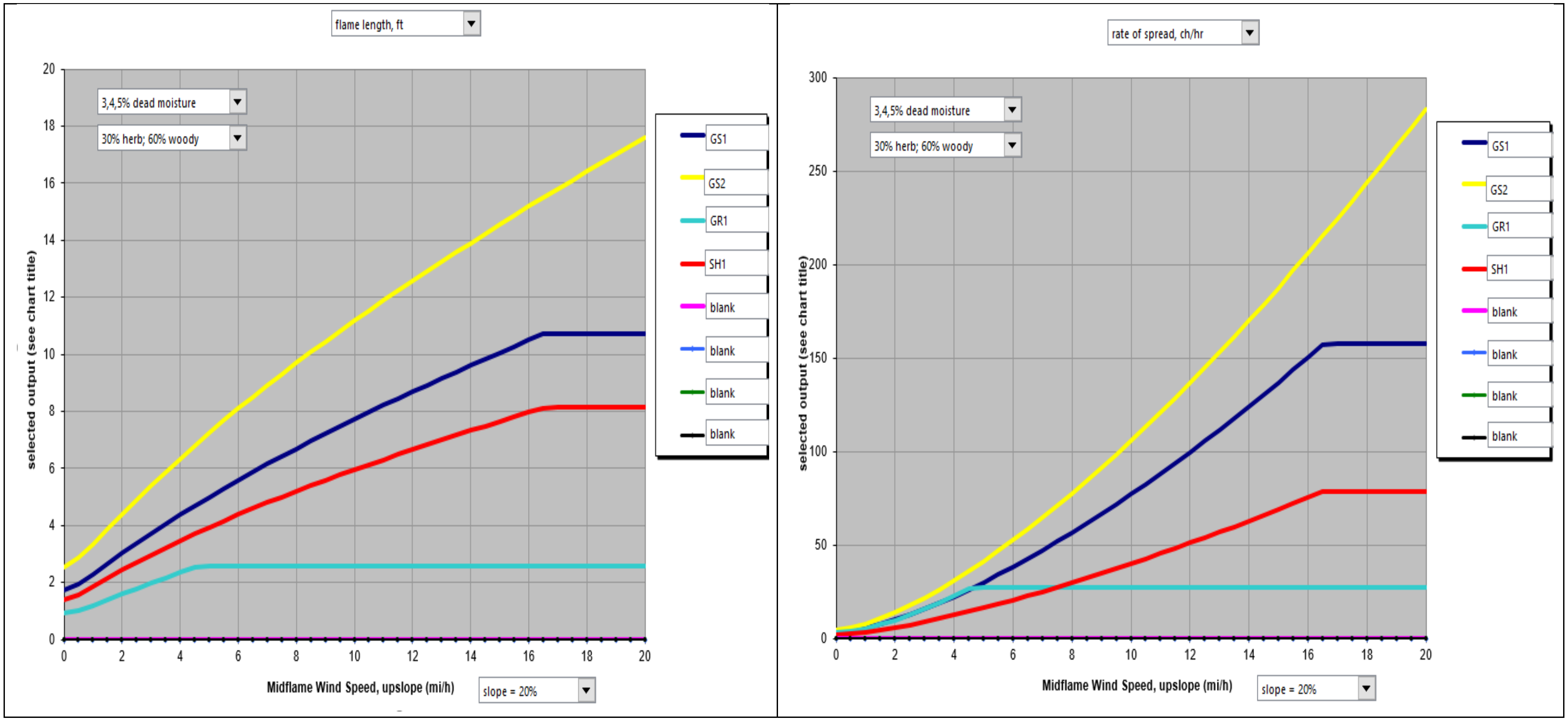


Figure H-2: Flame Lengths and Rates of Spread for grass and shrub fuel models under weather and fuel conditions as described in Table 4-3 and 20% slope. Includes the flame lengths and rates of spread of desired fuel models (GR1 and SH1) within fuel breaks.

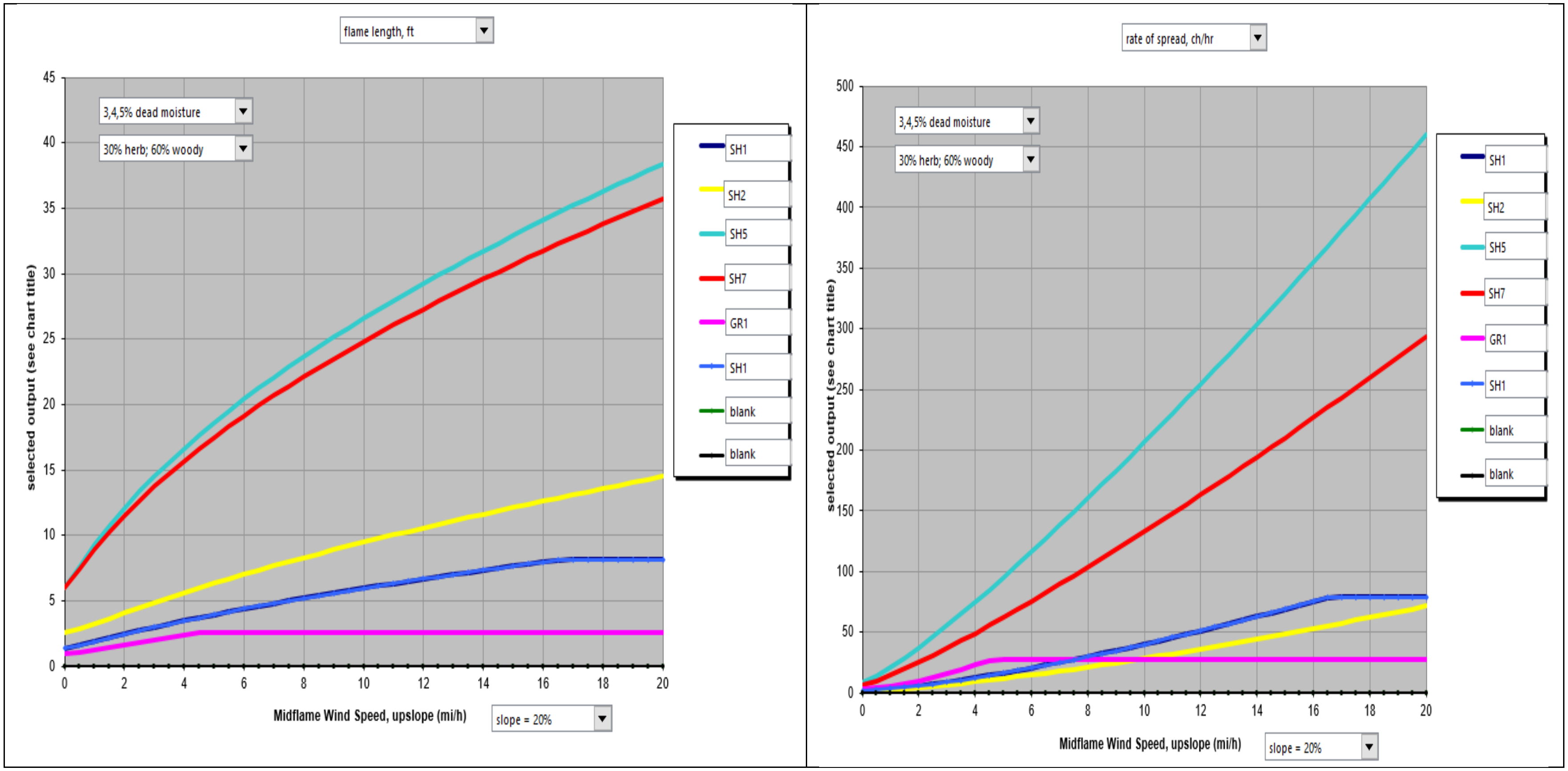


Figure H-3: Flame Lengths and Rates of Spread for shrub fuel models under weather and fuel conditions as described in Table 4-3 and 20% slope. Includes the flame lengths and rates of spread of desired fuel models (GR1 and SH1) within fuel breaks.

Fire Behavior can be described adjectively (**Table H-1**) as very low, low, moderate, high, very high, and extreme, in correlation of flame lengths and rates of spread. Surface fire flame lengths influence fire suppression activities, as described in **Table H-2**.

Table H-1
Adjective Class Definitions for Predicted Fire Behavior

Adjective Class	Rate of Spread (Chains[1] per Hour)	Flame Length (Feet)
Very Low	0-2	0-1
Low	2-5	1-4
Moderate	5-20	4-8
High	20-50	8-12
Very High	50-150	12-25
Extreme	>150	>25

Source: Scott and Burgan 2005

Table H-2
Fire Suppression Interpretations of Flame Length

Flame Length (Feet)	Interpretation
<4	• Fires can generally be attached at the head or flanks by persons using hand tools. • Hand line should hold the fire.
4-8	• Fires are too intense for direct attack on the head by persons using hand tools. • Hand line cannot be relied on to hold the fire. • Equipment such as dozers, pumpers, engines, and retardant aircraft can be effective.
8-11	• Fires may present serious control problems-torching out, crowning, and spotting. • Control efforts at the fire head will probably be ineffective.
>11	• Crowning, spotting, and major fire runs are probable. • Control efforts at head of fire are ineffective.

Source: Andrews and Rothermel 1982; Andrews, Heinsch, and Schelvan 2011

The following Surface Fire Behavior Fire Characteristics Chart displays visually Table H-1 and H-2

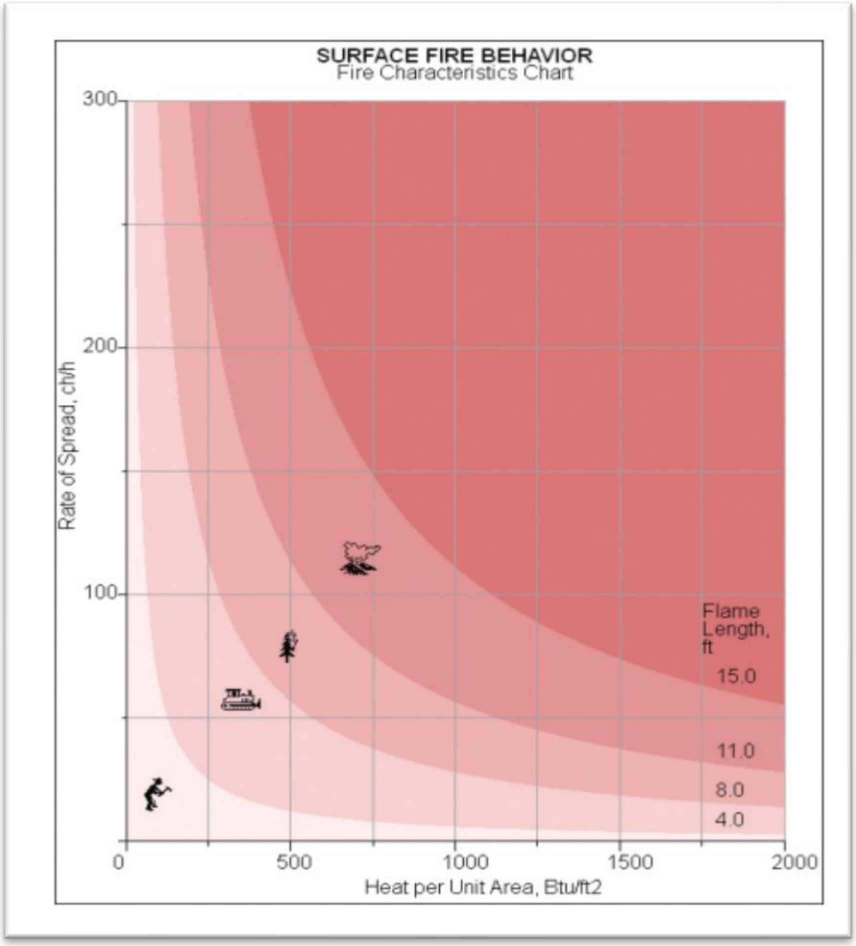


Figure H-4: Shows the relationship of surface fire flame length and fireline intensity to suppression interpretations.

H.4 Development Process For Preferred Fuel Break Types Within Table 2-2

Common to all Vegetation States: Brown strips would be an option for fuel breaks along Maintenance Level 5 roads such as interstates, state highways, or other highly traveled corridors. Use and placement would be determined at the site-specific level. Because of this, brown strips are the preferred fuel break type in each vegetation state and were given the ranking of 1a. At the site-specific level, a field office may decide to implement a different fuel break type other than brown strips, but for the purpose of this analysis, brown strips were the preferred option along Maintenance Level 5 roads.

Invasive Annual Grasses: This vegetation state describes sites dominated by invasive annual grasses. Green strips were identified as the preferred fuel break for this vegetation state due to the need to break up continuous fuels by replacing the current invasive annual grasses with plants that are short statured and widely spaced and do not cure early in the season but rather retain their moisture well into the summer months. Green strips, once in place, would be self-sustaining fuel breaks and would require minimal maintenance. Mowed and targeted grazing fuel breaks would still be an option in this vegetation state, but would be of lower priority due to the need for continued potential yearly maintenance. Mowed and targeted grazing fuel breaks could be utilized until green strip fuel breaks could be implemented, based on site-specific prioritization by field offices.

Invasive Annual Grasses with Shrubs: This vegetation state describes areas with shrubs in the overstory and invasive annual grass in the understory. Green strips were identified as the preferred fuel break for this vegetation state due to the need to break up the continuous fuels by replacing the current invasive annual grasses with plants that are short statured and widely spaced and do not cure early in the season but rather retain their moisture well into the summer months. Green strips once in place would be self-sustaining fuel breaks and would require minimal maintenance. Mowed and targeted grazing fuel breaks would still be an option in this vegetation state but would be of lower priority due to the need for potential yearly maintenance. Targeted grazing fuel breaks could be used in areas with a low shrub cover, while in areas with more shrub cover, mowed fuel breaks would be preferred in order to reduce flame length. Mowed and targeted grazing fuel breaks could be utilized until green strip fuel breaks could be implemented, based on site-specific prioritization by field offices.

Perennial Grasses and Forbs: This vegetation state describes areas that consist of either native intact vegetation or non-native perennial seedings. Mowed fuel breaks would be preferred in areas of native intact vegetation, where the desired vegetation would be kept, but the vegetation height would be reduced to decrease flame lengths. In areas of non-native perennial seedings, mowing would also reduce vegetation height and, in turn, decrease flame lengths. Targeted grazing fuel breaks would also be a viable option in this vegetation state to reduce vegetation height and could be timed to impact specific vegetation types. In this vegetation state, green strip fuel breaks would only occur in the non-native perennial seedings and could be prioritized over mowing or targeted grazing fuel breaks or mowed and targeted grazing fuel breaks could be utilized until green strip fuel breaks could be implemented, based on site-specific prioritization by field offices.

Perennial Grasses and Forbs with Shrubs: This vegetation state consists of intact vegetation and is similar to the reference state. Mowed fuel breaks would be the preferred fuel break method, where the vegetation height would be reduced to decrease flame lengths. Targeted grazing fuel breaks could be used in areas with a low shrub cover and could be timed to impact specific vegetation types. In this vegetation state, green strip fuel breaks would occur in areas where non-native perennial seedings are present.

Perennial Grasses and Forbs with Invasive Annual Grasses: This vegetation state describes perennial grasses with invasive annual grasses filling interspaces. Targeted grazing fuel breaks would be the preferred method to reduce vegetation height and could be timed to impact specific vegetation types such as invasive annual grasses. Mowed fuel breaks could be used to reduce fuel height and reduce flame length. It would be a desired fuel break if targeted grazing would not be viable. In this vegetation state, green strip fuel breaks would occur in areas where non-native perennial seedings are present.

Shrubs and Perennial Grasses and Forbs with Invasive Annual Grasses: This vegetation state describes intact vegetation with invasive annual grasses filling interspaces. Mowed fuel breaks would be the preferred fuel break method, where vegetation height would be reduced to decrease flame lengths. Targeted Grazing fuel breaks could be used in areas with low shrub cover and could be timed to impact specific vegetation types. In this vegetation state, green strip fuel breaks would occur in areas where non-native perennial seedings are present.

Shrubs with Depleted Understory: This vegetation state describes a shrub-dominated area. Mowed fuel breaks would be the preferred fuel break method, where vegetation height would be reduced to decrease flame lengths. Green strips are an option but would require intensive work to establish. Targeted grazing fuel breaks were not considered an option due to lack of grasses or forb vegetation.

Sites with Pinyon or Juniper:

Phase I: Due to the low tree cover, fuel break establishment would be dependent on the dominant vegetation state as described above. Limbing of trees left in the fuel break may be required to eliminate ladder fuel component.

Phase II or III: Fuel break establishment within these vegetation states would require treatment of both the overstory and understory. Overstory treatments would increase spacing between trees to reduce the canopy closure and decrease crown fire potential. Limbing remaining trees left within the fuel break may be required to eliminate ladder fuel component. Understory treatments would be determined by vegetation state described above.

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Appendix I

Representative Migratory Birds in the Project Area

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Appendix I. Representative Migratory Birds in the Project Area

Table I-1
Representative Migratory Birds in the Project Area[1]

Common Name	Latin Name	Seasons
Bald eagle	*Haliaeetus leucocephalus*	Year-round
Bendire's thrasher	*Toxostoma bendirei*	Breeding
Black swift	*Cypseloides niger*	Breeding
Black-chinned Sparrow	*Spizella atrogularis*	Breeding
Brewer's sparrow	*S. breweri*	Breeding
Burrowing owl	*Athene cunicularia*	Year-round
Cactus wren	*Campylorhynchus brunneicapillus*	Year-round
Calliope hummingbird	*Stellula calliope*	Breeding, migrating
Cassin's finch	*Carpodacus cassinii*	Year-round
Common raven	*Corvus corax*	Year-round
Costa's hummingbird	*Calypte costae*	Year-round
Ferruginous hawk	*Buteo regalis*	Year-round
Flammulated owl	*Otus flammeolus*	Breeding
Fox sparrow	*Passerella iliaca*	Year-round
Golden eagle	*Aquila chrysaetos*	Year-round
Grasshopper sparrow	*Ammodramus savannarum*	Breeding
Grace's warbler	*Dendroica graciae*	Breeding
Gray vireo	*Vireo vicinior*	Breeding
Greater sage-grouse	*Centrocercus urophasianus*	Year-round
Green-tailed towhee	*Pipilo chlorurus*	Wintering, breeding
Juniper titmouse	*Baeolophus ridgewayi*	Year-round
Lawrence's goldfinch	*Carduelis lawrencei*	Breeding
Le Conte's thrasher	*Toxostoma lecontei*	Year-round
Lewis's woodpecker	*Melanerpes lewis*	Year-round
Loggerhead shrike	*Lanius ludovicianus*	Year-round
Long-billed curlew	*Numenius americanus*	Breeding
Lucy's warbler	*Vermivora luciae*	Breeding
Mountain plover	*Charadrius montanus*	Breeding
Nuttall's woodpecker	*Picoides nuttallii*	Year-round
Oak titmouse	*Baeolophus inornatus*	Year-round
Olive-sided flycatcher	*Contopus cooperi*	Breeding
Peregrine falcon	*Falco peregrinus*	Year-round
Pinyon jay	*Gymnorhinus cyanocephalus*	Year-round
Prairie falcon	*Falco mexicanus*	Year-round
Purple finch	*Carpodacus purpureus*	Year-round
Rufous hummingbird	*Selasphorus rufus*	Breeding, migrating
Rufous-crowned sparrow	*Aimophila ruficeps*	Year-round

Common Name	Latin Name	Seasons
Sagebrush sparrow	*Artemisiospiza belli*	Breeding
Sage thrasher	*Oreoscoptes montanus*	Breeding, wintering
Short-eared owl	*Asio flammeus*	Year-round
Sonoran yellow warbler	*Dendroica petechia* ssp. *sonorana*	Breeding, migrating
Swainson's hawk	*Buteo swainsoni*	Breeding
Virgina's warbler	*Vermivora virginiae*	Breeding
White-headed woodpecker	*Picoides albolarvatus*	Year-round
Williamson's sapsucker	*Sphyrapicus thyroideus*	Year-round
Willow flycatcher	*Empidonax traillii*	Breeding

Source: BCC 2008

[1] Note that this list is a sample list of birds within the project area; it is not a complete list of species that occur.

Appendix J

Potentially Affected Special Status Species in the Project Area

Appendix J. Potentially Affected Special Status Species in the Project Area

Table J-1
Threatened, Endangered, Candidate/Proposed Species and Their Critical Habitat with the Potential to Occur in the Treatment Area

Species Common and Scientific Name[1]	Status[2]	Occurrence	Critical Habitat	Habitat Description
Mammals				
Black-footed ferret (*Mustela nigripes*)	E, Exp.	Yes	No	Exclusively inhabit prairie dog colonies
Columbia Basin pygmy rabbit DPS (*Brachylagus idahoensis*)	E	Yes	No	Sagebrush steppe and areas with relatively deep, loose soils that allow burrowing in the Columbia Basin in Washington state
Gray wolf (*Canis lupus*)	E	Yes	No	Sagebrush and forested areas throughout most of the US and Canada; large tracts of contiguous habitat are essential. Listed in California, Nevada, and portions of Oregon, Utah, and Washington
Grizzly bear (*Ursus arctos*)	T, Exp.	Yes	No	Woodlands, forests, alpine meadows, and prairies, with a preference for riparian areas
Utah prairie dog (*Cynomys parvidens*)	T	Yes	No	Shrub steppe and grasslands; found only in southwestern and central Utah (USFWS 2012)
Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*)	E	Yes	Yes	Sagebrush steppe, talus, rocky outcroppings; found only in the Sierra Nevada of California (USFWS 2007)
Birds				
Bi-state sage grouse (*Centrocercus urophasianus*)	PT	Yes	Proposed	Large expanses of sagebrush with a diversity of grasses, forbs, and healthy wetland and riparian ecosystems
Mexican spotted owl (*Strix occidentalis lucida*)	T	Potential	Yes	Roosts and nests in late seral forests or rocky canyon habitats, though forages in a wider variety of habitats, including pinyon-juniper woodlands
Southwestern willow flycatcher (*Empidonax trailii extimus*)	E	Yes	No	Uses a variety of vegetation types during migration; nests in riparian habitats, primarily areas with willows, tamarisk, or both
Yellow-billed cuckoo (*Coccyzus americanus*)	T	Yes	Proposed	Uses a variety of vegetation types during migration; nests in riparian habitats, primarily cottonwood-willow forests

Species Common and Scientific Name[1]	Status[2]	Occurrence	Critical Habitat	Habitat Description
Insects				
Carson wandering skipper (*Pseudocopaeodes eunus obscurus*)	E	Yes	No	Grassland habitats on alkaline substrates in Nevada and California, where there are three potentially viable known occurrences
Plants				
Barneby reed-mustard (*Schoenocrambe barnebyi*)	E	Potential	No	Coarse soils derived from cobble and gravel river terrace deposits; associated with other desert shrubland plants; endemic to the Canyonlands of south-central Utah, where it is known from five occurrences in two distinct clusters: one in the southern portion of the San Rafael Swell in southern Emery County and the other in Capitol Reef National Park in central Wayne County
Barneby ridge-cress (*Lepidium barnebyanum*)	E	Potential	No	Ridge crests of white shale outcrops; found with other mound-forming species in pinyon-juniper communities; known populations occupy a habitat of less than 200 ha, on four ridgelines in Duchesne County, Utah
Clay phacelia (*Phacelia argillacea*)	E	Potential	No	Steep hillsides of shaley clay colluvium; known only from four sites in Utah along the Douglas Creek and Gordon Gulch members of the Green River formation in the Wasatch Mountains in Pleasant Valley; these probably comprise only two populations due to the close proximity of both pairs of occurrences
Clay reed-mustard (*Schoenocrambe argillacea*)	T	Yes	No	Desert shrub plant communities in association with shadscale; endemic to the Uinta Basin (Book Cliffs area) in Uintah County, northeast Utah Endemic to a small area in the Uinta Basin, Uintah County, Utah, where there are 6-7 mapped occurrences clustered in 3 "populations," with fewer than 10,000 individuals in total
Frisco clover (*Trifolium friscanum*)	C	Yes	No	Inhabits soils derived from volcanic gravels; associated with pinyon-juniper and sagebrush communities; endemic to 4 mountain ranges in Beaver and western Millard Counties of west-central Utah. Approximately seven occurrences and 3000-7500 plants are known
Jones cycladenia (*Cycladenia humilis* var. *jonesii*)	T	Yes	No	Gypsiferous, saline soils at elevations of 4,390–6,000 feet in plant communities of mixed desert scrub, juniper, or wild buckwheat-Mormon tea. Known from 26 sites in Utah and Arizona
Kodachrome bladderpod (*Lesquerella tumulosa*)	E	Yes	No	White, bare shale knolls; known from a single population of about 20,000 plants scattered over an area only about 4 km wide in Kane County, Utah
Last Chance townsendia (*Townsendia aprica*)	T	Yes	No	Saltbush and pinyon-juniper communities on clay or clay-silt exposures of the Mancos, Morrison, Summerville, and Entrada Formations of south-central Utah; a narrow endemic of south-central Utah that is known from 23 populations
Pariette cactus (*Sclerocactus brevispinus*)	T	Potential	Yes	Fine soils in clay badlands derived from the Uinta Formation in Utah within sparsely vegetated desert shrubland; 1–5 occurrences in a single area a few miles across in the Pariette Draw region of the central Uinta Basin (Duchesne County, Utah)
San Rafael cactus	E	Potential	Yes	Limestone gravels, shales, clays, and silty substrates; endemic to central Utah

Species Common and Scientific Name[1]	Status[2]	Occurrence	Critical Habitat	Habitat Description
(*Pediocactus despainii*)				(Emery and Wayne Co.) where there are about 21 extant occurrences; some sites are close to each other and connected by suitable habitat, so may comprise one population
Shrubby reed-mustard (*Schoenocrambe suffrutescens*)	E	Potential	Yes	Endemic to semi-barren, white-shale layers in the Uinta Basin of eastern Utah; surrounded by mixed desert shrub and pinyon-juniper woodlands; there are currently 8 known populations
Slickspot peppergrass (*Lepidium papilliferum*)	T	Yes	Proposed	Endemic to southwestern Idaho on the Snake River Plain and its adjacent northern foothills (approx. 90 by 25 miles) and a disjunct population on the Owyhee Plateau (approx. 11 by 12 mi), where it is restricted to unique small-scale openings within sagebrush-steppe habitats; approximately 45 extant occurrences
Uinta Basin hookless cactus (*Sclerocactus wetlandicus*)	T	Yes	No	Coarse soils derived from cobble and gravel river and stream terrace deposits or rocky surfaces on mesa slopes; endemic to the Uinta Basin in northeast Utah (Duchesne and Uintah Counties) with approx. 8 occurrences observed since 1989
Webber's ivesia (*Ivesia webberi*)	T	Yes	Yes	Sparse vegetation with shallow, rocky, clay soils; known from 16 extant occurrences scattered over a small portion of northeastern California and western Nevada, occupying a maximum of 165 acres. 2,170 acres of land in 16 units are designated as critical habitat for the species.
Wright fishhook cactus (*Sclerocactus wrightiae*)	E	Yes	No	Arid sites with widely spaced shrubs, perennial herbs, bunch grasses, or scattered pinyon and juniper. Estimated population size is 4,500 to 21,000 individuals.

Source: USFWS 2018

[1]T&E species that may occur within the project area but would not be potentially affected by the proposed action or alternatives were excluded. These include species associated with open water, riverine, alpine, or subalpine habitats.

[2]E = Endangered; T = Threatened; P = Proposed; C = Candidate; Exp. = Experimental population; Status listed is that of the listed population in the project area; the status of populations outside of this area may differ.

Table J-2
BLM Sensitive Species with the Potential to Occur in the Treatment Area

Common Name	***Latin Name***	**Habitat Description**
	Mammals	
Pallid bat	*Antrozous pallidus*	**Shrub-steppe**, **grasslands**; most abundant in Great Basin ecosystems
Small-footed myotis	*Myotis ciliolabrum*	Desert scrub, **grasslands**, **sagebrush steppe**, **pinyon-juniper woodlands**, and agricultural/urban areas
Townsend's big-eared bat	*Corynorhinus townsendii*	Deserts, native prairies, active agricultural sites, sagebrush steppe**, grasslands**
Western mastiff-bat	*Eumops perotis californicus*	**Grasslands**, desert scrub, chaparral, and montane coniferous forests
Desert bighorn sheep	*Ovis canadensis nelsoni*	**Sagebrush, grasslands**, alpine meadows, mountain slopes, and foothills, all with rocky slopes for climbing
Fringed myotis	*Myotis thysanodes*	**Generalist**; low desert scrub to high coniferous forests
Pygmy rabbit	*Brachylagus idahoensis*	**Sagebrush steppe** habitats with high foliar cover of sagebrush.
Sierra Nevada bighorn sheep	*Ovis canadensis sierrae*	**Sagebrush, grasslands**, open upland, montane, and alpine habitats and meadows with rocky terrain
Yuma myotis	*Myotis yumanensis*	Dry rocky cliffs associated with desert scrub, **sagebrush, pinyon-juniper** and coniferous forests
Gray wolf	*Canis lupus*	Large areas of contiguous habitat, including **grasslands** and montane areas
Spotted bat	*Euderma maculatum*	**Grasslands, sagebrush**, desert and subalpine meadows, including desert-scrub, **pinyon-juniper woodland**, and fields
Black-tailed jackrabbit	*Lepus californicus*	**Grasslands, sagebrush**; herbaceous and desert-shrub areas and open, early stages of forest and chaparral habitats
White-tailed jackrabbit	*Lepus townsendii*	**Sagebrush**, subalpine conifer, **juniper**, alpine dwarf-shrub, and perennial **grassland**; also uses successional stages of conifer habitats
Little Brown myotis	*Myotis lucifugus*	**Pinyon-juniper**, Joshua tree woodland and montane coniferous forest
Preble's shrew	*Sorex preblei*	**Grasslands, pinyon-juniper woodlands**, arid or semiarid shrub-grasses associated with **sagebrush**-dominated coniferous forest
Townsend's ground squirrel	*Spermophilus townsendii*	**Grasslands, sagebrush, pinyon-juniper**; desert springs in arid environments as well as ridgetops, hillsides, and valley bottoms, canal and railroad embankments, and old fields
White salmon pocket gopher	*Thomomys talpoides limosus*	***Sagebrush,* grassland** and herbaceous habitats as well as shrubland and chaparral
Washington ground squirrel	*Urocitellus washingtoni*	**Sagebrush**, shrub steppe habitats of southeastern Washington and north-central Oregon
Kit fox	*Vulpes macrotis*	**Sagebrush**, desert scrub, chaparral, and **grasslands**
Allen's big-eared bat	*Idionycteris phyllotis*	**Sagebrush, pinyon-juniper woodlands**, desert shrub, **grasslands**; typically found near cliffs, boulders, lava flows, etc.
Big brown bat	*Eptesics fuscus*	**Generalist**; variety of habitats including pinyon-juniper, sagebrush, creosote, and agricultural/urban habitats; roots in caves and trees

Common Name	*Latin Name*	Habitat Description
Brazilian free-tailed bat	*Tadarida brasiliensis*	**Pinyon-juniper woodlands**
California myotis	*Myotis californicus*	**Sagebrush**, oak and **juniper woodlands**, canyons, desert scrub, and **grasslands**
Canyon bat	*Parastrellus hesperus*	**Pinyon-juniper**, blackbrush, creosote, **sagebrush** and salt-desert shrub; usually associated with rocky features
Dark kangaroo mouse	*Microdipodops megacephalus*	Shadscale scrub, **sagebrush** and alkali sink plant communities; may also be found in sand dunes
Hoary bat	*Lasiurus cinereus*	**Generalist**; Wide variety of habitat types; prefers roosting in dense vegetation and trees
Inyo shrew	*Sorex tenelius*	Rocky mountain habitats in areas with logs, boulders, or **sagebrush** scrub
Merriam's shrew	*Sorex merriami*	Various **grassland** habitats, including grasses in **sagebrush** steppe/ **pinyon/juniper** habitat, mountain mahogany and mixed woodlands
Pale kangaroo mouse	*Microdipodops pallidus*	Fine sands in alkali sinks and desert scrub dominated by *Atriplex* and big **sagebrush**
Botta's pocket gopher	*Thomomys bottae*	**Grasslands**; open habitats and meadows, where soils are deep enough to maintain permanent burrow systems
Fish Spring pocket gopher	*Thomomys bottae*	**Grasslands**; open habitats and meadows, where soils are deep enough to maintain permanent burrow systems
San Antonio pocket gopher	*Thomomys bottae*	**Grasslands**; open habitats and meadows, where soils are deep enough to maintain permanent burrow systems
Gunnison prairie dog	*Cynomys gunnisoni*	High desert, **grasslands**, meadows, and hillsides; often found in shrubs, such as rabbitbrush, **sagebrush**, and saltbush
White-tailed prairie dog	*Cynomys leucurus*	**Grasslands**, prairie and sometimes shrubby areas
Silky pocket mouse	*Perognathus flavus*	**Grasslands, sagebrush, pinyon-juniper woodlands**, low valley bottoms with soft soils, among weeds and shrubs
Bighorn sheep	*Ovis canadensis*	**Grasslands**; alpine meadows, mountain slopes, and foothills
Merriam's ground squirrel	*Urocitellus canus*	High desert habitat dominated by big **sagebrush**, western **juniper**, and greasewood; also found in **grasslands** and agricultural lands
Piute ground squirrel	*Urocitellus mollis*	Desert and **grassland** habitats
Southern Idaho ground squirrel	*Urocitellus endemicus*	**Grasslands**; rolling foothills originally dominated by big **sagebrush**, bitterbrush, and native bunchgrasses and forbs.
	Birds	
Bald eagle	*Haliaeetus leucocephalus*	Riparian habitats with abundant fish and adjacent snags or other perches (**pinyon-juniper**)
Burrowing owl	*Athene cunicularia*	**Grasslands**; open habitats with sparse vegetation
Golden eagle	*Aquila chrysaetos*	**Grasslands**; open country especially around mountains, hills and cliffs
Greater sage-grouse	*Centrocercus urophasianus*	**Sagebrush** steppe, mountain shrub, desert riparian and wet meadows
Northern goshawk	*Accipiter gentilis*	Mature and old-growth forests, riparian corridors, and more open habitats such as **sagebrush** steppe
Swainson's hawk	*Buteo swainsoni*	Open habitats with scattered trees and **grasslands**.
Grasshopper sparrow	*Ammodramus savannarum*	Open **grasslands** and prairies with patches of bare ground

Common Name	*Latin Name*	Habitat Description
Black-throated sparrow	*Amphispiza bilineata*	**Grassland, sagebrush**, variety of dry open habitats, from Sonoran desert with mixed shrubs and cactus to barren flats of creosote bush or saltbush
Short-eared owl	*Asio flammeus*	Large open areas with low vegetation, including **grasslands** and **sagebrush** steppe
Ferruginous hawk	*Buteo regalis*	Arid and semiarid **grasslands**, and **sagebrush** steppe
Lesser goldfinch	*Carduelis psaltria*	**Generalist**, thickets, weedy fields, woodlands, forest clearings, scrublands, farmlands
Gray flycatcher	*Empidonax wrightii*	Open and arid habitats, especially **sagebrush** plains with few trees or shrubs, scrubby woods of **juniper and pinyon pine**
Merlin	*Falco columbarius*	**Grasslands, sagebrush**, open and semi-open areas across northern North America
Peregrine falcon	*Falco peregrinus anatum*	**Generalist**, open landscapes with cliffs for nest sites; found anywhere from tundra to deserts
Wallowa rosy finch	*Leucosticte tephrocotis wallowa*	**Grasslands**, barren, rocky or grassy areas and cliffs in the alpine zone; winters in open areas like fields, brushy areas, and around human habitation
Ash-throated flycatcher	*Myiarchus cinerascens*	**Generalist;** Dry scrub, open woodlands, and deserts
Long-billed curlew	*Numenius americanus*	**Grasslands, sagebrush**, high plains and rangelands
Mountain quail	*Oreortyx pictus*	Dense brush in wooded foothills and mountains, pine-oak, coniferous forest and sometimes **pinyon-juniper woodlands**
Broad-tailed hummingbird	*Selasphorus platycercus*	High-elevation meadows, shrubby habitats near pine-oak and evergreen forests, and forest openings within **pinyon-juniper**, oak woodlands, and evergreen forests
Sharp-tailed grouse	*Tympanuchus phasianellus*	**Grasslands**, prairie, brushy groves, forest edges, open burns in coniferous forest
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	**Sagebrush steppe**, mountain shrub and **grasslands**
Bendire's thrasher	*Taxostoma bendirei*	Desert, especially areas with tall vegetation, cholla cactus, creosote bush and yucca, and in **juniper woodland**
Brewer's sparrow	*Spizella breweri*	**Sagebrush steppe**, desert scrub consisting mainly of saltbush and creosote
Gray-crowned rosy-finch	*Leucosticte tephrocotis*	**Grasslands**; breeds in alpine areas, winters in open country including mountain meadows, high deserts, valleys and plains
Loggerhead shrike	*Lanius ludovicianus*	**Sagebrush, grasslands**; open country with short vegetation and open shrubs or low trees
Pinyon jay	*Gymnorhinus cyanocephalus*	**Pinyon-juniper woodlands** and chaparral
Sage thrasher	*Oreoscoptes montanus*	**Sagebrush steppe**
Green-tailed towhee	*Pipilo chlorurus*	**Sagebrush, grasslands, pinyon-juniper**; prefers scrubby thickets and desert washes, though it can be found in a variety of shrubby habitats across its winter range
Sagebrush sparrow	*Amphispiza belli*	**Sagebrush** and other shrub steppe
Virginia's warbler	*Vermivora virginiae*	Dry mountainsides in scrub oak, chaparral, **pinyon-juniper**, or other low, brushy habitats
Reptiles		
Northern sagebrush lizard	*Sceloporus graciosus*	**Grasslands, pinyon-juniper**; mid- to high-altitudes in **sagebrush** and other shrublands, mainly in the mountains; prefers open areas with scattered low bushes and lots of sun
Striped whipsnake	*Coluber taeniatus*	Variety of habitats including shrub lands, **grasslands**, **sagebrush** flats, canyons, **pinyon-**

Common Name	*Latin Name*	Habitat Description
		juniper, and open pine-oak forests
Desert horned lizard	*Phrynosoma platyrhinos*	**Sagebrush**; open sandy areas in deserts, chaparral, **grassland**
Greater short-horned lizard	*Phrynosoma hernandesi*	Semiarid plains to high mountains; occupies a variety of habitats including **sagebrush**, open **pinyon-juniper**, pine-spruce and spruce-fir forests
Long-nosed leopard lizard	*Gambelia wislizenii*	**Sagebrush**; sandy and gravelly desert and semi-desert areas with scattered shrubs or other low plants
Northern rubber boa	*Charina bottae*	**Grasslands, sagebrush**, meadows and chaparral to deciduous and coniferous forests, to high alpine settings
Pygmy short-horned lizard	*Phrynosoma douglasii*	**Grasslands, sagebrush, pinyon-juniper**; semiarid plains to high mountains; open, shrubby or openly wooded areas with sparse vegetation at ground level
Ring-necked snake	*Diadophis punctatus*	Forest, woodlands, **grassland**, chaparral and riparian corridors in arid regions
Sierra alligator lizard	*Elgaria coerulea palmeri*	**Grasslands***;* Sierra Nevada and immediately adjacent ranges; forested montane areas and montane chaparral
Sonoran mountain kingsnake	*Lampropeltis pyromelana*	**Pinyon-juniper**; chaparral woodland and pine forests in mountainous regions, brushy rocky canyons, talus slopes and near streams and springs
Western red-tailed skink	*Plestiodon gilberti rubricaudatus*	**Generalist**; variety of habitats, avoids heavy brush and dense forest
Longnose snake	*Rhinocheilus lecontei*	**Grasslands, sagebrush**; desert lowland areas that have sandy or loose soil and numerous burrows
Ground snake	*Sonora semiannulata*	**Generalist;** dry, rocky areas with loose soil
Amphibians		
Western spadefoot toad	*Spea hammondii*	Open areas with sandy or gravelly soils, also found in mixed woodlands, **grasslands**, coastal sage scrub, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, alkali flats
Woodhouse's toad	*Anaxyrus woodhousii*	**Grasslands**; larger riparian corridors at lower elevations, and moist meadows, ponds, lakes, and reservoirs at higher elevations
Boreal toad	*Anaxyrus boreas* ssp. *boreas*	**Grasslands, sagebrush**; desert springs and streams, wet meadows, marshes, ponds, lakes reservoirs, slow moving rivers and woodlands
Dixie Valley toad	*Anaxyrus williamsi*	**Grasslands, sagebrush***;* springs, seeps, streams and similarly inundated areas
Western toad	*Anaxyrus boreas*	**Grasslands, sagebrush**; desert springs and streams, wet meadows, marshes, ponds, lakes reservoirs, slow moving rivers and woodlands
Great Plains toad	*Bufo cognatus*	**Grasslands, sagebrush;** damp areas in open grasslands and farm fields
Invertebrates		
Dalles mountainsnail	*Oreohelix variabilis*	**Sagebrush**; shrubland
Deschutes mountainsnail	*Oreohelix variabilis* ssp. *nov* (Deschutes)	**Sagebrush**; shrubland
Western bumblebee	*Bombus occidentalis*	Mixed woodlands, farmlands, urban areas, montane meadows and into the western edge of

Common Name	*Latin Name*	Habitat Description
		the prairie **grasslands**
Barry's hairstreak	*Callophrys gryneus chalcosiva*	**Pinyon-juniper**; variety of open, brushy to lightly wooded, dry habitats and weedy areas
Intermountain sulphur	*Colias occidentalis pseudochristina*	Steep, sunny slopes with **sagebrush** and scattered ponderosa pine
Eastern tailed blue	*Cupido comyntas*	**Grasslands**; variety of open, brushy to lightly wooded, dry habitats and weedy areas
Island checkerspot	*Euphydryas colon colon*	**Grasslands**; meadows, pine-oak woodlands, along streams or near lakes, agricultural lands, powerline right of ways, along roads, or old ski areas; wet meadows
Tawny-edged skipper	*Polites themistocles*	**Grasslands**; moist grassy areas including prairie swales, pastures, lawns, roadsides, and vacant lots
Coronis fritillary	*Speyeria coronis coronis*	**Grasslands**; mountain slopes, foothills, prairie valleys, chaparral, **sagebrush**, forest openings
Great basin fritillary	*Speyeria egleis*	**Grasslands**; mountain meadows, forest openings, exposed rocky ridges
Big Smoky wood nymph	*Cercyonis oetus alkalorum*	**Grasslands**; grassy, alkaline flats; known only from the Big Smoky Valley between the Toiyabe and Toquima ranges in central Nevada
Carson wandering skipper	*Pseudocopaeodes eunus obscurus*	Salt grass and nearby nectar producing flowers; **grassland** habitats on alkaline substrates
Early blue	*Euphilotes enoptes primavera*	**Grasslands**; records only exist from lower mountain canyons in Mineral County in the Wassuk Range; Trend unknown and considered critically imperiled in Nevada
Great Basin small blue	*Philotiella speciosa septentrionalis*	Distribution unknown, type is from Lyon County
Mattoni's blue	*Euphilotes pollescens mattonii*	Sonoran desert, prairies and sand dunes; **pinyon-juniper woodlands** and prairie **grasslands**
Mojave gypsum bee	*Andrena balsamorhizae*	**Grasslands**; occurs in various habitats; nests on the ground or in various natural cavities; restricted to the habitat of its host plant, sunray
Monarch butterfly	*Danaus plexippus plexippus*	**Grasslands, sagebrush**; widespread and scattered; requires milkweed (Asclepiacae) or dogbane (Apocynoceae) as host plants for larvae
Mono basin skipper	*Hesperia uncas giulanii*	**Grasslands**; Known only from the Adobe Hills in Mono County, CA. Gently rolling hills with sandy substrate.
Railroad Valley skipper	*Hesperia uncas fulvapalla*	**Grasslands**; From alkali meadows on the floor of Railroad Valley in Nye County
Idaho Point-headed grasshopper	*Acroplophitus pulchellus*	**Sagebrush**; xeric shrub-dominated habitat
	Plants	
A cyperus	*Cyperus lupulinus* ssp. *lupulinus*	**Grasslands**; grows in sun-lit locations such as fields, prairies, roadsides and farms.
Aase's onion	*Allium aaseae*	**Sagebrush**; associated with relatively sparsely vegetated or bitterbrush/sagebrush bitterbrush communities.
Alender wild cabbage	*Caulanthus major* var. *nevadensis*	In the **sagebrush** and **pinyon-juniper** zones.

Common Name	*Latin Name*	Habitat Description
Alexander's buckwheat	*Eriogonum alexanderae*	**Sagebrush** scrub, great basin scrub, **pinyon and juniper woodland**.
Alpine azalea	*Kalmia procumbens*	**Pinyon-juniper** communities at 2100 to 2745 m (6890 to 9006 ft).
American woodsage, western germander	*Symphyotrichum jessicae*	**Sagebrush** scrub; northern **juniper** woodland; mountains and plateaus.
Arapien stickleaf, Arapien blazingstar	*Mentzelia argillosa*	**Sagebrush, pinyon-juniper woodlands***;* scrubland and woodland.
Arrow thelypody	*Thelypodium sagittatum* ssp. *sagittatum*	Under or around western **juniper** (*Juniperus occidentalis*) in canyons, seasonal creek drainages, and springs.
Arrow-leaf thelypody	*Thelypodium eucosmum*	Occurs in the Blue Mountains of Oregon; Its habitat is dominated by **sagebrush** and **juniper**.
Arthur's milk-vetch	*Astragalus arthurii*	**Grasslands***;* known to occupy alkaline soils in dry washes and on barren bluffs.
Asotin milkvetch	*Astragalus asotinensis*	Open canyon **grasslands** on steep slopes of all aspects.
Atwood's pretty phacelia	*Phacelia pulchella* var. *atwoodii*	**Pinyon-juniper and sagebrush**.
Austin's knotweed	*Polygonum austiniae*	**Pinyon-juniper**; dry to moist flats or banks, from **sagebrush** plains to lower mountains, often with ponderosa pine.
Austin's plagiobothrys	*Plagiobothrys austiniae*	**Pinyon-juniper** communities at 1190 to 1310 m (3900 to 4300 ft) elevation.
Bald daisy	*Erigeron calvus*	**Sagebrush**; sandy loam substrates in Great Basin scrub.
Barren Valley collomia	*Collomia renacta*	Mostly a woodland-border species in **pinyon-juniper** and subalpine **sagebrush** zones in Nye County, Nevada.
Bartonberry	*Rubus bartonianus*	Dry open ground, gravelly soil; **sagebrush**; elevations of 1,500-1,750 meters (5000 to 5800 ft). Also in disturbed areas along roadsides.
Bashful beardtongue	*Penstemon pudicus*	In the subalpine **sagebrush**, mountain mahogany, and upper **pinyon-juniper** zones.
Bastard kentrophyta	*Astragalus tegetarioides*	Dry open ground, gravelly soil; **sagebrush**; elevations of 1,500-1,750 meters (5000 to 5800 ft). Also in disturbed areas along roadsides.
Beaked cryptantha	*Cryptantha rostellata*	Found in dry, volcanic outcrops with **sagebrush**/bitterbrush.
Beaked spikerush	*Eleocharis rostellata*	Sandy or loamy soils on the lower and middle Snake River Plains and surrounding, rolling, **sagebrush**-dominated foothills.
Beautiful penstemon	*Penstemon perpulcher*	**Grasslands**; habitats include dry sand prairies, dolomite prairies, and gravelly hill prairies.
Beaver Dam breadroot	*Pediomelum castoreum*	**Sagebrush**; found in desert shrublands, grows in disturbed areas.
Biennial stanleya	*Stanleya confertiflora*	Barren clay slopes in **sagebrush** communities.
Black lily	*Fritillaria camschatcensis*	Open valley bottom areas in the lower **sagebrush** zones.
Black snake-root	*Sanicula marilandica*	**Grasslands**; grows pure stands in mixed prairie associations and disturbed habitats.
Blaine pincushion	*Sclerocactus blainei*	In **sagebrush** associations within the **pinyon-juniper** and mountain sagebrush zones.
Blue gramma	*Bouteloua gracilis*	**Grasslands**; short grass in the mixed prairies and throughout the Great Plains and the Southwest
Blue-leaved penstemon	*Penstemon glaucinus*	**Grasslands, sagebrush, pinyon-juniper**; found in habitats ranging from open desert to moist forests.

Common Name	*Latin Name*	Habitat Description
Blunt sedge	*Carex obtusata*	Dry or vernally moist **grasslands**, bluffs, and sandy floodplains. Associated species include common **juniper**.
Bodie Hills cusickiella	*Cusickiella quadricostata*	**Sagebrush, pinyon-juniper**; pumice, gravelly or sandy substrates in Great Basin scrub.
Bodie Hills rockcress	*Boechera bodiensis*	Dry, open, slopes in **sagebrush** associations within the **pinyon-juniper** and mountain sagebrush zones.
Booth's evening primrose	*Camissonia boothii* ssp. *boothii*	Sandy flats, steep loose slopes, Joshua-tree and **pinyon-juniper** woodland
Boise milkvetch	*Astragalus adanus*	Brushy slopes, terraces and benches along canyons or along dry flats and gently rolling hill country among **sagebrush** in alluvial clays and gravels of both granitic and basaltic origin.
Bolander onion	*Allium bolanderi* var. *bolanderi*	**Sagebrush, pinyon-juniper**; heavy soils and openings in brush and woods.
Bolander's camissonia	*Camissonia bolanderi*	Best developed on southern slopes; common associates are *Artemisia rigida*, *Lomatium* spp., *Brassica* spp.
Branching montia	*Montia diffusa*	Found in mesic **grasslands**, low meadows.
Bristle-flowered collomia	*Collomia macrocalyx*	**Grasslands**; best developed on southern slopes; common associates are *Artemisia rigida*, *Lomatium* spp., *Brassica* spp.
Broad fleabane	*Erigeron latus*	Gravelly or rocky hillsides and outcrops in the **sagebrush** zone, near juniper woodlands.
Bugleg goldenweed	*Pyrrocoma insecticruris*	Mountain meadows, **sagebrush/grasslands**; 5000-6000 feet elevation.
Bupleurum	*Bupleurum americanum*	**Grasslands**; rocky places, grassy hillsides, meadows.
Calcereous buckwheat	*Eriogonum ochrocephalum* var. *calcareum*	**Grasslands, sagebrush**; on the valley floor or on dunes in barren openings with *Atriplex* spp., *Grayia* spp., *Chrysothamnus* spp., and *Artemisia* spp.
California buttercup	*Ranunculus californicus* var. *californicus*	Coastal bluffs, open **grasslands**, rocky slopes along the shore, and rocky wooded areas. Usually in dry grasslands areas.
California chicory	*Rafinesquia californica*	In the mixed-shrub and **sagebrush** zones.
California maiden-hair	*Adiantum jordanii*	Open areas of Great Basin **sagebrush**/bitterbrush scrub.
California milk-vetch	*Astragalus californicus*	**Grasslands, pinyon-juniper;** dry hillsides, stony ridges, and canyon benches, among **sagebrush**, in open oak woods or in openings of coniferous forests.
Callaway milkvetch	*Astragalus callithrix*	**Grasslands, sagebrush***;* deep, sandy soil on the valley floor or on dunes in barren openings with *Atriplex*, *Grayia*, *Chrysothamnus*, and *Artemisia* spp.
Candelaria blazingstar	*Mentzelia candelariae*	**Grasslands***;* found in disturbed, loose, gravelly slopes and clay hills.
Carson Valley monkeyflower	*Erythranthe carsonensis*	**Sagebrush**; shrubland.
Cascade reedgrass	*Calamagrostis tweedyi*	**Grasslands**; occupy a variety of habitats from low elevation wetlands to dry windblown mountains ridges.
Cespitose evening primrose	*Oenothera caespitosa* ssp. *caespitosa*	**Grasslands***;* found in Coal Valley Formation, on rounded knolls, low ridges, slopes, and especially small drainages on all aspects.
Chain-fern	*Woodwardia fimbriata*	**Grasslands, sagebrush***;* on foothills and valley floors above the playas, shadscale, and mixed shrub, often associated with *Atriplex confertifolia*.

Common Name	***Latin Name***	**Habitat Description**
Challis crazyweed	*Oxytropis besseyi* var. *salmonensis*	**Sagebrush**; occurs within the shrub-steppe in sandy wash or open lower slopes.
Challis milkvetch	*Astragalus amblytropis*	**Sagebrush**; gravelly washes and banks in the creosote-bursage, shadscale, and blackbrush zones
Chambers' twinpod	*Physaria chambersii*	Sandy or rocky locations; **sagebrush** plateaus, **pinyon-juniper** woodland roadsides.
Chinle chia	*Salvia columbariae* var. *argillacea*	In the **pinyon-juniper** zone.
Cima milkvetch	*Astragalus cimae* var. *cimae*	Mesas and stony hillsides, commonly among **sagebrush**. Habitats include Great Basin scrub, and **pinyon-juniper** woodland.
Coastal lipfern	*Cheilanthes intertexta*	Grows in rocky habitats.
Cock's-comb cat's-eye	*Cryptantha celosioides*	Stony or sandy, often sparsely vegetated soil of **grasslands**, **sagebrush** steppe; plains, valleys, montane areas.
Coffee fern	*Pellaea andromedifolia*	Found on dry Western facing sunny banks, in coastal and woodland habitats.
Columbia milk-vetch	*Astragalus columbianus*	Sandy to gravelly loams in **sagebrush-grasslands** communities of the Columbia River floodplain.
Common jewel flower	*Streptanthus glandulosus*	**Sagebrush**; grows in **grassland**, chaparral, and **woodlands**.
Common twinpod	*Physaria didymocarpa* var. *didymocarpa*	**Grasslands**; occurs in a wide variety of habitats, including gravelly prairies, dry hillsides, and road cuts.
Compact gilia	*Ipomopsis congesta* ssp. *crebrifolia*	Wide range of habitats from **sagebrush** through bristlecone pine communities.
Congdon's monkeyflower	*Diplacus congdonii*	**Grasslands**; found in mountains and foothills in moist spots, slopes, canyons, and sometimes in disturbed areas.
Cooke's phacelia	*Phacelia cookei*	**Sagebrush**; volcanic or sandy substrates in Great Basin scrub.
Cooper's rubber-plant	*Hymenoxys cooperi* var. *canescens*	**Sagebrush** steppe zone.
Cooper's goldflower	*Hymenoxys cooperi* var. *canescens*	Found near roadsides, open areas, and edges of **juniper-pine** forests.
Coral lichen	*Aspicilia rogeri*	**Sagebrush**; found in shrub steppe and prefers open habitats that are moist in winter or spring but dry most of the year.
Cordelia beardtongue	*Penstemon floribundus*	**Grasslands**; steep mountain slopes and associated alluvial fans in a limestone rock desert.
Cordilleran sedge	*Carex cordillerana*	**Grasslands, pinyon-juniper;** found in naturally disturbed, rocky slopes with organic layer and leaf litter in mesic mixed forests and grassy slopes.
Cordroot sedge	*Carex chordorrhiza*	**Grasslands;** occurs in transition mires, low-sedge vegetation and sedge dominated 'flarks' (wide, elongated pools) of raised mires.
Coville's lip-fern	*Cheilanthes covillei*	**Grasslands, sagebrush**; grows in rocky crevices in the mountains and foothills.
Coyote tobacco	*Nicotiana attenuata*	Dry sandy bottomlands, rocky washes, and other dry open places. Associated species include big **sagebrush**, rabbitbrush, buckwheat, giant wildrye.

Common Name	*Latin Name*	Habitat Description
Craters-of-the-Moon wild buckwheat	*Eriogonum ovalifolium* var. *focarium*	Occurs on black volcanic gravel on gentle slopes and flats in **sagebrush** communities, conifer woodlands.
Creeping chickweed	*Stellaria humifusa*	**Grasslands**; restricted to light-colored (white and tan) tuffaceous sandstone substrates, usually on rounded, gentle slopes.
Creeping nailwort	*Paronychia sessiliflora*	**Grasslands**; found in dry, stony hillsides, summits, and sandstone mesas.
Crenulate moonwort	*Botrychium crenulatum*	**Grasslands, pinyon-juniper**; dry, open, sparsely-vegetated, calcareous sandy-clay soils on flats and gentle slopes of hillsides and alluvial fans.
Crested shield-fern	*Dryopteris cristata*	Found in crevices of volcanic or carbonate rock in the **pinyon-juniper** zone, 6900-7400 ft elevation.
Crinite mariposa-lily	*Calochortus coxii*	Found in moist, north-facing **grasslands** and Jeffrey **pine savannahs**.
Cronquist’s forget-me-not	*Hackelia cronquistii*	Found in north-facing gentle to moderate slopes. Usually found with a plant association that includes big **sagebrush** and indian ricegrass.
Cronquist's phacelia	*Phacelia cronquistiana*	Often found in **pinyon-juniper-sagebrush** and ponderosa pine communities.
Cronquist's stickseed	*Hackelia cronquistii*	Found in north-facing gentle to moderate slopes. Associated with big **sagebrush** and indian ricegrass.
Crosby buckwheat	*Eriogonum crosbyae* var. *crosbyae*	Typically on rolling hills dominated by big **sagebrush**.
Currant milkvetch	*Astragalus uncialis*	Found in dry alkaline soils derived from limestone. With **sagebrush** in gullied foothills.
Currant Summit clover	*Trifolium andinum* var. *podocephalum*	Within **pinyon-juniper woodlands** in settings such as rocky hills. Other documented associates include sagebrush, *Artemisia tridentata*.
Cusick’s camas	*Camassia cusickii*	Occurs at low to mid elevations on steep, rocky hillsides. Often found in **sagebrush** scrub and among ponderosa pine.
Cusick's giant-hyssop	*Agastache cusickii*	On road cuts or other disturbances crossing such habitats, in **pinyon-juniper, sagebrush**, and mixed-shrub zones.
Cusick's lupine	*Lupinus lepidus* var. *cusickii*	Open woods and dry slopes.
Cusick's milk-vetch	*Astragalus cusickii* var. *cusickii*	Dry grasslands or rocky slopes in loose, finely textured soils on roadcuts, talus, and **sagebrush** plains.
Cusick's monkeyflower	*Diplacus cusickii*	**Grasslands;** arid regions, including bottomlands. Associated species are sparse but include arrowleaf buckwheat.
Cutler's spurred lupine	*Lupinus caudatus* var. *cutleri*	Occurs in **pinyon-juniper** woodland.
Dalles mt. buttercup	*Ranunculus triternatus*	**Grasslands, sagebrush**; meadow-steppe dominated by perennial xerophytic bunchgrasses and broad-leaved herbs.
Dalles water-starwort	*Callitriche fassettii*	**Sagebrush** and mountain mahogany communities, oak, **pinyon-juniper** and montane conifer woodlands
Darwin Mesa milk-vetch	*Astragalus atratus* var. *mensanus*	**Sagebrush**; carbonate, rocky substrates in Great Basin scrub and **pinyon-juniper** woodland.

Common Name	*Latin Name*	Habitat Description
Davis's milkweed	*Asclepias cryptoceras* ssp. *davisii*	On steep rocky slopes with **sagebrush**.
Death Valley round-leaved phacelia	*Phacelia mustelina*	**Sagebrush**; Great Basin scrub and **pinyon-juniper** woodland.
DeDecker's clover	*Trifolium kingii* subsp. *dedeckerae*	**Sagebrush**; stabilized dunes in Great Basin scrub.
Deer Lodge buckwheat	*Eriogonum pharnaceoides* var. *cervinum*	Occurs in **sagebrush** and mountain mahogany communities, oak, **pinyon-juniper** and montane woodlands.
Deeth buckwheat	*Eriogonum nutans* var. *glabratum*	Sandy flats and slopes, saltbush and **sagebrush** communities, and in montane conifer **woodlands**.
Densetuft hairsedge	*Bulbostylis capillaris*	Found in disturbed habitats and **grassland**.
Desert chaenactis	*Chaenactis xantiana*	Grows near **pinyon-juniper woodland and sagebrush** scrub.
Desert dodder	*Cuscuta denticulata*	Parasitic on a variety of native shrubs in desert areas, including **sagebrush** and rabbitbrush.
Desert needlegrass	*Pappostipa speciosa*	**Grasslands**; *f*ound in rocky slopes and canyons of arid to semi-arid regions.
Desert pincushion, broadflower pincushion	*Chaenactis stevioides*	**Grasslands**; grows in deserts, open arid and semiarid habitat
Desert prenanthella	*Prenanthella exigua*	Grows near **pinyon-juniper woodland**.
Diffuse stickseed	*Hackelia diffusa* var. *diffusa*	**Grasslands**; bottoms of mossy talus and scree slopes, shaded areas, cliffs, roadsides, and other disturbed sites.
Dimeresia or doublet	*Dimeresia howellii*	**Grasslands**; grows in dry volcanic soils, primarily on the Modoc Plateau volcanic plain.
Disappearing monkeyflower	*Mimulus evanescens*	Grows in **sagebrush-juniper** plant associations, among rocky rubble and boulders in vernally moist, heavy gravel.
Drummond's mountain-avens	*Dryas drummondii* var. *drummondii*	Frequently in small washes or other moisture-accumulating microsites, in the **sagebrush** and lower **pinyon-juniper** zones.
Dusky canada goose	*Branta canadensis occidentalis*	Dry, densely vegetated, relatively undisturbed, on moderate to steep north-facing slopes in the **sagebrush** zone
Dwarf gray rabbitbrush	*Ericameria nauseosa* var. *nana*	Dry sand, gravel, rocky crevices in the **sagebrush** zone.
Dwarf lousewort	*Pedicularis centranthera*	**Sagebrush**; usually granitic, sandy or rocky substrates in Great Basin scrub and **pinyon-juniper** woodland.
Dwarf phacelia	*Phacelia tetramera*	Grows near **sagebrush** scrub
Eastwood milkweed	*Asclepias eastwoodiana*	In open areas, including shale outcrops, generally barren, frequently in small washes, in the **sagebrush** and lower **pinyon-juniper** zones.
Elko rockcress	*Boechera falcifructa*	Gently north-sloping, **sagebrush-dominated** slopes with a high moss/cryptogamic cover over silty substrates.
Elusive Jacob's-ladder	*Polemonium elusum*	Occurs where vegetation transitions from **sagebrush** and mountain mahogany to Douglas-fir woodland

Common Name	*Latin Name*	Habitat Description
Engelmann's daisy	*Erigeron davisii*	Found in dry, mountainous areas and **grasslands**, with the highest diversity in North America.
Ephemeral monkeyflower	*Mimulus evanescens*	**Sagebrush***;* volcanic, gravelly, and rocky substrates in Great Basin scrub and **pinyon-juniper** woodland.
Erect pygmy-weed	*Crassula connata*	**Grasslands**; open areas
Featherleaf kittentails	*Synthyris pinnatifida* var. *lanuginosa*	**Grasslands**; occurs in dry, rocky areas in pin cushion communities of high elevations
Fee's lip-fern	*Cheilanthes feei*	**Grasslands**; in arid climates, on limestone or sandstone cliff crevices, outcrops, rocky areas, and steep slopes.
Few-flowered bleedingheart	*Dicentra pauciflora*	**Pinyon-juniper**; gravelly places, coniferous litter.
Field milk-vetch	*Astragalus agrestis*	**Sagebrush**; Great Basin scrub and **pinyon-juniper** woodland.
Flat Top buckwheat, Smith's wild buckwheat	*Eriogonum corymbosum* var. *smithii*	**Sagebrush***;* purple-sage, desert shrub, and rabbitbrush communities, on the Entrada Formation.
Four-petal jamesia, Basin jamesia	*Jamesia tetrapetala*	Grows with chokecherry, mountain mahogany, Ephedra, and **sagebrush** at around 7,600 feet elevation
Franklin's penstemon	*Penstemon franklinii*	**Sagebrush** community on sandy-gravelly and sandy soils across a gently sloping landscape.
Fremont's combleaf	*Polyctenium fremontii*	It is found near **sagebrush** scrub
Frisco buckwheat	*Eriogonum soredium*	Limestone outcrop-surfaces with gravel and scattered rocks and boulders in **pinyon-juniper**
Frisco clover	*Trifolium friscanum*	Grows on calcareous and volcanic gravels, usually on relatively steep slopes, within **pinyon-juniper**.
Gambel milk-vetch	*Astragalus gambelianus*	**Sagebrush, pinyon-juniper**; foothill woodland, southern oak woodland, coastal sage scrub.
Garrett's California fuchsia (Garrett's firechalice)	*Epilobium canum* ssp. *garrettii*	**Grasslands**; dry/Desert
Gasquet manzanita	*Arctostaphylos hispidula*	**Grasslands**; open rocky sites with serpentine or sandstone substrate.
Geyer's onion	*Allium geyeri* var. *geyeri*	**Sagebrush***;* Great Basin scrub, **pinyon and juniper woodland**; gravelly or rocky.
Gilman's milkvetch	*Astragalus gilmanii*	**Sagebrush***;* found in the Great Basin scrub, **pinyon and juniper woodland**; gravelly or rocky.
Gold poppy	*Eschscholzia caespitosa*	**Pinyon-juniper**; mostly on south to west aspects, in sparse *Juniperus osteosperma* woodland.
Golden buckwheat	*Eriogonum chrysops*	Often described as occurring within **sagebrush** communities.
Golden chinquapin	*Chrysolepis chrysophylla* var. *chrysophylla*	Dry open sites to fairly thick **woodlands**. Most competitive on sites that are relatively infertile.
Goodrich eared rockcress	*Arabis goodrichii*	Rocky slopes in sagebrush and **pinyon-juniper woodlands**.
Goose Creek milkvetch	*Astragalus anserinus*	Occurs in drainage bottoms, lower to upper slope and crest positions, in open Utah juniper, big **sagebrush**, or rabbitbrush.
Gorman's iris	*Iris tenax* var. *gormanii*	**Grasslands**; along the eastern edges of Elko and White Pine Counties, at elevations of 4600 to 6900 ft
Gould's camissonia	*Camissonia gouldii*	Volcanic ash cones in **pinyon-juniper** and big **sagebrush** communities.

Common Name	***Latin Name***	**Habitat Description**
Granite prickly phlox	*Linanthus pungens*	Occurs in dry, open forest, **woodland, shrubland, and grassland** habitats and their intergradations.
Gray cryptantha	*Cryptantha leucophaea*	Dry, often sandy places. Associated with rabbitbrush, bluebunch wheatgrass, cheatgrass, and **sagebrush**.
Gray pine	*Pinus sabiniana*	Grows in the summer dry mountains and foothills
Great Basin fishhook cactus	*Sclerocactus pubispinus*	Found in rocky hillsides of woodland and upper desert mountains. **Sagebrush and pinyon-juniper** communities.
Great Basin gilia	*Aliciella leptomeria*	**Grasslands**; open habitats in semiarid regions, on dry bluffs or in sandy swales.
Green buckwheat	*Eriogonum umbellatum* var. *glaberrimum*	Found in sandy to gravelly slopes, **sagebrush** communities, aspen and montane conifer woodlands.
Green keeled cotton-grass	*Eriophorum viridicarinatum*	**Grasslands**; Schoonover Formation, on mostly steep slopes of all aspects, and supporting a sparse to moderately dense vegetation
Green muhly, marsh muhly	*Muhlenbergia racemosa*	**Grasslands**; Grows in disturbed areas, wetlands and other moist and wet habitats. It can grow in dry areas.
Green rock-posey lichen	*Rhizoplaca melanophthalma ssp. cerebriformis*	Usually on calcium-deficient rock, from **pinyon-juniper** communities up to the low alpine.
Green-band mariposa lily	*Calochortus macrocarpus* var. *maculosus*	Found in dry plains, rocky slopes, **sagebrush** scrub, and in pine forests. Usually occurring in volcanic soils.
Grimes vetchling	*Lathyrus grimesii*	**Grassland**/herbaceous, sagebrush shrubland/chaparral
Gumbo milkvetch	*Astragalus ampullarius*	Mixed desert **sagebrush**/shrub and **juniper** communities
Hairy wild cabbage	*Caulanthus pilosus*	**Grasslands**; native to open, dry habitat.
Hall's aster	*Symphyotrichum hallii*	**Grasslands**; moist to dry prairies and open places in valley and plains.
Hall's daisy	*Erigeron aequifolius*	Great Basin sagebrush/scrub and **pinyon-juniper woodland** in clay or rocky substrates.
Hanaupah rock daisy	*Perityle villosa*	Great Basin sagebrush/scrub and p**inyon-juniper woodland** in clay or rocky substrates.
Hare's-foot milkvetch	*Astragalus purshii* var. *lagopinus*	Dry plains, slopes, often on basalt or pumice, often with **sagebrush**.
Hayden's mustard	*Terraria haydenii*	Scattered **juniper** habitat, very little vegetation.
Henderson's bentgrass	*Agrostis hendersonii*	Found in dry desert slopes, sandy washes, and valleys. Found within sagebrush (*Artemisia tridentata)* to **pinyon-juniper woodlands**.
Henderson's phlox	*Phlox hendersonii*	Found from high-elevation ridges to north-facing walls at lower elevations, in mountain **sagebrush** and **pinyon-juniper**.
Henderson's ricegrass	*Achnatherum hendersonii*	**Sagebrush, pinyon-juniper**; often associated with *Artemisia rigida* and occasionally with *Pinus ponderosa*.
Hoffmann's buckwheat	*Eriogonum hoffmannii* var. *hoffmannii*	Granitic or carbonate, rocky substrates in **pinyon and juniper woodland**.

Common Name	*Latin Name*	Habitat Description
Holmgren lupine	*Lupinus holmgrenianus*	Fond in dry desert slopes, sandy washes, and valleys. Found within **sagebrush** (*Artemisia tridentata*) to **pinyon-juniper woodlands**.
Holmgren smelowskia	*Nevada holmgrenii*	Sites are found in the mountain **sagebrush** and upper **pinyon-juniper** zones.
Hooker's balsamroot	*Balsamorhiza hookeri* var. *idahoensis*	Associated with **pinyon-juniper**, stiff **sagebrush**, and low sagebrush
Hoover's tauschia	*Tauschia hooveri*	**Sagebrush**; shrubland/chaparral
Howell's rush	*Juncus howellii*	Occurs on gentle to steep slopes of all aspects; most commonly associated with open Utah **juniper** communities.
Howell's thelypodium	*Thelypodium howellii* var. *howellii*	Rocky, granitic substrates in pinyon and **juniper** woodland
Howell's whitlow-grass	*Draba howellii*	**Grasslands**; rocky outcrops, meadows, dry-stone walls, brick walls, railway embankments, yards, paths, sloping pastures
Idaho hawksbeard	*Crepis bakeri* ssp. *idahoensis*	Occurs in canyon **grasslands** and on dry mountain slopes.
Idaho penstemon (also known as Idaho beardtongue)	*Penstemon idahoensis*	4400-7000 ft in the **pinyon-juniper, sagebrush**, and shadscale zones. Most commonly associated with Utah juniper (*Juniperus osteosperma*) communities.
Inchhigh lupine	*Lupinus uncialis*	Found in gravelly limestone soils on knolls, slopes, and small drainages, from the **pinyon-juniper** to the subalpine conifer zones.
Inflated Cima milk-vetch	*Astragalus cimae* var. *sufflatus*	Great Basin scrub/**sagebrush**
Intermountain wavewing (shadscales spring parsley)	*Cymopterus basalticus*	Bare basaltic rocks, barren clays in Utah. In **pinyon-juniper** and **sagebrush** communities.
Inyo blazing star	*Mentzelia inyoensis*	Documented on a variety of substrates in habitats that include **sagebrush** scrub and **pinyon-juniper**.
Inyo rock daisy	*Perityle inyoensis*	Shale or gravelly substrates in Great Basin sagebrush scrub and **pinyon and juniper** woodland.
Jaeger's hesperidanthus	*Hesperidanthus jaegeri*	Sand or gravelly substrates in **pinyon and juniper woodland**.
Janish's penstemon	*Penstemon janishiae*	Hillsides and slopes on clay soil derived volcanic rock with sagebrush (Artemisia) to **pinyon-juniper**.
Kanab thelyplody	*Thelypodiopsis ambigua* var. *erecta*	**Pinyon-juniper** and mixed desert sagebrush shrub communities, practically always on degraded purple Chinle shales.
Kane breadroot	*Pediomelum epipsilum*	**Pinyon-juniper** woodland on Chinle and Moenkopi formations.
Kaye H. Thorne's buckwheat	*Eriogonum artificis*	**Pinyon and juniper** woodland communities on gravelly substrates.
Kellogg's lily	*Lilium kelloggii*	Can grow in dry, rocky sites to shaded, deep soiled areas in **forests**, below 3500 feet.
Kellogg's rush	*Juncus kelloggii*	Dry, open, light-colored, strongly alkaline shrink-swell clay in mixed-shrub and lower **sagebrush** zones.
Kidney-leaved violet	*Viola renifolia*	**Grasslands**; along washes, roadsides, and canyon floors, particularly on carbonate-containing substrates.

Common Name	*Latin Name*	Habitat Description
King's rattleweed	*Astragalus calycosus*	**Grasslands**; forb/herb
Lahontan Basin buckwheat	*Eriogonum rubricaule*	**Grasslands**; found in volcanic slopes.
Lahontan beardtongue	*Penstemon palmeri* var. *macranthus*	**Grasslands**; along washes, roadsides and canyon floors, particularly on carbonate-containing substrates.
Lahontan milkvetch	*Astragalus porrectus*	**Grasslands**; gravelly or sandy washes and outwash fans of volcanic sand or rock debris in the foothills of desert mountains.
Lahontan sagebrush	*Artemisia arbuscula* ssp. *longicaulis*	**Sagebrush**; confined to gypsum-rich soils in central and eastern Clark County and southern Lincoln County, Nevada
Lanceleaf springbeauty	*Claytonia multiscapa* var. *flava*	**Grasslands**; grows in foothills up to alpine slopes
Lance-leaved draba	*Draba cana*	Open, dry, knolls, badlands, or outcrops, usually northeast to southeast aspects, in **pinyon-juniper** or **sagebrush**.
Large Canadian St. John's wort	*Hypericum majus*	**Grasslands**; found in fields, pastures, abandoned fields and in sunny locations.
Large yellow evening primrose, Flaming Gorge evening primrose	*Oenothera acutissima*	Rocky mountain **juniper-sagebrush** communities, and sagebrush scrub.
Large-leaved filaree	*Erodium macrophyllum*	Open sites, **grassland**, sagebrush scrub, vertic clay, occasionally serpentine. Grassland/herbaceous, Shrubland/chaparral
Lavin eggvetch	*Astragalus oophorus* var. *lavinii*	Occurs barren, arid and open, knolls, badlands, in **pinyon-juniper and sagebrush** communities.
Lavin's milk-vetch	*Astragalus oophorus* var. *lavinii*	Rocky substrates in **pinyon and juniper woodland**.
Lee's lewisia	*Lewisia leeana*	**Grasslands**; cliffs and rocks
Leiberg's clover	*Trifolium leibergii*	**Grasslands**; dry, exposed, shallow, relatively barren and undisturbed, on flat to moderately steep slopes of all aspects.
Lemmon buckwheat	*Eriogonum lemmonii*	**Grasslands**; rolling hills on weathered tuff, fine, light colored, sandy loam, and silt loam.
Lemmon's milk-vetch	*Astragalus lemmonii*	Rocky or gravelly substrates in Great Basin sagebrush scrub and **pinyon and juniper** woodland.
Lens-pod milk-vetch	*Astragalus lentiformis*	Rocky substrates in **pinyon and juniper woodland**.
Lichen	*Calicium quercinum*	**Sagebrush, grasslands, pinyon-juniper**; found on twigs and in sheltered sites on old wood or bark.
Lichen	*Hypotrachyna riparia*	**Sagebrush, grasslands, pinyon-juniper**; on deciduous shrubs and trees in foothills of the western Cascade Range, Oregon.
Lichen	*Lecanora caesiorubella* ssp. *merrillii*	**Sagebrush, grasslands, pinyon-juniper**; on barks of trees and shrubs, decaying wood in dry, open coniferous woodland, chaparral, and salt marsh.
Lichen	*Leptogium cyanescens*	**Sagebrush, grasslands, pinyon-juniper**; found on shaded twigs of deciduous trees and shrubs in humid habitats, rarely in exposed situations.

Common Name	*Latin Name*	Habitat Description
Lichen	*Lobaria linita*	**Sagebrush, grasslands, pinyon-juniper**; *f*ound on moss-covered rocks in cool, moist areas in forests.
Lichen	*Microcalicium arenarium*	**Sagebrush, grasslands, pinyon-juniper**; found on bark, wood, root, and rock faces that are sheltered from precipitation
Lichen	*Peltula euploca*	**Sagebrush, grasslands, pinyon-juniper**; *f*ound on acidic rocks in deserts and other open, arid habitats.
Lichen	*Ramalina pollinaria*	**Sagebrush, grasslands, pinyon-juniper**; grows on bark and rocks.
Lichen	*Rhizoplaca melanophthalma* ssp. *crispa*	Usually on calcium-deficient rock, from **pinyon-juniper** communities up to the low alpine.
Lichen	*Sigridea californica*	**Sagebrush, grasslands, pinyon-juniper**; growing on the trunks of trees and shrubs, such as *Quercus* spp., *Heteromeles* spp., *Adenostoma* spp., and *Pinus* spp.
Lichen	*Texosporium sancti-jacobi*	**Sagebrush, grasslands, pinyon-juniper**; shadscale, desert shrub, and juniper communities on calcareous substrates at 1,679 to 6300 ft elevation
Lichen	*Thelenella muscorum* var. *octospora*	**Sagebrush, grasslands, pinyon-juniper**; on soil, rock, and dead or dying mosses in dry woodlands, prairie, shrub-steppe, and subalpine forest.
Lichen	*Umbilicaria phaea* var. *coccinea*	**Sagebrush, grasslands, pinyon-juniper**; associated vegetation includes, *Juniperus occidentalis*, *Pinus ponderosa*.
Limestone buckwheat	*Eriogonum eremicum*	Found in shadscale, desert **sagebrush** shrub, and **juniper** communities on calcareous substrates.
Limestone daisy	*Erigeron uncialis* var. *uncialis*	Sandy to rocky substrates in Great Basin **sagebrush** scrub and **pinyon and juniper** woodland.
Limestone monkeyflower	*Erythranthe calcicola*	Usually carbonate, usually talus slopes in **pinyon and juniper** woodland.
Little bluestem	*Schizachyrium scoparium* var. *scoparium*	**Grasslands**; ill prairies, gravel prairies, sand prairies, black soil prairies, clay prairies, and scrubby barrens
Little ricegrass	*Stipa exigua*	Carbonate, rocky soils in Great Basin **sagebrush** scrub and **pinyon and juniper** woodland.
Liverwort	*Herbertus dicranus*	**Grasslands, sagebrush, pinyon-juniper**; found in dry to moist and open to shaded cliffs, outcrops, boulders, tree trunks, tree bases, dead trees, bushes.
Liverwort	*Lophozia gillmanii*	**Grasslands, sagebrush, pinyon-juniper**; found on peaty soil, usually associated with cliffs or ledges. It is an obligate calciphile.
Liverwort	*Phymatoceros phymatodes*	Forest Edge, Forest/**Woodland**, **Grassland**/**sagebrush**-herbaceous
Liverwort	*Porella vernicosa* ssp. *fauriei*	Found in crevices of granitic cliffs and outcrops on protected exposures in the **pinyon-juniper** zone.
Liverwort	*Ptilidium pulcherrimum*	Found in sandy rhyolitic soils on flats and gentle slopes of mountain **sagebrush**.
Liverwort	*Scapania obscura*	**Pinyon-juniper**, **sagebrush**, and mixed desert shrub communities.
Liverwort	*Sphaerocarpos hians*	Habitats include desert scrub, **grasslands**, **sagebrush** steppe, and **pinyon-juniper**
Loa milkvetch, Glenwood milkvetch	*Astragalus loanus*	Volcanic gravels in **sagebrush** and **pinyon-juniper** communities.

Common Name	*Latin Name*	Habitat Description
Lobb's buckwheat	*Eriogonum lobbii*	**Grasslands, sagebrush, pinyon-juniper**; found in a number of mountain plant communities.
Lone Mountain goldenheads	*Tonestus graniticus*	Crevices in granite cliffs and on bedrock outcrops within **pinyon pine woodlands**.
Long Valley Milkvetch	*Astragalus johannis-howellii*	Usually found in great basin sagebrush scrub, **pinyon and juniper** woodland.
Long-bract frog orchid	*Coeloglossum viride*	**Sagebrush, pinyon-juniper**; grows chiefly in sub-arid soil in damp open woods in thickets and shrub boarders.
Long-calyx eggvetch	*Astragalus oophorus* var. *lonchocalyx*	**Pinyon-juniper**, **sagebrush**, and mixed desert shrub communities.
Long-flowered snowberry	*Symphoricarpos longiflorus*	Found in relatively barren clay or sandy-clay knolls, slopes, and flats in the **pinyon-juniper woodland** zone.
Long-haired star-tulip	*Calochortus longebarbatus* var. *longebarbatus*	Mesic, alkaline, clay substrates in Great Basin sagebrush scrub.
Longsepal globemallow	*Iliamna longisepala*	Dry, open hillsides, gravelly streamsides, **sagebrush-covered** foothills.
Long-stemmed androsace	*Androsace elongata* ssp. *acuta*	Found on slopes, coastal sagebrush scrub, meadows and seeps, **pinyon and juniper** woodland, and valley and foothill **grasslands**
Loose beardtongue	*Penstemon laxus*	Dry meadows, **sagebrush** slopes and swales, and open to sparsely wooded slopes.
Loose-flowered vetch	*Astragalus tenellus*	**Grasslands, sagebrush, pinyon-juniper**; plains, Foothills, Montane
Lost Creek wild buckwheat	*Eriogonum brevicaule* var. *mitophyllum*	**Grasslands, sagebrush, pinyon-juniper**; dry, sunny site with a poor, sandy soil
Lost River Silene, lobed catchfly	*Silene scaposa* var. *lobata*	**Sagebrush**; scrubland, slope
Lost River whitlow-grass	*Draba hitchcockii*	Limestone outcrops and gravelly soils, **sagebrush**
Low feverfew	*Parthenium ligulatum*	Black **sagebrush**, pygmy sagebrush, and **pinyon-juniper** communities.
Macfarlane's four-o'clock	*Mirabilis macfarlanei*	On steep slopes and ridgelines of all aspects in the **pinyon-juniper** zone.
Mackenzie's phacelia	*Phacelia lutea* var. *mackenzieorum*	In the **pinyon-juniper and sagebrush** zones. Endemic to the Pine Nut and Virginia Ranges.
Maguire's daisy	*Erigeron maguirei*	Formations in lower limits of **juniper** woodland communities.
Malheur penstemon	*Penstemon miser*	Diatomite and ash soils, often weathered to clay, in sparse **sagebrush/juniper** communities.
Margaret rushy milkvetch	*Astragalus convallarius* var. *margaretiae*	Grows beneath **sagebrush** (*Artemisia tridentata)* in **pinyon-juniper** woodland.
Marigold navarretia	*Navarretia tagetina*	Found in open, **grassland** flats, vernal pools.
Masonic Mountain jewelflower	*Streptanthus oliganthus*	Plant communities include **sagebrush**, Great Basin scrub, and **pinyon-juniper** woodland.
McGee Meadows lupine	*Lupinus magnificus* var. *hesperius*	Sandy or gravelly in Great Basin **sagebrush** scrub (volcanic ash) and **pinyon and juniper** woodland.

Common Name	*Latin Name*	Habitat Description
Meadow milkvetch	*Astragalus diversifolius*	Moist, often alkaline meadows and swales in **sagebrush** valleys or closed drainage basins.
Meadow pussy-toes	*Antennaria corymbosa*	**Sagebrush***;* found in loose, sandy to gravelly soils, in the creosote-bursage, blackbrush, and mixed-shrub zones.
Membrane-leaved monkeyflower	*Erythranthe hymenophylla*	In the **pinyon-juniper** and mountain **sagebrush** zones.
Midget quillwort	*Isoetes minima*	Found in seasonally wet swales in big **sagebrush** shrub steppe.
Milo baker's cryptantha	*Cryptantha milo-bakeri*	**Pinyon-juniper***;* rocky, gravelly soil, sometimes serpentine, in conifer or mixed conifer-deciduous forests, Jeffrey pine.
Miner's candle	*Cryptantha scoparia*	Found in dry open slopes in mixed desert shrub, **sagebrush**, and **pinyon -juniper** communities.
Modoc Rim sideband	*Monadenia fidelis* ssp. *nov. (Modoc Rim)*	Found in mesic **forests habitats** or near springs or other water sources in forest situations.
Mono County Phacelia	*Phacelia monoensis*	It grows along with **sagebrush**, **pinyon-juniper**, great basin scrub, and rabbitbrush.
Mono Lake lupine	*Lupinus duranii*	Volcanic pumice, gravelly in Great Basin **sagebrush** scrub.
Mono milk-vetch	*Astragalus monoensis*	Sandy in Great Basin **sagebrush** scrub.
Moss	*Bruchia flexuosa*	Occurring in small clusters in openings among **grasslands** on open expanses of seasonally moist bare soil.
Moss	*Bryoerythrophyllum columbianum*	Habitats include **grassland** steppe as well as ledges and bluffs near rivers.
Moss	*Ephemerum crassinervium*	**Grasslands**; found on damp disturbed soil, often in old fields, paths, river banks or spots of open bare ground.
Moss	*Ephemerum serratum*	**Grasslands**; finely grained soil in arable fields, mud at the margins of reservoirs and rivers, or as part of the ephemeral community on tracks.
Moss	*Orthotrichum euryphyllum*	Primarily in dry **pinyon juniper** (*Juniperus occidentalis)*, *Pinus ponderosa*, and **sagebrush** *(Artemisia tridentata)* associations.
Moss	*Physcomitrium immersum*	**Grasslands**; grows on wet soil in floodplains or mud flats, also at roadsides and in bare spots of fields.
Moss	*Pseudephemerum nitidum*	**Grasslands**; grows on the edge of fields.
Moss	*Rhytidiadelphus subpinnatus*	**Grasslands**; grows heavily on grazed pastures and on mown fairways on golf courses.
Moss	*Thamnobryum neckeroides*	Found in open, gravelly soils in the subalpine conifer, subalpine **sagebrush**, mountain mahogany, and upper **pinyon-juniper** zones.
Mound cryptanth	*Cryptantha compacta*	**Sagebrush**; salt desert shrub and mixed desert shrub communities.
Mount Moriah beardtongue	*Penstemon moriahensis*	Habitats include scrubby **sagebrush**/mountain mahogany woodlands, open sagebrush meadows and slopes, and upper **pinyon-juniper** and pinyon woodland.
Mountain townsendia	*Townsendia montana*	**Pinyon-juniper**; mainly in the subalpine conifer zone.

Common Name	*Latin Name*	Habitat Description
Mourning milkvetch	*Astragalus atratus* var. *inseptus*	**Grasslands**; endemic to the Snake River Plain in Idaho. Occurs on sparsely vegetated ridge crests.
Mulford's milkvetch	*Astragalus mulfordiae*	**Sagebrush**; gentle to steep south and west-facing slopes in shrub-steppe or desert shrub communities.
Murdock's evening primrose	*Oenothera murdockii*	Barrens, Forest/Woodland, **Woodland - Conifer**
Naked-stemmed evening-primrose	*Chylismia scapoidea* ssp. *scapoidea*	**Sagebrush** desert, mostly in sandy or gravelly soils, including sand dunes and unstable areas.
Narrowleaf grapefern	*Botrychium lineare*	**Grasslands, pinyon-juniper**; meadow dominated by knee-high grass, shaded woods and woodlands. Early seral habitats
Narrow-leaved amole	*Chlorogalum angustifolium*	**Grasslands, pinyon-juniper**; grows in heavy, rocky, soils in woodland and on grassy hillsides.
Narrow-stem cryptantha	*Cryptantha gracilis*	Open, sandy, gravelly, or clay slopes and flats in the salt-desert, shadscale, and lower **sagebrush** zones.
Needle Mountains milkvetch	*Astragalus eurylobus*	Gravel washes and sandy soils in alkaline desert and arid **grassland**.
Needleleaf sedge	*Carex duriuscula*	Occurs in the desert along disturbed areas. Also found in a forest, **grassland**, meadow, and riparian areas.
Neese narrowleaf penstemon	*Penstemon angustifolius* var. *dulcis*	Four-winged saltbush, **sagebrush-***Eriogonum*, and **juniper** communities of sand dunes.
Nevada lupine	*Lupinus nevadensis*	Hillsides and valley floors, on dry, sandy, and stony soil with **pinyon-juniper** and **sagebrush**.
Nevada suncup	*Camissonia nevadensis*	Open, sandy, gravelly, or clay slopes and flats in the salt-desert, shadscale, and lower **sagebrush** zones.
Nevada willowherb	*Epilobium nevadense*	Mixed-mountain brush and **pinyon-juniper**-mountain brush
Newberry's milkvetch	*Astragalus newberryi* var. *castoreus*	**Woodland**, rocky outcrops, gravely hillsides.
Northern golden-carpet	*Chrysosplenium tetrandrum*	Gentle slopes in open areas or under shrubs in the upper salt desert and lower **sagebrush** zones.
Northern grass-of-parnassus	*Parnassia palustris* var. *tenuis*	Found in mountain ranges.
Northern microseris	*Microseris borealis*	**Grasslands, sagebrush**; meadow steppe habitat dominated by bunchgrasses and forbs.
Northern wormwood	*Artemisia campestris* ssp. *borealis* var. *wormskioldii*	Grows in generally arid with sagebrush shrub steppe vegetation.
Northwestern yellowflax	*Sclerolinon digynum*	Occurs in vernal pools margins and seasonally wet gravelly to rocky soils. Also found in **grasslands**.
Nuttall's sandwort	*Minuartia nuttallii* ssp. *fragilis*	Open, gravelly benches, dry rocky areas, or limestone talus from open **sagebrush** hills to alpine slopes.
Obscure scorpionflower	*Phacelia inconspicua*	Open sandy spots in **sagebrush/grass zone, near junipers**.
Ochoco lomatium	*Lomatium ochocense*	**Grasslands, sagebrush**; open, barren scabland with *Artemisia rigida*/*Poa secunda* plant association.

Common Name	***Latin Name***	**Habitat Description**
Oregon daisy	*Erigeron oreganus*	Dry, open soils among boulders in healthy **sagebrush** steppe vegetation.
Oregon white-top aster	*Sericocarpus oregonensis* var. *oregonensis*	Found in mesic to moist habitats, well-drained open **woodlands**, and dry, open, often rocky coniferous forest.
Osgood Mountains milkvetch (also identified as "mudflat milkvetch")	*Astragalus yoder-williamsii*	Dry, cold ridge crests, stony flats, and disturbed roadbeds. Associated with low **sagebrush** and big mountain sagebrush.
Ostler pepperplant	*Lepidium ostleri*	**Pinyon-juniper** community, often in shaded sites on limestone outcrop.
Ostler's ivesia or Wah Wah ivesia	*Ivesia shockleyi* var. *ostleri*	**Pinyon-juniper** and adjacent ponderosa pine communities in crevices of quartzite or whitish outcrops.
Owyhee clover	*Trifolium owyheense*	Barren slopes in **sagebrush-steppe** or desert shrub vegetation.
Owyhee prickly phlox	*Leptodactylon glabrum*	**Generalist;** Found in disturbed silty clay soils of valley bottoms in salt desert vegetation, or on roadsides or in abandoned fields.
Owyhee sagebrush	*Artemisia papposa*	This species grows in meadows, alkaline flats, and **sagebrush-juniper** slopes.
Pacific fir-moss	*Huperzia miyoshiana*	Found in loose soil and rock crevices among boulders in **pinyon-juniper** woodlands and **sagebrush** shrublands.
Pacific pea	*Lathyrus vestitus* ssp. *ochropetalus*	Dry, open to wooded areas, forest edges, and roadsides, near or within historical prairies **Pinyon-juniper**, **grasslands**.
Packard's buckwheat	*Eriogonum shockleyi* var. *packardiae*	Occurs in the **sagebrush**-steppe zone of the western Snake River Plain, in azonal microhabitats.
Packard's desert parsley	*Lomatium packardiae*	Found within **sagebrush** communities, on dry, open, rocky clay soils derived from rhyolite or volcanic ash.
Packard's milkvetch	*Astragalus cusickii* var. *packardiae*	Shrub-steppe, and to a lesser extent bunchgrass **grassland** community.
Pahrump silverscale	*Atriplex argentea* var. *longitrichoma*	Saline valley bottoms, with shrubby saltbush, creosote bush, mesquite, and annual weedy grasses and forbs, **grasslands**.
Pahute Mesa beardtongue	*Penstemon pahutensis*	In loose soil and rock crevices among boulders in **pinyon-juniper** woodlands and sagebrush shrublands.
Paiute lomatium	*Lomatium ravenii var. paiutense*	Flats, slopes, ridges, generally alkaline soils, **sagebrush**, **pinyon-juniper** woodlands.
Pale blue-eyed grass	*Sisyrinchium sarmentosum*	Forest - Conifer, Forest/Woodland, **Grassland**/herbaceous.
Palmer's buckwheat	*Eriogonum palmerianum*	Sandy to gravelly washes, flats, and slopes, saltbush, greasewood, creosote bush, blackbrush, and **sagebrush** communities, **pinyon** and/or **juniper** woodlands
Palmer's evening-primrose	*Tetrapteron palmeri*	Grows in desert and **sagebrush** habitats.
Palouse goldenweed	*Pyrrocoma liatriformis*	Grassland communities and transition zones between prairie and open ponderosa pine. It also occurs in mesic **grassland** habitats.
Palouse milk-vetch	*Astragalus arrectus*	Grassy loess hillsides, **sagebrush** slopes, river bluffs, and openings in yellow pine forest.
Palouse thistle	*Cirsium brevifolium*	Open **grasslands** and grassy areas (roadsides) rarely extending far into forest or shrublands.

Common Name	*Latin Name*	Habitat Description
Panamint dudleya	*Dudleya saxosa* subsp. *saxosa*	Great Basin scrub/**sagebrush** and **pinyon and juniper** woodland.
Panamint Mountains buckwheat	*Eriogonum microthecum* var. *panamintense*	Rocky, sometimes carbonate in Great Basin scrub/**sagebrush** and **pinyon and juniper** woodland.
Panamint Mtns. lupine	*Lupinus magnificus* var. *magnificus*	Gravelly or rocky, vernally mesic in Great Basin scrub/**sagebrush** and **pinyon and** juniper woodland.
Parish's horse-nettle	*Solanum parishii*	Grows in many types of habitats, including inland chaparral/**sagebrush**, woodlands, and forests.
Parry's petalonyx	*Petalonyx parryii*	Often found in warm, dry desert regions. Dry, desert washes.
Pasqueflower	*Anemone patens* var. *multifida*	Prairies and **grasslands**, open alpine slopes and ridges in loose, sandy, well-drained soil.
Pauper milk-vetch	*Astragalus misellus* var. *misellus*	Habitat is stony hills and pastures and gravelly clay banks, on basaltic bedrock, with **sagebrush** and **juniper**.
Pauper milk-vetch	*Astragalus misellus* var. *pauper*	Associated species include **sagebrush**, rock buckwheat, bluebunch wheatgrass, and yellow fleabane.
Payson's bladderpod	*Lesquerella paysonii*	Windswept, gravelly, calcareous ridgecrests, semi-open slopes, and rocky floodplains. Often associated with **sagebrush**/**grassland** communities.
Payson's milkvetch	*Astragalus paysonii*	Endemic of Clearwater Mountains; occurs primarily in disturbed areas such as recovering burns, clear cuts, road cuts, and blow downs. **Grassland**, **sagebrush, pinyon-juniper.**
Peck's Indian paintbrush	*Castilleja peckiana*	Dry areas. Sandy or gravelly soil, open pine forests, **sagebrush** slopes.
Peninsular onion	*Allium peninsulare*	Valley **Grassland**, Foothill Woodland, and Coastal Chaparral.
Perennial thelypody	*Thelypodium flexuosum*	Moderately to strongly alkaline sandy loam or clay, open deserts, **sagebrush** scrub
Phipp's hawthorn	*Crataegus phippsii*	Occurs in open thickets. Sometimes found in riparian areas. Forest/Woodland, Shrubland/chaparral/**sagebrush**, Woodland **-** Conifer.
Picabo milkvetch	*Astragalus oniciformis*	Occurs almost exclusively on the *Artemisia tridentata* var. *wyomingensis/Stipa comata* habitat type. **Sagebrush**.
Pine Nut Mountains mousetails	*Ivesia pityocharis*	Shrubland/chaparral. Seasonally saturated soils in **sagebrush** flats.
Pink egg milkvetch	*Astragalus oophorus* var. *lonchocalyx*	**Pinyon-juniper**, **sagebrush**, and mixed desert shrub communities.
Pinnate spring-parsley	*Cymopterus beckii*	Sandy or stony crevices, ledges, and cliff bases on Navajo Sandstone in **pinyon-juniper**, mountain brush, and ponderosa pine.
Pinyon Mesa buckwheat	*Eriogonum mensicola*	Great Basin scrub/**sagebrush**
Pinyon penstemon	*Penstemon pinorum*	**Pinyon-juniper**, mountain-mahogany, ephedra, oak, **sagebrush**, and less commonly greasewood communities.
Pioche blazingstar	*Mentzelia argillicola*	Found in forb, herb, and subshrub. **Grassland**, **sagebrush.**
Piper's daisy	*Erigeron piperianus*	Commonly found in virgin stands of the big **sagebrush**/bluebunch wheatgrass association.

Common Name	***Latin Name***	**Habitat Description**
Playa phacelia	*Phacelia inundata*	Great Basin, scrub/**sagebrush**, Playa/salt flat. Alkali playas and seasonally inundated areas with clay soils.
Plumas ivesia	*Ivesia sericoleuca*	Volcanic, rocky, sometimes roadsides in Great Basin scrub and **pinyon and juniper** woodland.
Plumed clover	*Trifolium plumosum* ssp. *plumosum*	Dry hillsides and meadows. Associated species include ponderosa pine, lupine, and Idaho fescue. **Grassland**, **pinyon-juniper.**
Plumed clover	*Trifolium plumosum* var. *amplifolium*	Known from Palouse prairie remnants, forest edge, and one site described as a sedge wetland to open Pinus ponderosa forest with bunchgrass understory. **Grassland, pinyon-juniper.**
Polished blazingstar	*Mentzelia polita*	Open areas in mixed desert shrub communities. **Sagebrush**
Prairie moonwort	*Botrychium campestre*	Occurs primarily in non-forested habitats at low elevations, although it may grow under shrubs in or at the margins of these habitats. **Grassland**, **sagebrush**
Prickly-poppy	*Argemone munita* ssp. *rotundata*	Found on open slopes and foothills. **Grassland**, **sagebrush, pinyon-juniper.**
Prostrate bladderpod	*Lesquerella prostrata*	**Sagebrush**, **grassland**, and **juniper** communities.
Prostrate ceanothus	*Ceanothus prostratus*	Dry to mesic forest sites, often associated with chaparral/**sagebrush**.
Psorlea globemallow	*Sphaeralcea psoraloides*	Desert, Forest/Woodland, Woodland - Conifer. Salt and mixed desert shrub communities. **Pinyon-juniper** communities
Puget balsamroot	*Balsamorhiza deltoidea*	Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Foothill Woodland, Chaparral, Valley **Grassland**, (many plant communities).
Pulsifer's milk-vetch	*Astragalus pulsiferae* var. *pulsiferae*	Rocky, carbonate in Great Basin scrub and **pinyon and juniper** woodland.
Pulsifer's monkey-flower	*Erythranthe pulsiferae*	Seasonally wet or moist open areas; often in exposed mineral soil or in grass/forb openings in ponderosa pine, Douglas fir. **Grassland**.
Purple cymopterus	*Cymopterus purpurascens*	Found in desert regions and near **pinyon-juniper** woodland.
Pygmy suncup	*Camissonia pterosperma*	**Pinyon-Juniper** Woodland
Rabbit Valley gilia	*Aliciella caespitosa*	Found within open **pinyon-juniper** communities, often mixed with mountain brush, **sagebrush**, or ponderosa pine.
Rabbitbrush or Bloomer's goldenweed	*Ericameria bloomeri*	Grows in coniferous forests, **pinyon-juniper**.
Racemose pyrrocoma	*Pyrrocoma racemosa* var. *racemosa*	Northern Juniper Woodland, **Sagebrush** Scrub, Alkali Sink, Red Fir Forest, wetland-riparian.
Railroad Canyon buckwheat	*Eriogonum soliceps*	Gravelly soil, **sagebrush** communities.
Railroad Valley globemallow	*Sphaeralcea caespitosa* var. *williamsiae*	Greasewood, shadscale, and mixed shrubs zones/**sagebrush**, often more abundant on recovering disturbances such as washes and roadsides.
Red poverty weed	*Micromonolepis pusilla*	May be found in plains, open pine forest, chaparral slopes, and dry rock cliffs. Desert regions, in saline or alkaline clay soils, salt-encrusted soils, or edges of alkaline ponds.
Redberry	*Rhamnus ilicifolia*	Chaparral, sagebrush, montane forests.

Common Name	***Latin Name***	**Habitat Description**
Red-fruited lomatium	*Lomatium erythrocarpum*	Generally found in open areas, in the ecotone between shrub-steppe/**sagebrush** vegetation, dominated by mountain mahogany and big sagebrush
Red-rooted yampah	*Perideridia erythrorhiza*	Found in moist prairies with tufted hairgrass and California oatgrass. Also pastureland, **grasslands**, and wood edges.
Reese River phacelia	*Phacelia glaberrima*	Low, barren hills with white, alkaline clay soils. Also limestone talus. Generally on steeper slopes of low hills, bluffs, and badlands in shadscale-greasewood, **sagebrush**, and lower **pinyon-juniper** zones.
Rigid threadbush	*Nemacladus rigidus*	Desert scrub, juniper or **pinyon-juniper** woodland, sandy and gravelly wash bottoms, volcanic ash.
Roadside agrimonia	*Agrimonia striata*	Moist places, generally in woodland; Moist upper elevation mixed conifer forests, forest edges, forests, meadows and fields, **grasslands**, woodlands.
Rock melic, nodding melicgrass	*Melica stricta*	**Sagebrush** Scrub, Yellow Pine Forest, Red Fir Forest, Northern Juniper Woodland, Lodgepole Forest, Subalpine Forest, Bristle-cone Pine Forest.
Rock purpusia	*Ivesia arizonica* var. *saxosa*	Crevices of cliffs and boulders on volcanic and possibly carbonate rocks in the upper mixed-shrub, **sagebrush**, and **pinyon-juniper** zones.
Rollins' lomatium	*Lomatium rollinsii*	Mid to low elevation canyon **grasslands** of early to late seral successional stage. Found on gentle to steep slopes.
Rose checker-mallow	*Sidalcea malviflora* ssp. *virgata*	Open meadows, **grasslands**, prairies, grassy hillsides, fencerows, roadsides, and in low mountain areas.
Rose's lomatium	*Lomatium roseanum*	Bare rock/talus/scree, Shrubland/chaparral. Usually found within low **sagebrush** vegetation. Also common in open, dry, basalt talus.
Rosy balsamroot	*Balsamorhiza rosea*	Dry, rocky slopes at low elevation, shrube-steppe, **sagebrush**
Rosy owl-clover	*Orthocarpus bracteosus*	**Sagebrush** Scrub, Northern **Juniper** Woodland. Likely to occur in wetlands and non-wetlands.
Rosy pussypaws	*Calyptridium roseum*	Occurs usually in nonwetlands, occasionally in **Sagebrush** Scrub, Northern Juniper Woodland, Red Fir Forest, Lodgepole Forest.
Rough pyrrocoma	*Pyrrocoma scaberula*	Mesic **grasslands** and transition zones between grasslands and ponderosa pine communities.
Rural paintbrush	*Castilleja flava* var. *rustica*	Subalpine **sagebrush** steppe, rocky slope.
Sabin's lupine	*Lupinus sabinianus*	Lower to mid-elevation mixed coniferous forests and transitional **grasslands**.
Saddle Mountain bittercress	*Cardamine pattersonii*	**Grassland**/herbaceous. Moss mats over bare rocks, moist cliffs and other rocky slopes, and grassy balds.
Sagebrush loeflingia	*Loeflingia squarrosa* var. *artemisiarum*	Rocky, carbonate in Great Basin scrub, sagebrush, and **pinyon-juniper** woodland.
Sagebrush pygmyleaf	*Loeflingia squarrosa* ssp. *artemisiarum*	Occurs in dry soils and loose sands of washes. Found in Great Basin scrub, Sonoran Desert scrub, and **sagebrush**.
Sagebrush stickseed	*Hackelia hispida* var. *disjuncta*	**Sagebrush**; rocky talus (sparsely-vegetated) at elevations of 600 to 2100 feet in the Columbia Basin and Eastern Cascades.
Saline plantain	*Plantago eriopoda*	Alkaline meadows at lower elevations, marshes, prairies, plains, **grasslands**.

Common Name	*Latin Name*	Habitat Description
Salt heliotrope	*Heliotropium curassavicum*	Occurs in yellow pine forest, red fir forest, lodgepole forest, foothill woodland, chaparral/**sagebrush**, valley g**rassland**.
Sanborn's onion	*Allium sanbornii* var. *sanbornii*	Heavy serpentine clay. chaparral/**sagebrush**, foothill woodland, yellow pine forest.
Sand seep clover or Kane white-tip clover	*Trifolium variegatum* var. *parunuweapensis*	Drainage bottoms with rushes within ponderosa pine and **pinyon-juniper** woodland.
Scapose or tufted Townsend daisy	*Townsendia scapigera*	Openings in sagebrush. **Sagebrush** Scrub, **Pinyon-Juniper** Woodland, Subalpine Forest, Lodgepole Forest.
Scarlet buckwheat	*Eriogonum phoeniceum*	Tuffaceous ash outcrops, **sagebrush** communities, **pinyon-juniper** woodlands.
Schoolcraft buckwheat	*Eriogonum microthecum* var. *schoolcraftii*	Sandy to rocky soil, **sagebrush** communities, pinyon-juniper woodlands.
Schoolcraft catseye	*Cryptantha schoolcraftii*	**Sagebrush** steppe zone.
Scribner's grass	*Scribneria bolanderi*	**Sagebrush, grassland**, sterile or sandy to rocky soil, often along roadsides, mostly in foothills and lower mtns.
Scrub lotus	*Lotus argyraeus* var. *multicaulis*	**Pinyon-juniper** woodland
Serpentine catchfly	*Silene hookeri* ssp. *serpentinicola*	Serpentine soils, chaparral/**sagebrush**, conifer forest.
Serpentine dwarf rose	*Rosa gymnocarpa* var. *serpentina*	Forest/Woodland, Shrubland/chaparral/**sagebrush**. Full sun in chaparral, dwarf forest on ultramafic substrates.
Sevier townsendia	*Townsendia jonesii* var. *lutea*	Salt desert and mixed desert shrub, **pinyon-juniper** and **sagebrush** communities.
Sexton mt. mariposa-lily	*Calochortus indecorus*	Rocky, serpentine substrates. Probably in woodlands with grassy openings, **pinyon-juniper**, **grassland**
Shaggy horkelia	*Horkelia congesta* ssp. *congesta*	**Grassland** and oak savannah remnants and grassy balds.
Sharpfruited peppergrass	*Lepidium oxycarpum*	Valley **Grassland**, Coastal Salt Marsh, wetland-riparian.
Shasta orthocarpus	*Orthocarpus pachystachyus*	Alkaline in Great Basin scrub, **sagebrush**.
Shevock bristlemoss	*Orthotrichum shevockii*	Habitat is arid **pinyon-juniper** woodland to very open ponderosa pine forests. It is restricted to very large granitic boulders and rock walls.
Shiny-fruited popcorn flower	*Plagiobothrys lamprocarpus*	Moist places in an old [dirt] road.
Shockey's or matted cowpie buckwheat	*Eriogonum shockleyi* var. *shockleyi*	Gravelly or clayey flats, washes, and slopes, saltbush, blackbrush, and **sagebrush** communities, **pinyon-juniper** woodlands.
Shockley's ivesia	*Ivesia shockleyi*	Open, exposed rocky ridges and outcrops. Associates with **pinyon-juniper** woodlands and ponderosa pine forests.
Short-flowered eriogonum	*Eriogonum brachyanthum*	Creosote bush, other warm desert shrub, **sagebrush**, shad-scale communities
short-lobed penstemon	*Penstemon seorsus*	Dry, open, rocky places in the plains and foothills, often with **sagebrush**.

Common Name	*Latin Name*	Habitat Description
Sickle-pod rockcress	*Boechera atrorubens*	Rocky summits and sandy loam on **sagebrush** slopes.
Sickle-pod rockcress	*Arabis sparsiflora* var. *atrorubens*	Rocky summits and sandy loam on **sagebrush** slopes.
Sierra brodiaea	*Triteleia ixioides* ssp. *anilina*	Coniferous forest edges, often in moist gravel or sand, **pinyon-juniper**.
Sierra Valley ivesia	*Ivesia aperta* var. *aperta*	Clay, often roadsides in Great Basin scrub and **pinyon** and **juniper** woodland.
Simpson's hedgehog cactus	*Pediocactus simpsonii*	**Pinyon-juniper** woodlands, sagebrush, montane and prairie **grasslands**, and coniferous forests.
Siskiyou fairy bells	*Prosartes parvifolia*	Montane conifer, mixed-evergreen forest, exposed roadsides, **pinyon-juniper**.
Siskiyou mariposa-lily	*Calochortus persistens*	Open areas of ridgeline rock outcrops and talus within montane shrub plant communities of coniferous forests, **sagebrush**.
Siskiyou monardella	*Monardella purpurea*	Rocky slopes, generally on serpentine or related bedrock, chaparral, woodland, montane forest, **sagebrush, pinyon-juniper**.
Siskiyou phacelia	*Phacelia leonis*	Upper montane coniferous forest openings; sometimes serpentinite. Sandy flats, slopes, conifer forest, **pinyon-juniper**.
Slender moonwort	*Botrychium lineare*	Cliff, Forest - Conifer, Forest/Woodland, **Grassland**/herbaceous, Woodland - Conifer
Slender sedge	*Carex lasiocarpa* var. *americana*	**Grasslands**/Grass-like habitat.
Slender-flowered evening-primrose	*Tetrapteron graciliflorum*	Open or shrubby slopes, generally clay soils, **grassland**, oak and Joshua-tree woodland.
Slickspot peppergrass	*Lepidium papilliferum*	Playa/salt flat, Shrubland/chaparral. Semi-arid, **sagebrush-**steppe habitats.
Small-flower evening-primrose	*Eremothera minor*	Sandy slopes, flats, **sagebrush** scrub.
Smoky Mt. globemallow	*Sphaeralcea grossulariifolia* var. *fumariensis*	Desert, forest/woodland, shrubland/chaparral, **sagebrush**, woodland - conifer.
Smooth mentzelia	*Mentzelia mollis*	Barren. Ash/claybed outcrops. Adjacent areas support **sagebrush-**shadscale plant communities.
Smooth wild cabbage	*Caulanthus crassicaulis* var. *glaber*	Dry **sagebrush** scrub, **pinyon/juniper** woodland.
Snake River cryptantha	*Cryptantha spiculifera*	Dry, open, flat, or sloping areas in stable or stony soils, with low vegetative cover. **Sagebrush, grasslands**.
Snake River goldenweed	*Pyrrocoma radiata*	A grazing-modified **sagebrush/grassland** community and steep, rocky hillsides.
Snowball cactus	*Pediocactus nigrispinus*	**Sagebrush**, **grasslands**, and coniferous forests.
Soldier Meadow cinquefoil	*Potentilla basaltica*	**Grassland**/herbaceous and in alkaline meadows above, and outflow stream margins below, desert springs.
South Fork John Day milk-vetch	*Astragalus diaphanus* var. *diurnus*	Dry, barren slopes and in openings in pinyon-**juniper** woodland.
Southern Oregon buttercup	*Ranunculus austrooreganus*	Open oak savannahs and **grasslands** and along the margins of rocky vernal pools.

Common Name	***Latin Name***	**Habitat Description**
Spinescent fameflower	*Phemeranthus spinescens*	Basaltic outcrops and scablands in **sagebrush** deserts.
St. George blue-eyed grass	*Sisyrinchium radicatum*	**Grassland**/herbaceous. Occurs in moist, sometimes alkaline meadows, stream banks, and borders of springs.
Stalked moonwort	*Botrychium pedunculosum*	**Grassland, pinyon-juniper**, mountain meadows, streamside areas, open- to closed-canopy forests and woodlands, roadsides or similarly open or disturbed habitats.
Starveling milkvetch	*Astragalus jejunus* var. *jejunus*	Occurs on dry barren ridges and bluffs of shale, sandstone, clay, or cobblestones. Barrens, Shrubland/chaparral, sagebrush.
Steamboat monkeyflower	*Diplacus ovatus (Mimulus ovatus)*	Dry slopes in **sagebrush** and **pinyon-juniper** communities.
Stebbin's malacothrix	*Malacothrix stebbinsii*	Gravelly soils beneath shrubs, along ditches, near streams, in **sagebrush** steppes, creosote bush scrublands.
Sticky pyrrocoma	*Pyrrocoma lucida*	Carbonate or volcanic, gravelly or rocky substrate in **pinyon** and **juniper** woodland.
Stiff milkvetch or Idaho milkvetch	*Astragalus conjunctus* var. *conjunctus*	Dry rocky slopes, scablands, and hilltops throughout the **sagebrush** desert. It typically is found above 2000 feet.
Succor Creek parsley	*Lomatium packardiae*	Usually found within low **sagebrush** vegetation. Also common in open, dry, basalt talus.
Suksdorf's milk-vetch	*Astragalus pulsiferae* var. *suksdorfii*	Sandy, volcanic, lake margins in Great Basin scrub, sagebrush, and **pinyon** and **juniper** woodland.
Sunnyside green gentian	*Frasera gypsicola*	Barrens, desert, shrubland/chaparral, sagebrush. White soils encrusted with mineral salts in valley bottoms.
Susanville beardtongue	*Penstemon sudans*	Forest/Woodland, Shrubland/chaparral. Open, **sagebrush-** or woodland-dominated, rocky slopes on volcanic, alkaline clay, or other igneous substrates.
Tall buckwheat	*Eriogonum elatum var. elatum*	Sandy to gravelly slopes and flats, mixed **grassland** and **sagebrush** communities**, pinyon-juniper**, and conifer woodlands.
Tecopa birdbeak	*Cordylanthus tecopensis*	Desert, **Grassland**/herbaceous. Mohavean desert scrub, alkali flats and meadows below 2500 feet.
Thin-leaved peavine	*Lathyrus holochlorus*	Characteristic habitat is believed to be grassland or prairie edge/oak savanna/prairie-oak woodland ecotone, which historically was maintained by fire.
Thompson's chaenactis	*Chaenactis thompsonii*	Barrens, **Grassland**/herbaceous. Mostly restricted to serpentine soils.
Thompson's clover	*Trifolium thompsonii*	Dry, open **grasslands** dominated by Idaho fescue and bluebunch wheatgrass, occasionally ponderosa woods.
Thompson's paintbrush	*Castilleja thompsonii*	Dry soil, frequently associated with **sagebrush**. Local on open slopes and bald summits of the surrounding mountains to about 7000 ft.
Three-leaf goldthread	*Coptis trifolia*	Sandy or gravelly soil of **grasslands**, sagebrush steppe, barren slopes; plains, valleys.
Threeleaf milkvetch, plains milkvetch	*Astragalus gilviflorus*	Barren knolls, stony hilltops, gullied bluffs and badlands, on limestone, shale or sandstone in **sagebrush** communities at 5340-6590 feet.
Three-toothed horkelia	*Horkelia tridentata* ssp. *tridentata*	Open areas, primarily in **sagebrush** communities and conifer woodlands.

Common Name	*Latin Name*	Habitat Description
Tiehm peppercress	*Stroganowia tiehmii*	Found most often within the **sagebrush** zone; outlying occurrences can be found in the surrounding lower **pinyon-juniper**.
Timwort	*Cicendia quadrangularis*	Valley **Grassland**, Northern Oak Woodland, Foothill Woodland; < 2700 m.
Tioga Pass sedge	*Carex tiogana*	**Grassland**/herbaceous. On terraces next to lakes; meadows. Mesic sites; 3090-3310 m
To be determined	*Monardella angustifolia*	Surrounding vegetation includes **sagebrush** steppe and big **sagebrush** shrubland.
Tonopah milk-vetch	*Astragalus pseudiodanthus*	Great Basin scrub, **sagebrush.**
Toquima milkvetch	*Astragalus toquimanus*	**Sagebrush, pinyon-juniper**, Forest/Woodland, Shrubland/chaparral, Woodland - Conifer. Gravelly/stony hillsides and canyon benches.
Torrey milkvetch	*Astragalus calycosus* var. *monophyllidius*	Forest - Conifer, Forest/Woodland. Open gravelly hillsides, in scattered **juniper and pinyon** forest, on limestone.
Trans montane abronia	*Abronia turbinata*	Sandy soils, desert scrub, **sagebrush**.
Tufted cryptantha	*Cryptantha caespitosa*	**Sagebrush**; populations are usually restricted to rocky or chalky ridgetops in cushion plant communities.
Tufted evening primrose	*Oenothera caespitosa* ssp. *marginata*	Rocky or sandy sites in granite, limestone, or sandstone soils, **pinyon-juniper** woodland to pine forest.
Tufted townsend daisy	*Townsendia scapigera*	**Sagebrush s**crub, **pinyon-juniper w**oodland, subalpine forest, lodgepole forest, bristle-cone pine forest.
Tunnel Springs beardtongue	*Penstemon concinnus*	Endemic to the Great Basin occurring in **pinyon-juniper**, blue grama, mountain mahogany, cliff rose, and **sagebrush** communities.
Twin-spiked moonwart	*Botrychium paradoxum*	Montane to subalpine **grasslands** or forb-dominated meadows. Also in western red cedar forests.
Tygh Valley milk-vetch	*Astragalus tyghensis*	Dry rocky soils with a thin overlying sandy layer. Part of mounded prairies, open bunchgrass **grasslands**, or semi-open **pinyon-juniper** communities.
Umpqua mariposa-lily	*Calochortus umpquaensis*	Found within a rather broad continuum of habitats, from closed canopy coniferous forests and pinyon-juniper to rather open, species-rich, grass-forb meadows, **grasslands,** and **sagebrush**
United blazingstar, ventana stickleaf	*Mentzelia congesta*	Disturbed slopes, **sagebrush** scrub, **pinyon-juniper** woodlands, pine forests.
Upward-lobed moonwort	*Botrychium ascendens*	Lower montane coniferous forest (mesic), **pinyon-juniper**
Utah spurge	*Euphorbia nephradenia*	Shale, clay hills, blow sand and stabilized dunes; desert shrub, **sagebrush**, and **grassland** communities.
Valley sedge	*Carex vallicola*	Dry to mesic hillsides, **grasslands**, thickets, open forests.
Veyo milkvetch	*Astragalus ensiformis* var. *gracilior*	Open valley floor in stiff clay soil, sheltering under and growing up through **sagebrush**, 4900 ft.
Wallowa ricegrass	*Achnatherum wallowaense*	**Sagebrush, grassland**, restricted to non-forested, rocky, shallow soils, dominated by *Poa secunda*, other bunchgrasses and forbs. Rigid **sagebrush** is often present.
Wanapum crazyweed	*Oxytropis campestris* var. *wanapum*	Open **sagebrush** communities dominated by shrubs and grasses on deep sand.

Common Name	*Latin Name*	Habitat Description
Ward's penstemon	*Penstemon wardii*	Semi-barren, light-colored clays (often calcareous or gypsiferous) in desert shrub, **sagebrush**, and **pinyon-juniper**.
Warner mt. bedstraw	*Galium serpenticum* ssp. *warnerense*	Steep slopes, rocky areas, meadows, **pinyon-juniper** woodland.
Washoe suncup	*Camissonia pusilla*	Dry, open to branchy slopes, flats, and roadsides on sandy soil with **sagebrush** (*Artemisia* spp.) to **pinyon-juniper**.
Wassuk beardtongue	*Penstemon rubicundus*	Desert scrub, **sagebrush**, **pinyon-juniper** ecosystems on rocky to gravelly soils on perched tufa shores.
Wavy-leaf thelypody	*Thelypodium laciniatum* var. *streptanthoides*	**Sagebrush** scrub.
Wax currant	*Ribes cereum* var. *colubrinum*	Dry habitats in conifer and oak woodlands, **pinyon-juniper**.
Webber's ivesia	*Ivesia webberi*	**Pinyon and juniper** woodland (volcanic or granitic, rocky).
Welsh's milkvetch, Loa milkvetch	*Astragalus welshii*	**Sagebrush**, **pinyon-juniper**, and **sagebrush**-aspen communities.
Western sedge	*Carex occidentalis*	Dry **grasslands**, forests.
Western yellow oxalis	*Oxalis suksdorfii*	**Sagebrush, pinyon-juniper**, open woods, fir, Douglas fir-oak woodlands, dry shrublands, roadsides, disturbed areas; 0–700 m.
Wheeler's skeleton-weed	*Chaetadelpha wheeleri*	Dunes, sandy soils and alkali flats in creosote bush scrub, **sagebrush** scrub.
White cushion erigeron	*Erigeron disparipilus*	Gravelly and rocky slopes, ridges, **sagebrush**, **grassland**.
White locoweed	*Oxytropis sericea* var. *sericea*	**Sagebrush** and **pinyon-juniper** habitats
White River swertia	*Frasera gypsicola*	White soils encrusted with mineral salts in valley bottoms.
Whited's milk-vetch	*Astragalus sinuatus*	**Sagebrush**-bunchgrass shrub-stepps on predominantly south facing slopes.
White-margined wax plant	*Glyptopleura marginata*	Sandy or rocky deserts, alkali flats, arid **grasslands**, often with *Atriplex* spp.
White-topped aster	*Sericocarpus rigidus*	Open, non-forested habitats (**sagebrush, grasslands**) that are seasonally mesic but somewhat moisture stressed during late summer.
Wilcox's penstemon	*Penstemon wilcoxii*	Grows in a range of habitats, from **sagebrush**, shrubby areas, forested slopes, moist soil, and rocky sites.
Wild crabapple	*Peraphyllum ramosissimum*	Oak-**sagebrush**, **pinyon-juniper**, mountain brush, and ponderosa pine communities.
Wildrose Canyon buckwheat	*Eriogonum eremicola*	Great Basin scrub, **sagebrush**
Willamette Valley larkspur	*Delphinium oreganum*	**Grasslands**; native wet prairies, on the edges of ash and oak woodlands, and along roadsides and fence rows.
Williams's combleaf	*Polyctenium williamsiae*	**Pinyon and juniper** woodland
Windloving buckwheat	*Eriogonum anemophilum*	Bare rock/talus/scree, desert, **sagebrush**/chaparral.
Winward's goldenbush	*Ericameria discoidea* var. *winwardii*	Landscape in the vicinity of known occurrences is predominantly mountain shrub **grassland** dominated by *Artemisia tridentata* (big sagebrush).

Common Name	*Latin Name*	Habitat Description
Wirestem buckwheat	*Eriogonum pharnaceoides* var. *cervinum*	Occurs on sandy or gravelly slopes, **sagebrush** and mountain mahogany communities, oak, **pinyon-juniper** and montane conifer woodlands.
Wolf's evening primrose	*Oenothera wolfii*	Roadcuts and roadsides near the coast and possibly, moist sandy riparian areas.
Yellow lady's-slipper	*Cypripedium parviflorum*	**Grasslands, pinyon-juniper, d**amp forest understory of mixed deciduous and coniferous forests to open meadows, and along streams in acidic soils
Yellowflower locoweed	*Oxytropis monticola*	**Grasslands**, dry, sunny hillsides, rocky slopes, prairie meadows

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Appendix K

Fire Behavior and Fuel Breaks – Great Basin Examples

Appendix K. Fire Behavior and Fuel Breaks – Great Basin Examples

A system of effective fuel breaks along roadsides can mean the difference between containment and controlling a wildfire at a few thousand acres as opposed to tens of thousands of burned acres, especially when only limited firefighting resources are available. The management of surface fuels to reduce wildfire intensity and change the fire behavior of a fire entering the fuel-altered zone allows firefighters a higher probability of successfully attacking a wildfire (Agee 2000), thus reducing the chance of the fire continuing to burn beyond the road/fuel break. In addition, opportunities to safely engage wildfires would be increased and acres burned would likely be reduced over time.

The effectiveness of an established fuel break on the spread of wildfire can be demonstrated by firsthand observations from firefighters in the field. Discussions and synopses of these fires are provided below and summarized in Table K-1. Each summary is drawn from a single source with direct knowledge of suppression operations on the fire, either in the form of a personal communication or from an internal FTEM report. In other fire suppression activities and research, fuel breaks have either slowed a fire enough for suppression crews to control the incident or have removed fuel sufficient to contain any further spread (Monsen and Memmott 1999).

Table K-1
Summary of fuel break performance in recent fire behavior.

Fire	BLM District	Noteworthy Conditions	Fuel Break Characteristics	Fuel Break Performance
2011 Southsim	Boise District	Wind gusts to 28 mph	Prostrate kochia on one side of roadway	Safe burn out location.
2012 Cox's Well	Idaho Falls District	Strong winds Hot, dry conditions	200-300 feet wide with existing vegetation mowed to 8 inches	Safe burn out location.
2012 MM86 I-84	Boise District	Occurred outside the active fire season	Prostrate kochia adjacent to I-84	Fire eventually crossed fuel break and I-84.
2017 Centennial	Twin Falls District	Winds sustained 15-20 mph	Chemical fallow not yet seeded to kochia	Air resources were diverted to a higher priority fire. Stopped forward progress of head fire. Reduced spotting potential.
2017 Oil Well	Elko District	Extreme fire behavior conditions – high winds	Unknown	Variable performance depending on fuel break configuration, vegetation, and wind-driven head fire. Stopped flanking fire.

Fire	BLM District	Noteworthy Conditions	Fuel Break Characteristics	Fuel Break Performance
2017 Snowstorm	Elko District	Higher grass fuel loadings due to increased winter and spring precipitation	300-400 feet wide Mow strips interspersed with unmowed sagebrush	Safe burn out location.
2017 Lock Fire	Boise District	Large lightning event, multiple fires. Wind speeds 23-43 mph due to cold front passage.	400 feet wide forage kochia, Sandberg's bluegrass, and crested wheatgrass.	Reduced flame lengths and rates of spread allowed suppression resources to utilize direct attack.
MM78 I 84 Fire	Boise District	Windy, hot, and dry conditions.	Mowed vegetation and Brown Strip adjacent to I-84.	Reduced flame lengths and rates of spread within mowed vegetation allowing for direct attack. Fire was held to freeway ROW by brown strip. Fuel breaks allowed the fire to be put out by a single person.
2019 Pot Hole Fire	Twin Falls District	Strong winds. Hot, dry conditions.	Chemical treatments and forage kochia with interspersed vegetation. Fuel break segments were scheduled for maintenance in the fall 2019 to reduce invading cheatgrass.	Variable performance based on condition of fuel break or distance between fuel break and advancing fire and wind driven conditions. Fuel breaks were utilized in conjunction with burnout operations to successfully stop the forward progression of the fire.
2012 Charlotte Fire	Idaho Falls District	Red Flag Weather conditions; strong winds, low relative humidity and above normal temperatures. Along with persistent drought conditions.	Not fuel breaks but rather fuels reduction treatments within dense juniper stands adjacent to WUI. Thinned, Hand Piled, and Pile Burned.	Fire outside of treated area was an active crown fire. As the fire entered the treated area, it dropped from a crown fire to a surface fire. Some isolated torching was observed.

Southsim Fire

During the Southsim fire in 2011, the prostrate kochia fuel break along the east side of Simco Road gave firefighters a safe location from which to burn out due to decreased flame lengths and the lack of spotting within the fuel break (L. Neiwert, Fire Operations Specialist Battalion 10, Boise District BLM, personal communication, 2014; L. Okeson, Fuels Program Manager, personal communication, 2014). Additionally, the only location where the Southsim Fire crossed control lines was along Highway 67 (Grandview Highway) in an area with heavy sagebrush immediately adjacent to the road. The weather hampered suppression efforts, but the prostrate kochia fuel breaks functioned well even as winds gusted to 28 mph (L. Neiwert, Fire Operations Specialist Battalion 10, Boise District BLM, personal communication, 2014).

Cox's Well Fire

In the spring of 2012, the Idaho Falls District BLM implemented the first phase of the Big Desert Fuel Breaks Project. Fuel break construction began on April 30, 2012 and consisted of mowing existing vegetation to a height of roughly eight inches in a 100-150 feet wide swath from the centerline, creating fuel breaks 200-300 feet in width. The Cox's Well Fire ignited on the afternoon of July 10, 2012 within the National Park Services (NPS) portion of the Craters of the Moon National Monument and Preserve (CMNMP). Strong, gusty winds and hot, dry conditions allowed the fire to spread quickly north, east, and south and into the Upper Snake Field Office area. Suppression operations of the wildfire began around 13:30 with initial attack crews attempting to anchor and tie the fire into the Great Rift within the BLM managed CMNMP lands. When direct attack efforts failed, crews backed off to the Arco/Minidoka Road and started improving the road grade and back burning from the road. Portions of the Arco/Minidoka Road had been treated to establish a fuel break earlier in the year, and these treated portions ultimately aided in suppression operations. During burn out operations off the Arco/Minidoka Road, flame lengths in the treated fuels compared to the untreated fuels were substantially lessened, averaging a height of approximately 2 feet. The mowed areas provided an area for suppression crews to safely and effectively implement the burn out operation and were instrumental in controlling this wildfire (B. Dyer, Fuels Lead, Idaho Falls District, personal communication, 2012).

MM86 I-84 Fire

Similar fire behavior was observed during the MM86 I-84 Fire of 2012. This was a human caused fire that started along I-84 near Lockman Butte, northwest of Mountain Home, ID. Following ignition, the fire meandered through the prostrate kochia fuel break adjacent to I-84 before eventually breaking through to the other side. Because this fire started in October, response time was slower than during the active fire season. If the fire had started during the regular fire season, it is likely that fire crews could have controlled the fire before it broke through the prostrate kochia fuel break (L. Okeson, personal communication, 2014).

Centennial Fire

The Centennial Fire was the combination of two fires that started on June 28, 2017 and was contained the following day on June 29. During that short period of time, the two fires burned together and consumed a total of 18,660 acres (progression of the fire and the relationship to the Jarbidge Fuel Breaks project can be referenced on the map below and in the Centennial Fire Video[1]). The first and largest fire was located to the southwest on DOD lands and the second fire was small, roughly 370 acres, with minimal activity. When crews arrived on scene, the first fire's forward progress to the east was stopped with the resources on site. This fire was also backing to the west-southwest into the DOD fuel break. This allowed crews to begin working the backing portion by anchoring into the black and progressing to the DOD fuel break to utilize direct attack. The second fire to the north was smoldering and a dozer line was put in around the entire perimeter. The backing fire on the first fire was stopped at around 1600; at this time both fires were no longer growing in size. Winds throughout the day were sustained 15-20 mph out of the west north-west.

[1] Centennial fire video URL: https://www.youtube.com/watch?time_continue=3&v=K_M7scIAXns

As a secondary benefit, the DOD fuel break holding the south fire allowed air resources to be diverted to a third fire that was also burning at the same time to the north (Sand Point Fire). The Sand Point Fire was several thousand acres in size and threatening structures and a popular recreation site. The Incident Commander (IC) of the Sand Point Fire requested all air resources, and because the head of the Centennial fire had been stopped and the DOD fuel break was holding the backside of the fire, the IC of the Centennial Fire concurred with that decision.

At approximately 1600, the smaller fire to the north spotted across the dozer containment line and rapidly grew in size. The wind-driven fire burned to the southeast and burned nearly 6 miles in a little over an hour. Crews were unable to keep pace with the fire as it grew in size. Between 1700 and 1730, the head of the breakout ran into the Jarbidge Fuel Breaks treatment along the Pot Hole road. This portion of fuel break had been sprayed with herbicide to begin the chemical fallow, but had not yet been seeded to kochia. The chemical fallow, however, was effective; the fuel break was devoid of cheatgrass and the perennial vegetation had been significantly stunted. Fine fuel loading within the fuel break was a fraction of the loading found outside of the fuel break.

According to the Centennial Fire IC, when the head fire ran into the fuel break it immediately stopped forward progress. This was the most northern portion of the fire where it ran into the Pot Hole fuel break. With the head fire stopped, the fire then began flanking southward along a dry creek bed. While the fire continued to flank southward, air and ground resources secured the northern flank. The south flanking fire was kept from forward progression by the dry creek bed. This part of the fire continued to run into the creek bed/fuel break for a couple of miles over the course of about a half to one hour. However, according to the IC and a post fire recon of the site, the fire was unable to spot across the dry creek bed because the fuel break was on the other side. A couple of small spot fires were found later where the fire did in fact spot into the fuel break, but those spots went out on their own and were only a few feet in size.

Crews were able to pick up the south flanking fire along the creek bed and tie it back into the main fire and all forward progress was stopped. The entire breakout consumed about 12,000 acres within a two hour period. According to the IC, if the head of the breakout had not met the fuel break, the fire would have easily jumped the road and suppression resources would not have been able to catch it. The IC also stated that the dry creek bed may have held the fire in check, but it would not have stopped the fire alone without the fuel break on the other side (Fuels Staff, Elko District, personal communication, 2017; internal FTEM report).

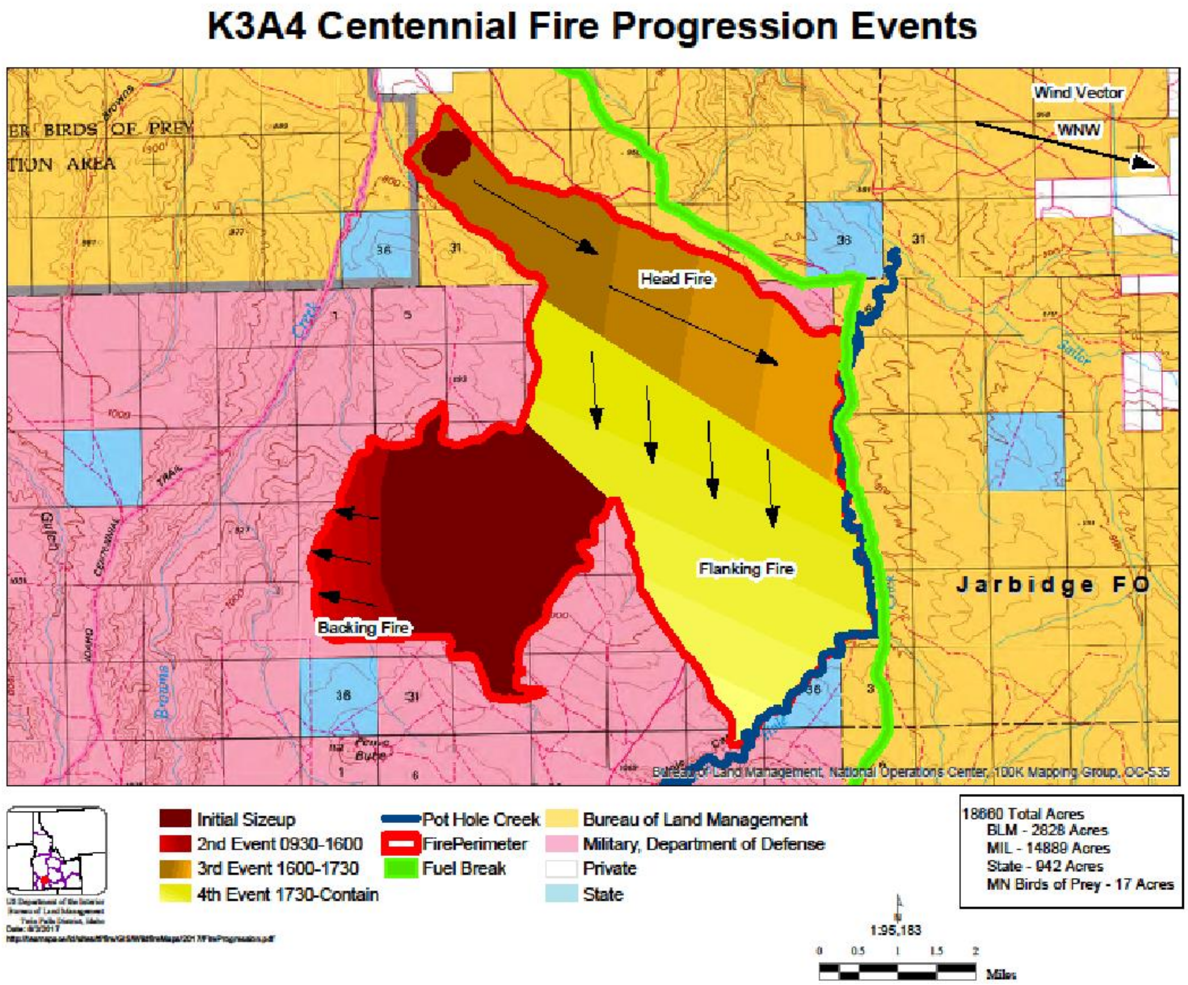

Figure K-1. Centennial Fire Progression.

Oil Well Fire

The Oil Well Fire began on the afternoon of July 17, 2017 and burned actively through the wildlands and select neighborhoods in Osino, NV, one of several small communities making up the North Elko Communities group. The fuel break network in the area was established by the Northern Communities Fuels Treatment project, which was designed in cooperation with Elko County and the communities. Beginning in 2006, the Bureau of Land Management (BLM) began installing fuel breaks adjacent to this area of urban interface to improve fire operations opportunities should fires occur in the future. The Oil Well Fire intersected approximately 8 miles of BLM fuels treatments.

Fuel breaks in the Oil Well Fire area were effective when they were tested by flanking fire. In many instances, the fire failed to spread through treated fuels on the flanks of the fire, and was extinguished without any suppression action. Conversely, the fuel breaks generally were ineffective when they were subject to wind-driven head fire. It should be noted that the head of the Oil Well Fire also jumped Interstate 80, so expectations of fuel break effectiveness should be tempered under extreme fire behavior conditions. Also, fuel breaks were less effective when configured with sharp angles such as ninety degree turns following ownership boundaries.

Attributes of effective fuel breaks at the Northern Elko Communities include:

- Configuration of fuel breaks characterized by straight or slowly curved lines
- Healthy sagebrush communities with perennial grasses occupying the interspaces between sagebrush shrubs
- Minimal cheatgrass in the herbaceous community

Conditions where fuel treatments were not effective:

- Abrupt changes in the configuration of fuel breaks (e.g., right angles following ownership boundaries, irregular doglegs)
- Abundant annual grass fuel loadings
- Treatment areas subject to wind-driven head fire (i.e., extreme fire behavior conditions) (Fuels Staff, Elko District, personal communication, 2017; internal FTEM report)

Snowstorm Fire

The Snowstorm fire was started by lightning on July 14, 2017. During fire progression from July 14 through July 18, the fire burned out of the Snowstorm Mountains and into the Owyhee Desert, where it eventually held on the northeast corner as it encountered the South Fork of the Owyhee River. The primary carrier of fire was the abundance of grass present, due to above average winter and spring precipitation. Approximately 9 miles of roadside fuels treatments were tested by the fire. The fuel break network in the area was established by the Owyhee Desert Sagebrush Focal Area Fuel Breaks project. Roadside treatments were mow strips approximately 15 yards wide, with narrow unmowed sagebrush strips between mow strips. There were typically 7-10 mow strips, creating an overall fuel break approximately 300 – 400 feet wide. A majority of the fuel breaks that were impacted by this fire were used during burnout operations.

During the first few shifts of the incident, fire mainly burned in previous fire scars where grass was abundant, and sagebrush was not a major contributor to fire spread. This was confirmed by ground observations and updated fire perimeter shape-files, where the fire nearly mirrored the perimeter of the 2006 Winters Fire. Roughly, after the third burn period, we saw a transition in fire consumption from grasses to the sagebrush communities, which led to very large runs and active burning through the night. During this period, the Elko District Fuels Staff recorded 98% live fuel moisture data from a representative site.

The fuel breaks in the Snowstorm Fire area were not tested by free ranging fire. In some instances, fuel breaks were located on the opposite side of road from the approaching fire front. In other cases, fuel breaks were used as locations for burning out in response to an advancing fire front. In the mowed areas, cheatgrass abundance varied. In some areas, seeded grass species (primarily bottlebrush squirreltail and Sandberg bluegrass) were abundant with minimal cheatgrass. Some fuel breaks were placed in a stair-step fashion, and were located at least 300 feet from the road.

Conditions at the Snowstorm Fire area where fuel treatments were not effective:

- Fuels treatments placed on east side of road, as fire approached from the west
- Abundant annual grass fuel loadings in the mow strips

- Mow strips that are placed perpendicular, rather than parallel, to the road
- Fuel breaks that were not located adjacent to the road, where a wider fuel break could be created if combined with the width of the road (Fuels Staff, Elko District, personal communication, 2017; internal FTEM report)

Lock Fire

The Lock fire started in the late afternoon of June 26 during a large lightning event that went through the eastern half of the Boise District. The Boise District staffed over 14 different fires that afternoon and the next morning. The lock fire was a lightning fire that began on the east aspect of Lockman Butte between the butte and I-84. Lockman Butte sits about 2 miles East of Mountain Home, Idaho.

This fire when initially reported was 5-10 acres mid-slope about 1000 ft away from I-84. It was active on all flanks and was being pushed around from heavy downdrafts from the cold front above it. The fire spread in all directions but as it backed towards the freeway it went out in many areas and had many fingers as it entered the old seeding that was planted in 1989.

The original seeding from 1984 was not very successful and was reseeded in 1989 with forage kochia, Sandberg's bluegrass, and crested wheatgrass after some of the project area burned. The fuel break strip was approximately 400 feet wide but at the time of the fire it grew somewhat wider in places and in others it receded dramatically almost all the way back to the freeway. The condition of the seeding changes throughout. There are some areas that are dominated by only forage kochia which creates a lot of interspaces that are vegetation free. In other areas the Sandberg's bluegrass has dominated and in other significant amounts of cheatgrass has invaded. There are a few remnants of the crested wheatgrass but it is not dominant in any area. One thing to note is that wherever the forage kochia is present there is very little to no occurrence of cheatgrass.

In areas where the Lock Fire grew into kochia stands the fire stopped quickly and very little to no mop up was required.

The Boise District Fuels Program has observed this fuel break over the years to be a successful tool in stopping and preventing fires along roadways. The Paradigm project covers much of the area adjacent to I-84 from Boise to Glens Ferry and seeding and maintaining forage kochia strips is one of its primary objective. In order to maintain fuel break effectiveness, the kochia fuelbreak that was seeded over 29 years ago has been retreated with additional kochia seeding and chemical treatments. The interspaces that forage kochia provides breaks up the fuel continuity even after all the vegetation has cured out. When fuel breaks are accompanied by a roadway firefighters can quickly access the fuel break multiplying the effectiveness of suppression resources during a wildfire event.

MM78 I-84

The MM78 I84 fire occurred along I-84 on the north side of the freeway. The fire started in and was held to a mowing treatment that was conducted by the Idaho Department of Transportation with help from the Boise District BLM who helped them get the mower decks that were used in the treatment through a Community Assistance Agreement. (ITD purchased the Tractors and supplies the labor). The fire tried to spread out of the freeway's right of way but was stopped by a diskline that was put in by the Mountain Home Rural Fire Department in cooperation with the Boise District BLM and the Idaho Transportation Department.

The fire was caused by a flat tire from a truck and sparks and heat from the wheel and axel ignited two spot fires. When the IC arrived on scene he reported that the fire was held in check by the diskline. He proceeded to put the fire out by himself, between the freeway and the diskline with a shovel before responding engines arrived on scene. Without these two treatments in place multiple structures adjacent to the freeway would have been threatened by this fire.

Figure K-2. Aerial vicinity picture of MM78 fire to show proximity to private property.

Figure K-3. Mowed and brown strip fuel break approximately 2.5 weeks before fire.

Figure K-4. Fire burned between road and brown strip.

Pothole Fire

Summary:

The Pot Hole fire started as 2 separate fires on the Saylor Creek Bombing Range on August 6, 2019, eventually burning together pushed by strong northwest winds. The fire consumed the majority of the total 67,069 acres during the first 12 hours. A burnout operation took place on the Pot Hole South Fuel Break. However, because of the short amount of time allowed to burn out and high fuel loading in this portion of the fuel break, it was difficult to get a wide enough black line before the head fire arrived. This fuel break was scheduled for a herbicide maintenance treatment in fall 2019 to target the annual invasives that had grown in since the last treatment. The head fire burned through the Pot Hole South Fuel Break and progressed towards the Balanced Rock West Fuel Break. The Balanced Rock West Fuel Break had a moderate density of vegetation and was more effective at slowing fire progression, which allowed firefighters time and safe access to successfully suppress that flank of the fire.

To stop the forward progress of the fire, firefighters burned out fuels along the Saylor South Fuel Break, but due to higher than expected vegetation cover in the fuel break, crews experienced similar issues as the Pot Hole South Fuel Break. The fire breached the fuel break, moving towards the Clover Road. The Pot Hole South Fuel Break was also scheduled for herbicide maintenance treatment fall of 2019 to target the annual invasives which had grown in since the late treatment.

Before crews could prep the Clover Road, the fire pushed by strong winds, crossed the Clover Road making a strong push towards the Horse Butte Road. Fire crews successfully conducted a burnout operations progressing along the Clover North and South fuel breaks and along the Horse Butte fuel break to successfully contain the fire.

Due to higher fuel loading within the Pothole South and Saylor South Fuel Breaks and the strong winds during the fire, these fuel breaks were not effective in changing the fire behavior or allowing fire fighters to conduct indirect fire suppression. This highlights the importance of maintenance of fuel breaks. These fuel breaks were scheduled for maintenance in the fall, however certain on the ground conditions may warrant adapting timelines to maintain fuel break efficacy.

The following is a more in depth discussion of the events of the Pot Hole Fire.

The Pot Hole fire started on August 6, 2019, and was contained on August 8, 2019. The fire consumed most of the total 67,069 acres during the first 12 hours. Map 1 shows the vicinity of the Jarbidge Fuel Break network to the Pot Hole Fire. The initial size-up at 1406 hours placed the fire within the Saylor Creek Bombing Range (see "Heel," Map 2, Pothole Fire Progression). The first resources arrived at approximately 1412 hours, and began suppression efforts. At roughly 1451 hours, the fire made a run to the south, with the Incident Commander (IC) stating there were two fires (upper east and upper west side of the Saylor Creek Bombing Range; "Initial," Map 2, Pothole Fire Progression). The fire made a strong push to the northwest around 1620 hours, crossing the Bruneau Hot Springs Road.

A burnout operation took place around 1727 hours on the Pot Hole South Fuel Break towards the Bombing Range Road, in an effort to tie in both fires ("1st Event," Map 2, Pothole Fire Progression). Fire crews attempted to use this fuel break segment, but because of the short amount of time allowed to burn out and because of the high fuel loading in this portion of the fuel break (see photo 1 pre fire vegetation conditions), it was difficult to get a wide enough black line before the head fire arrived. This segment of the fuel break was scheduled for a herbicide maintenance treatment in fall 2019 to target the annual invasives (cheatgrass, tumble mustard, and Russian thistle) that had grown in since the last treatment. The head fire burned through the Pot Hole South Fuel Break and burned towards the Balanced Rock West Fuel Break ("1st Event," Map 2, Pothole Fire Progression and Photo 2). The Balanced Rock West Fuel Break had a moderate density of tumble mustard, and proved to be more effective at slowing fire progression (see Photo 3). Very little of this fuel break burned. This allowed firefighters time and safe access to successfully suppress the breakout.

Firefighters continued to burn south along the Saylor South Fuel Break. However, fire crews experienced the same issues as they did burning the Pot Hole South Fuel Break segment. The head fire burned through this segment of the fuel breaks ("2nd Event," Map 2, Pothole Fire Progression and Photo 4), making a run southeast towards the Clover Road, due to more vegetative cover, including some cheatgrass, making this portion of the Saylor South Fuel Break a less effective fuel break (Photo 5 pre fire vegetation conditions). A maintenance herbicide spray on this segment of the fuel break was scheduled to occur in the fall of 2019 to target the annual invasives (cheatgrass, tumble mustard, and Russian thistle).

When the IC realized the head fire breached the Saylor South Fuel Break, he traveled towards the Clover Road to determine if a burn operation would help contain the fire. By the time he reached the Clover Road, the fire had already burned through the Clover South Fuel Break (was proposed but no implementation had occurred) and crossed the Clover Road at approximately 2038 hours, making a strong push towards the Horse Butte Road ("2nd Event," Map 2, Pothole Fire Progression). The fire stayed on the west side of the fuel breaks at the Clover North Fuel Break segment. Fire crews conducted a burnout progressing southwest along the Clover North and South fuel breaks to corral the fire to stay on the west side of the fuel breaks (see Photo 6). The Clover North Fuel Break was one year post-seeding, which likely kept the fire from crossing the fuel break and the road.

At approximately 0013 hours on August 7, fire crews conduct a burnout moving south, using the Horse Butte fuel break ("3rd event," Map 2, Pothole Fire Progression). The burn was successful and held, with the most fire activity occurring between the Clover and Horse Butte roads.

At approximately 0816 hours, the fire had been lined and knocked down in all sections, except for an unburned island in the center (non-threatening). Outflow winds were predicted with a thunderstorm approaching; but all sections of the line held during this event. On August 8, the fire received precipitation and was contained at 0900 hours. The fire was controlled on August 9 at 1709 hours.

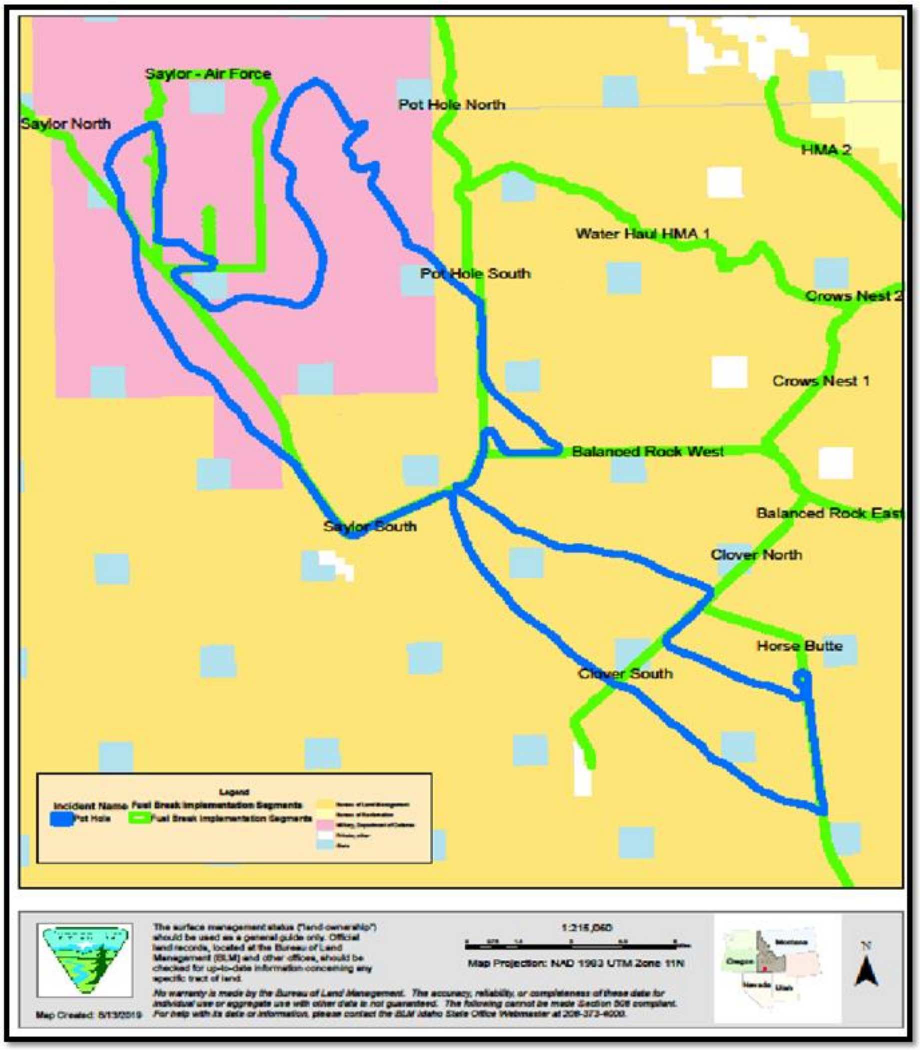

Figure K-5. Vicinity of Jarbidge Fuel Breaks to the Pot Hole Fire.

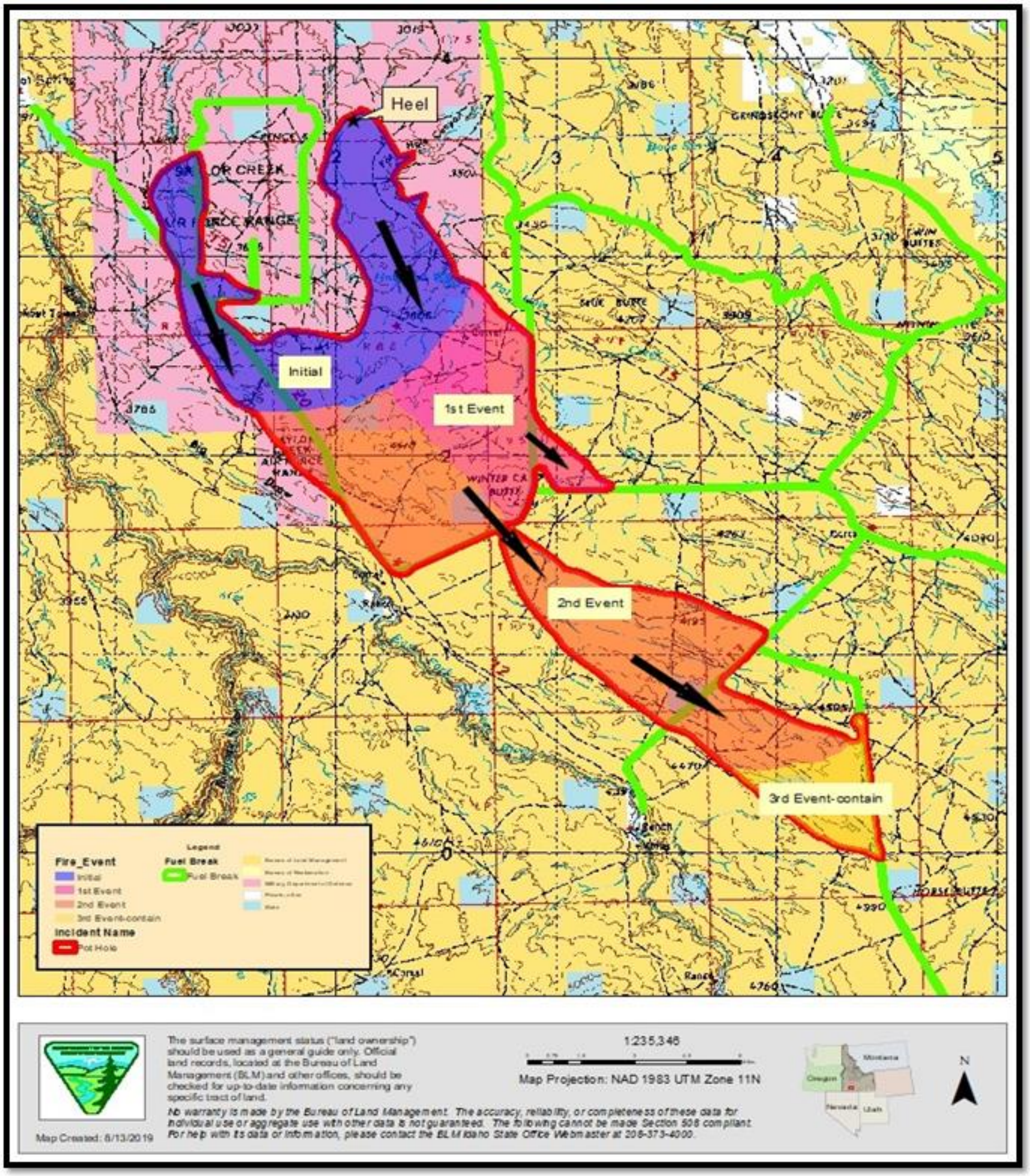

Figure K-6. Pothole Fire Progression.

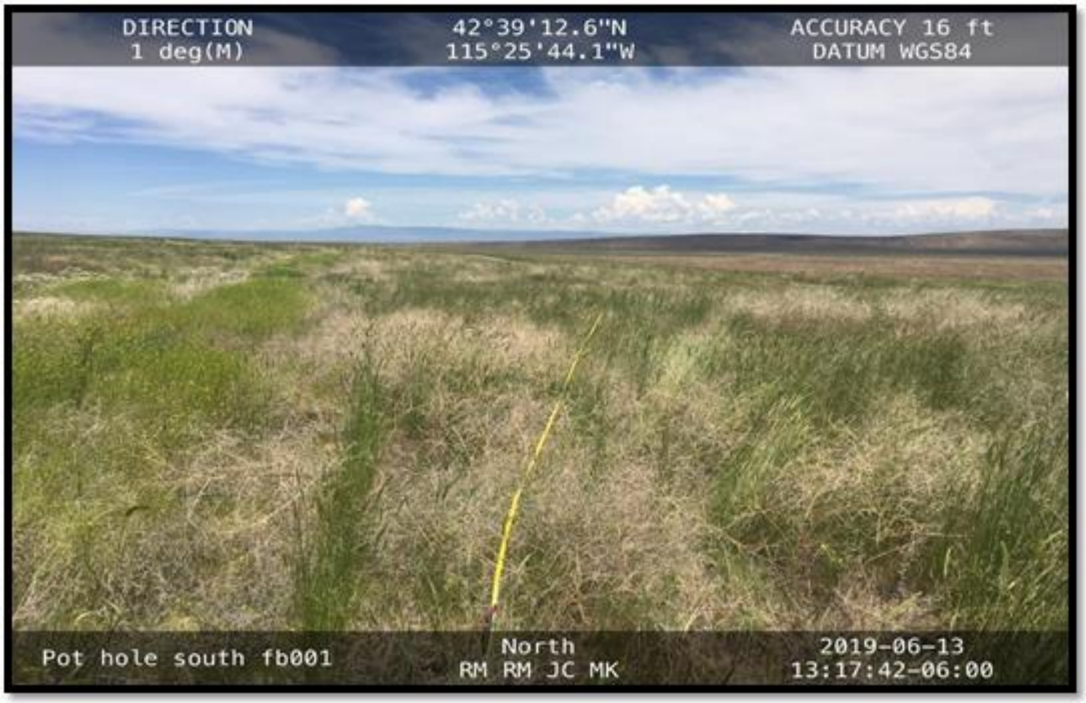

Figure K-7. Pre-fire photos from a Pot Hole South Fuel Break monitoring plot. This segment is between phases, which is clearly visible in the vegetation (consisting of a mix of perennial and annual grasses and forbs); maintenance of herbicide spray was scheduled fall 2019.

Figure K-8. This image shows a segment of the Pot Hole South Fuel Break segment (facing south) where the fire burned through to the southeast, towards the Balanced Rock West Fuel Break segment.

This segment was also not able to hold the fire's progression and burned through the fuel breaks on both sides of the road, although there are patches of unburned fuel in this part of the fuel break, due to the type of existing vegetation present. This segment is also in between phases of post-treatment and re-treatment (maintenance).

Figure K-9. Image of the Balanced Rock West Fuel Break (facing west). This fuel break was an effective segment that held the fire's progression, which allowed firefighters to get line around it. A minimal portion of this segment was burned when the fire came through.

Figure K-10. Image of the Saylor South Fuel Break segment (facing southeast). This segment was not able to hold the fire's progression and burned through the fuel breaks on both sides of the road. This segment is in between phases of post-treatment and re-treatment (maintenance).

Figure K-11. Pre-fire photos from a Saylor South Fuel Break monitoring plot. This segment is between phases, which is clearly visible in the vegetation (consisting of a mix of perennial and annual grasses and forbs); maintenance of herbicide spray was scheduled fall 2019.

Figure K-12. Image of the Clover North Fuel Break (facing north). This portion of the fuel break was also an effective segment that held the fire. Firefighters were able to use this segment as an anchor point to conduct a burn operation (heading south). This segment is in its post-treatment, year-one phase. Vegetation consisted mostly of a mix of annuals (Russian thistle and tumble mustard) and seeded species (kochia and 'Stabilizer').

Charlotte Fire 2012

The Charlotte Fire was human caused and began around 14:30 on June 28th, 2012. Fire ignition was in the area of Charlotte Drive and Mink Creek Road on private land. It promptly burned north/northeast across private property, entered public lands, and exited back onto private lands burning the entire 226 acre treated parcel of public land along with 66 homes. Occurring during Red Flag Weather conditions, consisting of strong winds (steady south southwest 15-20 mph), low relative humidity values and warmer than normal temperatures, the fire easily became an active crown fire carried by dense juniper with intermixed pockets of sagebrush and grass. In addition to the Red Flag Weather conditions, the area was experiencing lower than normal moisture content in the vegetation. Aerial and ground resources experienced difficulties in containment due to increased fire behavior and active spotting ahead of the fire. Flame lengths were observed to be between 20 and 40 ft and spotting was up to ¼ mile ahead of the fire front.

The ability to place dozer line for the protection around homes was largely due to the Portneuf Westbench fuels treatment unit #3. When the fire entered the mechanically treated unit, suppression resources observed fire behavior to decrease substantially, dropping out of the crowns, becoming a surface backing fire with 2-3 foot flame lengths with isolated single tree torching. Crews were able to hold the fire at the Bannock Highway. Burn severity on soils was determined to be primarily light with moderate areas; however burn severity on vegetation was mostly moderate. The fire area is highly visible from the town of Pocatello.

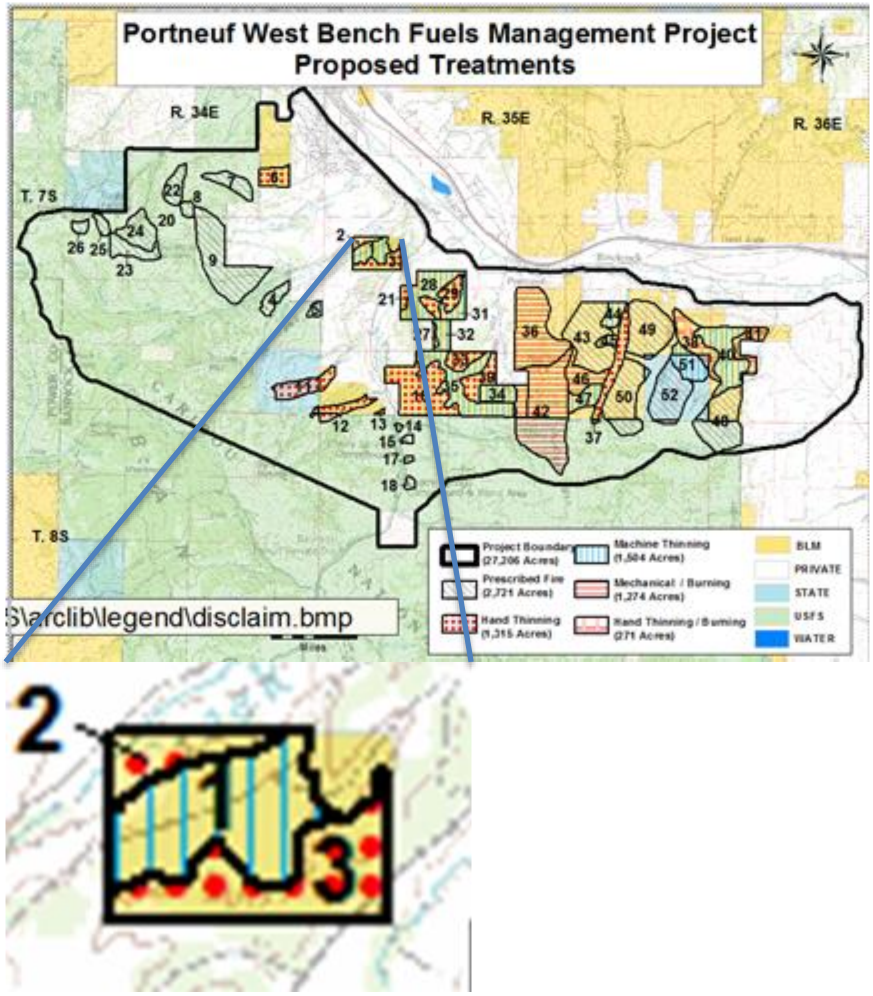

Figure K-13. Portneuf Westbench fuels treatment.

Figure K-14. Mechanical Treatments with Chainsaw. Units 1, 2, 3 were all thinned with chainsaws and Unit 2 & 3 were piled and burned. Unit 3 had two entries of thinning and the leave trees were limbed 3-4 foot high.

Proposed Actions from Fuel Breaks Projects in the Great Basin

Twin Lakes-Telford Fuel Breaks - Washington 2017

The BLM is proposing to establish fuel breaks within 150 feet from the center line of all county roads that adjoin BLM-administered lands in the Twin Lakes and Telford management areas (see maps). Treatments would occur along 13.5 miles of county road on either one or both sides of the road and result in up to 313 acres of vegetation treatments. These roads include Seven Springs Dairy, Grant, Lone Pine, Telford (south of Hwy 2 only), and Highline. Treatments would be repeated as necessary to maintain fuel breaks in the desired condition. The desired condition is for fuel breaks that are composed of native species, free of hazardous accumulations of sagebrush and other fuel, and resistant to non-native annual grass and noxious weed invasion.

<u>Sagebrush Removal</u>

The BLM would remove big sagebrush (*Artemesia tridentata*) within 75 feet from road center line. Sagebrush removal would be accomplished by hand cutting and chipping (i.e., chainsaw, brush trimmers, loppers or other handheld means). The slash from cutting big sagebrush would be dragged to a chipper, chipped, and broadcast (i.e., scattered) evenly over the cutting area.

From 75-150 feet from road center line, the BLM would reduce big sagebrush density and maximum height. The maximum height of big sagebrush would be 32 inches tall. All big sagebrush greater than 32 inches tall in this zone would be removed regardless of resulting canopy cover. Density of big sagebrush would then be reduced to achieve 15% average canopy cover. Emphasis would be placed on removing the tallest shrubs first in order to achieve 15% cover with the shortest shrubs available. The density and height reductions are designed to meet minimum habitat requirements for sage-grouse while reducing fuels along the fuel break.

Annual Grass Treatments

The BLM would actively convert areas dominated by non-native annual grasses (cheat grass, medusa head, etc.) to vegetation types consisting of low fuel and perennial vegetation by using a combination of herbicide application, mechanical site preparation, and seeding. These treatments would occur up to 150 feet from road center line.

The herbicides glyphosate, imazapic, and others would be used according to allowable application rates (Table K-3) to kill annual grasses and prevent their germination. Herbicide applications would be made from October to mid-May while annual grasses are actively growing. Glyphosate, a broad spectrum herbicide, would be used primarily in the spring to kill all existing vegetation in areas dominated by annual grasses and where no desirable (native) plants are present. Imazapic, a selective preemergent herbicide, would be used in areas where some desirable vegetation is present but is threatened by annual grass invasion. Imazapic applications are intended to prevent germination of annual grasses and would be made primarily in the fall.

Following, or in conjunction with, herbicide treatments, sites would be prepared for seeding to low stature, low fuel native plants (see Table K-2). Site preparation would include hand raking or ATV-based harrowing of litter and duff to create a clean, firm seed bed. Multiple herbicide and mechanical treatments may be applied over multiple years before a site is adequately depleted of the annual grass seedbank and ready for seeding.

Seeding

Seeding with native plants would occur on bare ground in areas where herbicide treatments have removed weeds and annual grasses and in areas of sagebrush removal where bare ground is exposed. These areas would be prepared for seeding by hand raking or ATV-based harrowing of litter and duff to prepare a clean, firm seed bed. Seed would be hand, or ATV-based broadcast and covered by raking or harrowing by no more than 1/8 - 1/4 inch of topsoil. The seed mix to be used would consist of low statured, low fuel native plants (Table K-2). Any substitutions to the seed mix will be with native species that have low fuel characteristics.

Table K-2
Low Statured, Low Fuel Native Seed Mix

Common Name	Scientific Name	Pure Live Seed*
Sandberg Bluegrass	*Poa secunda*	2 lbs/ac
Prairie Junegrass	*Koeleria macrantha*	2 lbs/ac
Squirreltail	*Elymus elymoides*	3 lbs/ac
Common Yarrow	*Achilla millefolium*	0.25 lbs/ac
Lewis Flax	*Linum lewisii*	2 lbs/ac

*Seeding rates are shown for drill seeding techniques. When broadcast seeding, 2-3 times these rates may be applied. Additional native plants beneficial to pollinator species may be added to seed mix.

Pruning

Small pockets of Ponderosa pine lie within the proposed fuel break corridor. Pruning would occur on live and dead limbs and branches up to 8 feet in height measured above ground level. Tree limbs that attach to the bole above 8 feet but have limbs extending into the pruning height area shall be pruned so that limbs do not extend below the 8-foot level.

Noxious Weed and Invasive Plant Control

The fuel break zones would be spot and/or broadcast sprayed with herbicides, as needed, to eradicate and/or control noxious weeds that occur within the project area. Noxious weed species may include but are not limited to diffuse and spotted knapweed, Dalmatian toadflax, St. Johnswort, Canada thistle, bull thistle, leafy spurge, rush skeletonweed, and kochia.

Biological and mechanical methods would also be implemented when feasible. These methods include hand treatment (e.g. pulling, chopping), weed trimmers, or mowing. Hand-pulling and digging may be used for some species in small patches for species that do not leave viable root fragments (This method would not be recommended for rush skeleton weed). Mowing or clipping flowering stems before they produce seed may be implemented but is not feasible on larger populations or species where taproots can re-sprout (e.g. diffuse knapweed). Ground-based spot and broadcast application of herbicides such as glyphosate, chlorsulfuron, metsulfuron methyl, clopyralid, aminopyralid, 2, 4-D, dicamba, imazapyr, and picloram woulfd not exceed the maximum application rates identified in Table K-3. Application rates may vary based upon weather conditions, soil conditions, weed species and stage of development which all affect the efficacy of herbicide applications. See Design Features section below for standard operating procedures that will guide noxious weed treatments.

Table K-3
Herbicide Application Rates

Chemical	Maximum Application Rate (pounds/acre)	Typical Application Rate (pounds/acre)
Glyphosate	7.0 lb. a.e.	2.0 lb. a.e.
Chlorsufuron	0.141 lb. a.i.	0.047 lb. a.i.
Metsulfuron methyl	0.15 lb. a.i.	0.03 lb. a.i.
Clopyralid	1.0 lb. a.e.	0.35 lb. a.e.
Aminopyralid	0.1 lb. a.e.	0.078 lb. a.e.
2, 4-D	1.9 lb. a.e.	1.0 lb. a.e.
Dicamba	2.0 lb. a.e.	0.25 lb. a.e.
Imazapic	0.187 lb. a.e.	0.031 lb a.e.
Imazapyr	1.5 lb. a.e.	0.45 lb. a.e.
Picloram	1.0 lb. a.e.	0.35 lb. a.e.

lb. a.e. a.e.= acid equivalent   a.i.=active ingredient

Prioritization/Implementation Schedule

Due to BLM's fragmented ownership pattern, the proposed fuel breaks would consist of only short treatment segments interrupted by other ownerships (WDFW, DNR, private) along the county roads. Some of these ownerships are implementing fuel breaks in cooperation with the Lincoln County Conservation District. Additionally, some treatment types such as the removal of sagebrush are more important to reducing hazardous fuels than others. Therefore, the following prioritization of treatments would be considered during implementation.

1. BLM would prioritize implementation of segments that adjoin existing or planned fuel breaks on other ownerships.

2. BLM would prioritize implementation of segments according to a prioritization map developed by the Lincoln County Conservation district:
    a. Priority 1: Seven Springs Dairy Road, Grant Road, and Lone Pine Road
    b. Priority 2: Highline Road
    c. Priority 3: Telford Road

Coordination

During implementation and upon completion and maintenance of the fuel breaks, BLM would continue to communicate and coordinate with federal, state, and Lincoln County fire districts about the location and status of the fuel breaks. The status and condition of other fuel breaks (private land, etc.) would be reviewed. This would allow for BLM's partners to have a basic understanding of the location and functionality of the fuel breaks once they are created in order to allow for faster, safer, and more effective wildfire responses.

Design Features and Standard Operating Procedures

<u>Noxious Weeds</u>

1. All herbicide applications would follow manufacturer label instructions, specifications, and precautions; all federal, state and local laws, rules and regulations; and BLM policy. In instances where herbicide labels, federal, or state stipulations overlap, the more restrictive criteria would apply.

2. Applications would be made by a certified applicator consistent with the manufacturer's label and an approved BLM Pesticide Use Proposal.

3. During implementation and maintenance of fuel breaks, ATVs would be cleaned of all plant and soil material to remove seeds or other plant parts that may contribute to noxious weed and invasive plant spread.

4. Equipment would be selected to achieve proper application (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]).

5. Precautions would be taken to minimize drift by not applying herbicides when winds exceed >10 mph or a serious rainfall event is imminent.

6. Drift control agents and low volatile formulations would be used.

7. Records of each application, including the active ingredient, formulation, application rate, date, time, and location would be kept.

8. Appropriate signage would be posted in herbicide-treated areas at the treatment site and at nearby kiosks, if available.

9. The BLM would control noxious weeds in the County road right-of-way (30 feet from road centerline) for 3 years after fuel break construction. Noxious weed treatments in the ROW would be coordinated annually with the County to avoid double treatment.

Wildlife

1. Prior to cutting sagebrush during the sage-grouse nesting season (April 1 - June 23), a wildlife biologist would survey the cutting area to ensure no sage-grouse or other migratory birds are nesting. If nesting birds are found, treatments would be delayed until young have left the nest.

2. Work activities would be avoided between sunset and 3 hours after sunrise within 1.2 miles of an active sage or sharp-tailed grouse lek during the lekking season (February 15 – May 31).

Botany

1. Areas where threatened, endangered or sensitive (TES) plants occur would be removed from chemical treatments with a 20-foot buffer to protect rare plants from drift. Except for Picloram, Aminopyralid, Imazapic, and Chlorsulfuron, long-lived chemicals would not be used within 200 feet of any TES plant sites due to their potential to persist in soils for more 300 days.

2. Hand removal of sagebrush would be allowed within 20 feet of individual rare plants. Rare plants would be flagged to protect them from trampling.

3. Prior to any mechanical or chemical treatments, a BLM botanist would be notified in order to supply the applicator with Spalding's catchfly occurrences to avoid.

Cultural

1. All sites vulnerable to impacts from this project would be protected by establishing avoidance buffers 10 to 50 feet around the site boundaries.

2. In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area must be secured, and the concerned tribe's cultural staff and cultural committee and the BLM would be notified.

Mitigation and Monitoring

1. All known sites of Spalding's catchfly within the project area would be revisited post treatment. If damage occurs, treatments within the 200 foot buffer would be discontinued.

Roadside Fuel Break Hazardous Fuels Reduction Project: Nevada 2017

The BMD is proposing to reduce hazardous fuels along roadsides within BLM-administered public lands in Lander, Eureka, Nye, and Esmeralda Counties in central Nevada. The Proposed Action will consist of treating up to 30,000 acres by:

- mowing/masticating/disking shrub and grass fuel types
- thinning piñon-juniper stands

- treating with herbicide to reduce cheatgrass fine fuel loadings
- targeted grazing to reduce cheatgrass fine fuel loadings
- broadcast and drill seeding

Fuel break treatments could occur along roads throughout the BMD. However, they will be prioritized based upon recommendations from the Southern Great Basin FIAT Assessment (Greater Sage-Grouse Wildfire, Invasive Annual Grasses, and Conifer Expansion Assessment, Southern Great Basin, BLM 2015a). This guiding document has identified potential project areas in highly valued GRSG habitat, including fuel breaks that would limit fire spread and augment suppression capabilities. The proposed roadside fuel breaks in the Project Area would only be implemented in areas meeting the following hazardous fuels criteria:

- Shrub-dominated fuels where the total above-ground biomass is greater than 2.0 tons per acre, and horizontal continuity can be classified as moderate or higher. Representative sites are shown in Figures 2-1 and 2-2.
- Pinyon-juniper dominated fuels where the total above-ground biomass is greater than 6.0 tons per acre, and horizontal continuity can be classified as moderate or higher. A representative site is shown in Figure 2-3.
- Grass-dominated fuels where the total above ground biomass is greater than 400 pounds per acre, and horizontal continuity can be classified as moderate or higher. Representative sites are shown in Figures 2-4 and 2-5.
- Horizontal continuity is determined using professional judgement and is rated Low, Moderate, High, Very-High, or Extreme. The definition for each assumes that fuels are capable of sustaining combustion and is determined without wind or slope influences. The definitions are as follows:
  - Low: Fuels are discontinuous and incapable of supporting fire spread. Less than 10% of a fires perimeter is capable of active combustion at any one time. Fuels are spaced more than 2.5 times the potential flame length away.
  - Moderate: Fuels are capable of supporting fire spread without winds, but not in large patches. Active fire is possible on 11-25% of a fires perimeter. Fuels are between 1 and 2.5 times the potential flame length away.
  - High: Without the aid of wind and slope, fire is able to actively spread over continuous patches 10 to 100 acres in size with active fire possible on 26-50% of a fires perimeter. Fuels are between 0.5 and 1 times the potential flame length away.
  - Very-High: Without the aid of wind and slope, fire is able to actively spread over large continuous patches with active fire possible on 51-75% of a fires perimeter. Fuels are spaced less than ½ the potential flame length away from each other.
  - Extreme: Fuels are in a continuous layer with interconnected crowns. Fire is able to spread readily in all directions with active fire possible on greater than 75% of a fires perimeter.

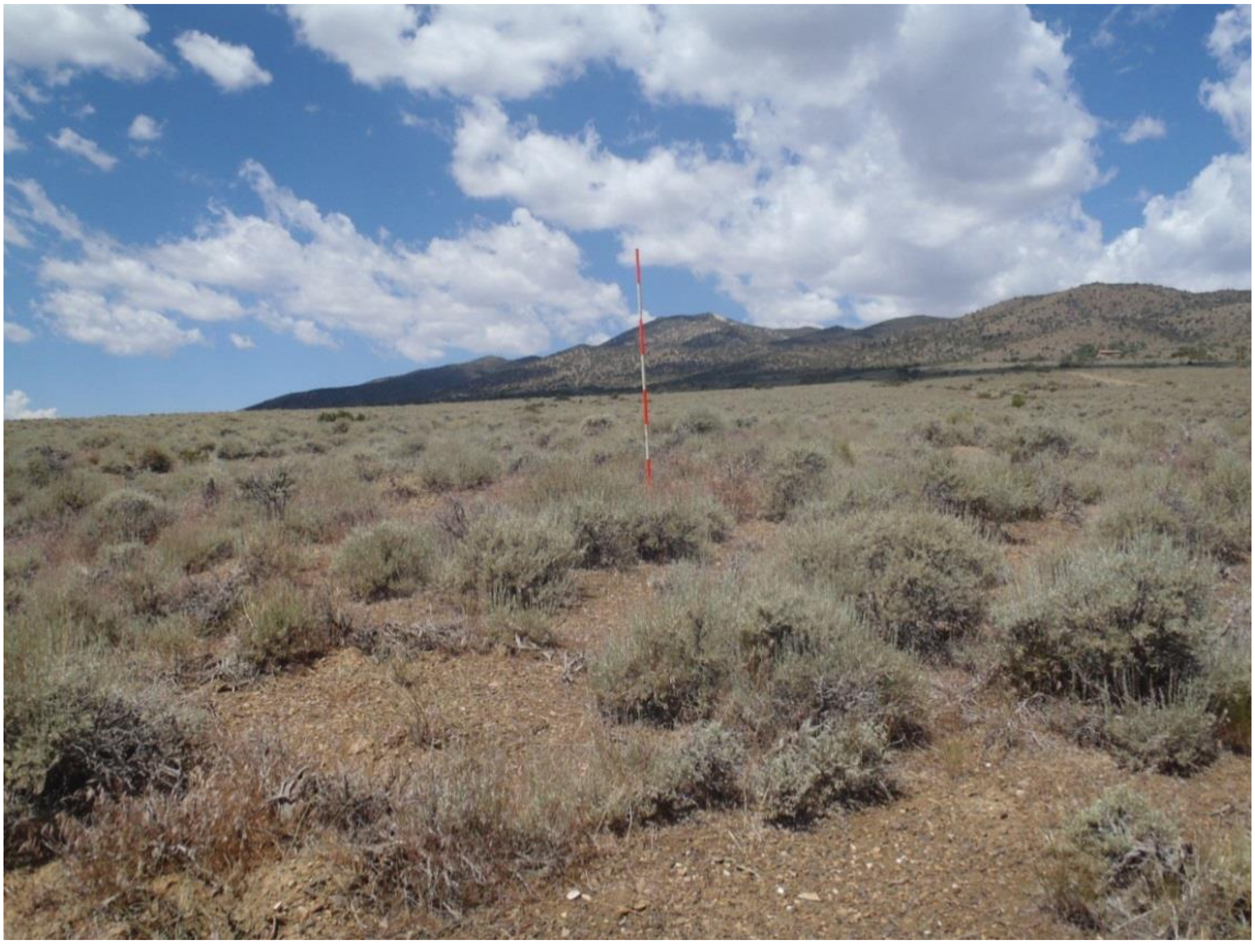

Figure K-15. Shrub Fuel Loading at 2 Tons/Acre

Figure K-16. Shrub Fuel Loading at 2 Tons/Acre

Figure K-17. Piñon-Juniper Fuel Loading at 6 Tons/Acre

Figure K-18. Grass Fuel Loading at 0.2 Tons/Acre (400 Pounds/Acre)

Figure K-19. Grass Fuel Loading at 0.2 Tons/Acre (400 Pounds/Acre)

Design Features

Common design features of the Proposed Action include:

- Cooperation with the state, counties and private landowners to initiate treatments on non-BLM administered land.
- No new roads would be constructed.
- No treatments would be conducted in Wilderness Study Areas (WSA) or WSAs which are adjacent to roads.
- No treatments would be conducted in Threatened and Endangered Species habitat, with the exception of where proposed annual weed treatment actions would help to prevent catastrophic wildfire within Desert Tortoise habitat. Any proposed treatments within Desert Tortoise habitat would require Section 7 consultation with the United States Fish and Wildlife Service (USFWS).
- Mitigation measures would be developed and implemented on a site-specific basis to protect Special Status Species (SSS) habitat from adverse effects resulting from mechanical and prescribed fire treatments.
- No treatments would be conducted in wetlands, floodplains and riparian areas.

- Mitigation measures would be developed and implemented on a site-specific basis to protect National Register-eligible cultural sites and Key Management Areas (KMA) from adverse effects resulting from mechanical and prescribed fire treatments.
- Notification and coordination with allotment permittee(s) would take place prior to fuels-related actions.
- Treatment adjacent to existing roads to improve their usefulness as fuel breaks and control lines for wildfires and prescribed fires.
- Resting of areas that are seeded from livestock grazing may occur.
- Disposition of activity fuels created by the thinning of piñon-juniper using one or more of the disposal options from the Activity Fuel Disposal methods list.
- Implementation of best management practices to control noxious weeds, cheatgrass and other invasive and non-native species.
- Implementation of protection best management practices for wildlife such as no treatments during sensitive nesting/breeding seasons and compliance with the GRSG Plan Amendment (BLM 2015b) including:
- Ground disturbing activities would not occur within 4 miles of active sage grouse leks from 6 p.m. to 9 a.m., Pacific Time, during March 1-May 15, or in accordance with any revised guidelines and policies. The BLM would conduct lek and other surveys based on the BLM Nevada Wildlife Survey Protocols (BLM 2013) and the September 2015 GRSG Plan Amendment.
- Ground disturbing activities would not occur in sage-grouse brood rearing areas from May 15-September 15, or in accordance with current guidelines and policies. The BLM would consult seasonal range maps prepared by the Nevada Department of Wildlife (NDOW) to delineate Greater Sage-Grouse use areas at the time of treatment activities. Waivers could be requested upon consultation with NDOW and USFWS.
- Ground disturbing activities would not occur in sage-grouse winter habitat use areas from November 1-February 28, or in accordance with current guidelines and policies. The BLM would consult seasonal range maps prepared by NDOW to delineate Greater Sage-Grouse use areas at the time of treatment activities. Waivers could be requested upon consultation with NDOW and USFWS.
- Monitoring of all treatments for noxious weeds, invasive and non-native species annually.
- Monitoring of treatments in accordance with monitoring plan (Appendix F).
- Maintenance treatments that may occur annually to maintain the viability of the fuel breaks using one or more of the treatment alternatives analyzed in this document.
- Reducing the potential for the introduction of noxious weeds, and
- removing all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts by cleaning off all equipment using a pressure washer before and after traveling to a site.
- Reducing the possible spread of noxious weeds and invasive exotic plants by not mowing them after they have seeded out.
- Disking treatments would not be done over creeping perennial plants.
- All herbicide treatments would follow the herbicide label as well all BLM manuals and policies.
- Taking precautionary measures to minimize potential fire-related impacts to vegetation during prescribed fire treatments.

- Implementing GRSG Plan Amendment Required Design Features (RDFs) for different uses and management activities, including fire management. GRSG Plan Amendment strategies for GRSG conservation include:
  - the avoidance and minimization of surface disturbance
  - the improvement of GRSG habitat conditions
  - the reduction of threats from wildfires:
    - identify and prioritize areas that are vulnerable to wildfires and prescribe actions important to GRSG protection
    - restrict the use of prescribed fire for fuel treatments (this plan would not use prescribed fire)
  - prioritize post-fire treatments in Priority Habitat Management Areas (PHMA), and General Habitat Management Areas (GHMA)
  - the use of monitoring, evaluation and adaptive management techniques to improve GRSG habitat.

Fuel Break Treatments

The roadside fuel breaks would be up to 300 feet on both sides of a road, depending on the fuel type and arrangement, and are designed as a tool for fire fighters to assist in the control of fires. The objective for fuel reduction is to change fire behavior by impacting the following: fuel bed depth, fuel loading, percent cover, and ladder fuels that result in a fire flame less than four feet high. At that level, all firefighting management tools can be used, while maintaining fire fighter safety.

Creating fuel breaks is a three-step process: The initial treatment, the disposal of fuel from those treatments and subsequent maintenance treatments.

A. Sagebrush Mowing/Mastication Treatment Method

Under this treatment method, chainsaws, rotary mowers towed by an agricultural tractor or a tracked or wheeled masticator (bull-hog) would be used to treat shrubs where the vegetative community and terrain make it feasible in order to create fuel breaks. Mowing, or masticating, would result in strips between 20 and 60 feet wide.

B. Piñon-Juniper Treatment Method

Under this treatment method, chainsaws, masticators, feller-bunchers, tree shear, or similar mechanized device, would be used to remove piñon and juniper within the 300-foot buffer to create a minimum of 40 feet of canopy spacing. Stumps would be flush cut as low as possible.

C. Disking Treatment Method

Under this treatment method, disking would be used to treat fine fuels and cheatgrass where the vegetative community and terrain make it feasible to create fuel breaks. Disking creates a fuel break by exposing mineral soil that is free of fuel. This is done by a harrow, towed by a tractor. The metal discs on the harrow are angled in a manner that would upturn the soil surface to expose mineral soil. This would result in strips between 20 and 100 feet wide.

D. Herbicide Treatment Method

Under this treatment method, a BLM approved herbicide or bio-pesticide, would be used to treat fine fuels and cheatgrass where the vegetative community and terrain make it feasible to create fuel breaks. Imazapic has been the primary herbicide used for this purpose, however any BLM approved herbicide known to effect cheatgrass may be used in accordance with the label. It would be applied by ground based sprayers and would result in strips between 20 and 100 feet wide.

Best management practices, along with design features described above will ensure that application of herbicide will be conducted in a safe and reasonable manner.

E. Targeted Grazing Treatment Method

Under this treatment method, targeted grazing by livestock would be used to treat fine fuels and cheatgrass where the vegetative community and terrain make it feasible to create fuel breaks. Treatment would result in strips between 20 and 100 feet wide. Temporary range improvements and permit modifications may be needed on-site during treatment activities.

Invasive annual grasses, especially cheatgrass, have a self-perpetuating relationship with fire. Fire creates conditions that favor their growth, which, in turn, creates fine fuel loads that favor subsequent wildfire. Targeted livestock grazing can help diminish this type of fire hazard by disrupting fine fuel continuity and reducing fuel loads (Mosley and Roselle, 1996).

F. Seeding Treatment Method

Under this treatment method, drill seeding (towed by tractor and/or a dozer) and/or broadcast seeding (by tractor and/or a UTV) would be used to seed native and non-native seed in fuel breaks to create strips of fire-resistant species where the vegetative community and terrain make it feasible to create fuel breaks. Treatment would result in strips between 20 and 100 feet wide. Seed mixes would be determined on a site-specific basis, based on Ecological Site Descriptions (ESDs).

Drill seeding involves mechanically pressing seed into the ground. As a seed drill moves across a field, seed from a hopper is metered out; it falls through tubes into a soil-opening device (i.e. disc openers, chisels) that plants the seed at a set depth. Most seed drills have an adjustable planting depth to accommodate different seed sizes. The typical planting depth of most conservation species ranges from ¼ inch to 1 inch. The soil opening and planting operation is normally followed by a set of packer wheels that press and firm the soil over the seed. No further soil preparation is required after drill seeding is completed.

Drill seeding equipment would disturb soil approximately 2 to 4 inches deep creating more pronounced disturbance to the soil and biological soil crusts than mowing. Drill seeding would generally occur in areas previously disturbed or where invasive annual grasses are dominant. Seeding impacts from both drill seeding and broadcast seeding would be short-term and negligible.

Non-native seeding: Non-native seeding may be used in fuel breaks. Non-native plants/seed may be useful for emergency soil stabilization and weed control after wildfires, floods or other natural disasters.

Other examples of use for non-native plants/seed include the initial seeding or planting on a highly disturbed site with few native plants or where native seed stock is not available and as forage for specific wildlife species or domestic livestock. Where native seeds are unavailable or no longer appropriate for the area, non-native seeds are used. In some cases, the seed of non-native plants may be used as an intermediary solution to restoring the desired native plant community (BLM, 2005).

Seeding of forage kochia: Kochia (*K. scoparia*) is a non-native, perennial shrub that is fire resistant and outcompetes cheatgrass. Plantings of forage kochia can decrease densities of annual weeds, thus decreasing fire intervals of degraded rangelands while providing valuable forage to livestock and forage and cover for wildlife and upland game birds. Forage kochia has been successfully used for greenstrip or firebreak plantings in the Intermountain West for several reasons. Forage kochia is well adapted to the very dry areas of the region and establishes easily. The evaluated fuel moisture content of species commonly used in greenstrip plantings following a wildfire including forage kochia was estimated at 40 percent as compared to crested wheatgrass at 10 percent and cheatgrass at 1 percent. Forage kochia plants will burn with sufficient fuel but the plants quickly recover. Studies show that forage kochia reduces flame intensity and can suppress or even stop wildfires (USDA, 2012).

According to the Natural Resource Conservation Service (NRCS), there is concern that forage kochia could become invasive similar to the herbaceous kochia, but this is mostly unwarranted. Studies indicate that plants will spread under favorable conditions into bare or disturbed sites where competition is limited. Forage kochia competes with and establishes readily into sites dominated by annual weeds, but it does not seem to reduce the density of stands of established perennials. Spread of forage kochia has been found to be related to the following: soil disturbance, predominant wind direction, lack of vegetative competition and open space near established plants (USDA, 2012).

Seeding of crested wheatgrass: Crested wheatgrass (*Agropyron cristatum*) is a perennial introduced grass commonly seeded in the arid sections of the western United States. Crested wheatgrass is commonly recommended for forage production. It is palatable to all classes of livestock and wildlife. It is a preferred feed for cattle, sheep, horses, and elk in spring and also in the fall, if additional growth occurs. It is considered a desirable feed for deer and antelope in spring and fall, if additional growth occurs. It is not considered a desirable feed for cattle, sheep, horses, deer, antelope, and elk in the summer. It is noted for its ability to withstand very heavy grazing pressure (65-70 percent utilization), once stands are established. Crested wheatgrass is not compatible in mixes with native species, because it is very competitive and will out-compete slower developing native species. Their drought tolerance, fibrous root systems, and good seedling vigor make this species ideal for reclamation in areas receiving 8 to 16 inches annual precipitation.

Full, properly managed stands of crested wheatgrass generally exclude native grasses and forbs. When inter-seeded into native stands, crested wheatgrass commonly co-exists with native grasses, forbs and shrubs. Some native shrubs, such as big sagebrush and rabbitbrush, often invade crested wheatgrass stands, especially if native seed sources are nearby. Crested wheatgrass is commonly planted in monocultures (single species) stands. Crested wheatgrass resists cheatgrass competition better than most native species, because it germinates earlier and grows more rapidly at colder temperatures. This has an important competitive advantage, when dealing with winter annual species, such as cheatgrass (USDA, 2006).

Activity Fuel Disposal Methods

This section outlines the disposal options that would be used for the Project as appropriate and where feasible.

A. Biomass Utilization

On June 18, 2003, the Departments of Energy, Interior, and Agriculture announced an initiative to encourage the use of woody biomass from forest and rangeland restoration and hazardous fuels treatment projects. The three Departments signed a Memorandum of Understanding (MOU) on Policy Principles for Woody Biomass Utilization for Restoration and Fuel Treatment on Forests, Woodlands, and Rangelands, supporting woody biomass utilization as a recommended option to reduce hazardous fuels rather than burning or employing other on-site disposal methods. Directives include:

- Make juniper activity fuels available for sale as forest products, for personal and commercial use;
- Make activity fuel available as mulch (would be chipped). Woody biomass includes the trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment, that are the by-products of forest management. In this case, they would be the by-products of piñon-juniper fuels.

B. Prescribed Fire (Pile Burn)

Some activity fuels from the piñon-juniper treatment method will be placed into piles to burn at a later date:

- Burn piles would not exceed 10’ long x 10’ wide x 6’ high;
- Burn piles would be piled with fine fuels and slash on the interior and larger fuels on the exterior; and
- Pile burning would take place in the spring, fall, or winter during unstable atmospheric conditions (e.g., rain, snow, or storm events) when atmospheric mixing is occurring.

C. Leave on Site

Some material would be left on site in the form of piles or scattered slash. Large woody debris (LWD) would be hand-placed in the channel of incised streams that had been surveyed and selected in order to introduce channel complexity, initiate channel aggradation (increase in elevation due to deposition of sediment), and to create deflection points.

Maintenance Methods

Implementation of the Proposed Action would reduce fuel loadings in shrub fuel types to one to two tons per acre and one to five tons per acre in piñon-juniper fuel types. The treatments would be maintained for up to 20 years following initial treatment using one or more of the treatment alternatives analyzed in this EA. Maintenance treatments would be initiated when fuel loadings reach more than 2 tons per acre in shrub fuel types and more than 6 tons per acre in piñon-juniper fuel types or when more than 400 pounds per acre of fine fuels are present and/or there is sufficient horizontal continuity of fuels to carry fire.

Maintenance treatments would include the same type of activities as the Proposed Action, but in a much lesser amount and frequency.

Jim Brown Vegetation Treatment Project - Idaho 2017

The proposed action is to implement the Jim Brown Vegetation Treatment/Fuel Break Project (See Jim Brown Vegetation Treatment map). Implementation will entail aerial herbicide treatment with Imazapic (Plateau®), Glyphosate (Roundup®) and Aminopyralid (Milestone®), aerial seeding (grasses and forbs), drill seeding (grasses, forbs, and shrubs), aerial sagebrush seeding and hand-planting sagebrush/bitterbrush, spot-herbicide and biological control treatments for noxious weeds, a livestock grazing closure, and monitoring.

The Jim Brown project consists of a larger-scale vegetation treatment and an associated fuel break proposal. An aerial herbicide treatment would be implemented on the proposed vegetation seeding treatment area and the fuel breaks. The herbicide treatment would be utilized as a seed bed treatment for the proposed vegetation seeding treatments and to reduce fine fuels and noxious weeds along approximately 36 miles of surrounding roadsides (See Treatment map). The sprayed roadsides would act as a fuel break. No seeding treatments are proposed within the roadside/fuel break.

The Jim Brown Vegetation Treatment project is a 17,904 acre BLM project area located in Lincoln County. The proposed roadside/fuel break treatment is an additional 8,252 BLM acres for a total of 26,152 acres. Included within the project area are 1,280 acres of Idaho State Lands which could be treated along with the BLM lands. The State Lands would be treated under the Memorandum of Understanding between the BLM, Idaho Department of Fish and Game, and Idaho Department of Lands (BLM MOU ID-SO2015-03).

The proposed treatment area has burned at least 3 times previous to the 2013 Jim Brown fire (See Fire Frequency map). The majority (14,404 acres) of the Jim Brown project area burned in the 2013 Jim Brown wildfire.

As a result of high fire frequencies and limited success of past Emergency Stabilization and Rehabilitation (ESR) treatments the area is dominated by annual exotic vegetation and noxious weeds (diffuse knapweed, rush skeletonweed, and leafy spurge). Herbicide treatments, aerial and drill seeding, and aerial seeding and hand planting of shrubs are proposed to improve habitat conditions and reduce hazardous fuels.

Figure K-20. Jim Brown Vegetation.

The Jim Brown project area is within a sage-grouse General Habitat Management Area (GMHA) and is within 4 miles of a sage-grouse Priority Habitat Management Area (PHMA) (See sage-grouse habitat map). The project area falls within the Magic Project Planning Area (USDI-BLM 2015).

Soil-vegetation correlation information indicates that the project area is located primarily on a loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass ecological site or a sandy loam 8-1 0" Basin big sagebrush/Indian ricegrass ecological site. The potential natural plant communities on these sites would be comprised of a big sagebrush shrub overstory with principal understory plants dominated by bluebunch wheatgrass or Indian ricegrass.

Ecological Site(s):

Loamy 8-12 Wyoming Big Sagebrush/Bluebunch Wheatgrass Sandy Loam 8-10 Basin Big Sagebrush/Indian Ricegrass

Annual exotic vegetation and noxious weeds dominate the treatment area and are expected to negatively impact adjacent sage-grouse PHMA habitat long-term. The current vegetation condition also negatively affects year-round big game habitat. Rush skeleton weed (*Chondrilla juncea*) is the primary noxious weed of concern because of its ability to increase and expand its range across large landscapes, especially after fire (Jacobs 2009 and Kinter 2007). Diffuse knapweed (*Centaurea diffusa*) is common in the project area with varying levels of dominance. Leafy spurge (*Euphorbia esula*) is a new noxious weed invader that has been found in the project boundary.

Figure K-21. Leafy Spurge Infestation

Due to past wildfire impacts and invasive plant/noxious weed infestation, current conditions are not optimum for sage-grouse or big game habitat. Habitat conditions within and outside the treatment area are expected to further decline unless a larger-scale vegetation treatment for annual exotic vegetation and noxious weeds is implemented.

Proposed Vegetation Treatments

Seed Bed Treatment

The aerial herbicide treatment would be implemented as a primary seed bed treatment to reduce exotic annual vegetation and noxious weed cover on the project area. The treatment would be applied to the seed treatment area plus the roadside/fuel break area. The aerial herbicide treatment would be implemented in fall (September 15-November 15) before ground freeze-up or spring (March 15-May 31). Imazapic (Plateau®), Glyphosate (Roundup®), and Aminopyralid (Milestone®) herbicides would be applied at the following rates and timing.

Jim Brown Aerial Herbicide Treatment Seed Treatment Area-17,900 Acres Roadside/Fuel Break Area-8,252 Acres Total - 26,152 Acres			
Herbicide	**Rate-oz./acre**	**Target Vegetation**	**Application Timing**
Imazapic (*Plateau®*)	6-8	Exotic annuals-cheatgrass, mustard	Fall
Aminopyralid (*Milestone®*)	5-7	Rush skeletonweed, diffuse knapweed, leafy spurge	Fall
Glyphosate (*Roundup®*)	16-32	Exotic annuals-cheatgrass, mustard	Fall or Spring

Dependent on vegetation conditions (abundant annual exotic cover), the fall application of Imazapic could be deferred until exotic annual cover is reduced. If a fall germination of cheatgrass occurs, the proposed use of Glyphosate and Aminopyralid would be implemented in the fall to reduce annual exotic cover and noxious weeds. A fall application of Glyphosate could be followed with up to two applications of Glyphosate in the spring to further reduce annual cover. Spring applications would only include Glyphosate. A fall application of Imazapic would be implemented once annual cover is reduced.

Drill and Aerial Seed Treatments

The following fall after the herbicide seed bed treatment the proposed vegetation treatment area would be aerial and drill seeded. The aerial seeding would be implemented prior to the drill seeding with the following seed mix. Due to the rockiness of the treatment area the aerial seeding would provide a perennial vegetation seed source across areas that cannot be physically drilled. The entire project area will be aerial seeded.

Jim Brown Aerial Seed Grass and Forb Mix-17,900 Acres	
Species and Variety	**Seed Rate Lbs/Acre PLS**
Grasses	
1.'Vavilov II' Siberian Wheatgrass	2.00
2. 'Sherman' Big Bluegrass (*Poa ampla*)	0.30
3. Sandberg's Bluegrass (*Poa secunda*)	0.20
Forbs	
1. Hot Rock Penstemon (*Penstemon deustus*)	0.05
2. Fleabane (*Erigeron pumilis*)	0.05
3. Western Yarrow (*Achillea millefolium*)	0.05

Following the grass and forb aerial seeding the vegetation treatment area would be drill seeded with a standard rangeland drill with the following seed mix. Due to the rockiness of the treatment area approximately 11,000 acres can be physically drill seeded.

Jim Brown Drill Seed Mix-11,000 Acres	
Species and Variety	**Seed Rate-Lbs/Acre**
Grasses	
1. 'Columbia' and/or 'Anatone' Bluebunch Wheatgrass *	2.50
2. 'Discovery' Snake River Wheatgrass *	1.00
3. 'Vavilov II' Siberian Wheatgrass	0.75
4. 'Rim Rock' Indian Ricegrass *	0.50
5. 'Sand Hollow' Big Squirreltail*	0.50
6. 'Craters' Bluegrass and/or 'Sherman' Big Bluegrass *	0.20
Forbs	
1. Sulfur Buckwheat, (*Eriogonum umbellatum*) ♦	0.40
2. 'Munroe' Globemallow, (*Sphaeralcea munroana*) ♦	0.10
3. 'Ladak' Alfalfa	0.50
4. 'Eski' Sainfoin	1.00
Shrubs	
1. Bitterbrush, (*Purshia tridentata*) ♦	0.30
* Native Cultivar / ♦ Wildland Collected	

Following the drill and aerial seedings (grass and forb) the treatment area would be strip seeded with 'Wyoming' and 'Basin' big sagebrush, perpendicular to the prevailing winds.

Jim Brown Aerial Seed Sagebrush-9,000 Acres	
Species and Variety	**Seed Rate Lbs/Acre PLS**
1. 'Wyoming' Big Sagebrush	0.50 (Bulk)
2. 'Basin' Big Sagebrush	0.50 (bulk)

Shrub Planting

Containerized 'Wyoming' big sagebrush and bitterbrush plants would be hand planted in the fall up to 3 years subsequent to the fall seed treatments.

Treatment Exclosure

Approximately 60 acres of the project area would be excluded from use by an exclosure to evaluate and measure larger-scale treatment effectiveness and allow for small scale tests such as containerized shrub and forb plantings. The exclosure would be constructed with a combination of net and barbed wire. The net wire would be 32 inches high with two strands of barbed wire spaced at 2" and 14" above the net wire. Steel posts would be spaced at 16.5 feet with one wire stay between posts. One gate would be provided.

In addition to the larger-scale treatments proposed, the following list of containerized forbs would be planted within the plot. These forbs are from local, wildland collections.

- Oregon sunshine (Eriophyllum lanatum)
- Nineleaf biscuitroot (*Lomatium triternatum*)
- Cusick's beardtongue (*Penstemon cusickii*)
- Hooker's balsamroot (*Balsamorhiza hookeri*)
- Douglas' dustymaiden (*Chaenactis douglasii*)

Spot Herbicide and Biologic Control

Spot herbicide and biologic control efforts would be utilized to further control noxious weeds following the seed bed and seeding treatments. Primary noxious weeds include rush skeletonweed, diffuse knapweed and leafy spurge.

Monitoring

Exclusion of livestock is critical for the recovery of existing vegetation or establishment and protection of new seedings. The seeded treatment area would be closed to livestock grazing for a minimum period of two growing seasons to promote recovery of existing vegetation and to facilitate the establishment of seeded species as specified in the 2017 Twin Falls District Noxious Weed and Invasive Plant Treatment EA# BLM-ID-T0002012-0001-EA (TFD-NWIPT-EA).

Resumption of livestock grazing would ultimately depend on monitoring and meeting of aerial/ground seeding and natural recovery objectives. Recovery of the treated area would be monitored for availability to grazing on a yearly basis. The monitoring for grazing availability and recommendations for opening the area to livestock would be the responsibility of an interdisciplinary team. A grazing decision or agreement would be issued closing the project area to livestock grazing.

The drill and aerial seed treatment area would be considered recovered and available for grazing when:

- The amount of bare mineral soil (lacking cover of plants, litter, or biological soil crust) is within 10% of what would be expected for the site,
- Desirable herbaceous perennial plants are producing seed, and

- Desirable perennial vegetation have developed extensive root and shoot systems to provide for soil stabilization and are sustainable under livestock grazing.
- Natural recovery areas would be considered recovered and available for grazing when:
- Recovered herbaceous vegetation is providing sufficient ground cover to protect the site from accelerated erosion and expansion/conversion to annual grasses and noxious weeds.
- The amount of bare mineral soil (lacking cover of plants, litter, or biological soil crust) is within 10% of what would be expected for the site. Recommended study methods include line-point intercept or step point cover methods and photo points.
- A qualitative visual assessment of the following would also be considered:
- Plant vigor (perennial plants)
- Precipitation information during the non-growing (winter) and growing (spring through early summer) seasons
- Competition with invasive annual plants and noxious weed species
- Seed production

An evaluation of collected monitoring data would be completed documenting that reintroducing grazing to the area would not cause a downward trend in vegetation establishment and recovery.

Little Owyhee Roads Fuel break - Nevada 2014

Road Fuel breaks

Proposed fuel break maintenance and improvement actions would include using a tractor with deck mower to reduce the height of standing vegetation adjacent to the roadways in previously treated areas (see maps) up to 300 feet in width. Treatments would generally occur on areas previously treated with herbicide where brush has been killed along the existing disturbance corridors. Herbicide application using Imazapic or other BLM approved herbicide and seeding with native vegetation, where necessary, is also proposed to reduce the spread and establishment of noxious or invasive weeds. Herbicide may be applied aerially or using ground-based equipment. Once maintained and improved, treated areas would serve as fuel breaks and allow for better access for fire suppression equipment. These fuel breaks would be subject to periodic maintenance to reduce fuel loads/heights and treat any invasive or noxious plants that may become established within the fuelbreak. Total length of proposed fuelbreak improvement is 95 miles, for total proposed treatment acreage of 3,439 acres. The project would be completed over a three year period from September through February yearly.

Wildlife Considerations

There are two special status plants found within the project area - Owyhee prickly phlox (*Linanthus glabrum*) and Davis peppercress (*Lepidium davisii*). Owyhee prickly phlox was dismissed from analysis in the 2008 EA (NV-020-08-EA-05) due to the habitat not being impacted by the proposed action. However, soils with the potential for Davis peppercress occur in a small portion of the project area. Thus, all potential areas for Davis peppercress would require a special status plant survey by a trained employee and performed during the appropriate time period to maximize detection. No treatments would occur within potential habitat until those surveys occur. If found, plants would be flagged, a buffer area would be established and no treatments would occur within that buffer (Vegetation Treatment Using Herbicide on Bureau of Land Management Lands in Seventeen Western States Programmatic EIS, 2007; see design features for protection measures for Davis Peppercress).

Design Features

In addition to SOPs and Best Management Practices contained in Appendix A of the Vegetation Treatment Using Herbicide on Bureau of Land Management Lands in Seventeen Western States Programmatic EIS, Record of Decision (2007), the following Design measures from the NEPA documents (See section C) are applicable to all proposed actions.

1. Herbicide application rates (range of rates) and application will be subject to label restrictions and standard operating procedures. (Montana Mountains Cooperative Fuels Management EA)

2. All treatments identified will be in accordance with the Instruction Memorandums WO-IM-2012-043 Greater Sage-Grouse Interim Management Policies and Procedures and WO-IM-2010-149 Sage-grouse Conservation Related to Wildland Fire and Fuels Management. Fuels Management Best Management Practices (BMPs) for Sage-Grouse Conservation as described in Appendix IV in EA. (Montana Mountains Cooperative Fuels Management EA)

3. Any unanticipated archeological discovery on BLM lands will be reported to a BLM archeologist and work in the immediate vicinity will stop until the authorizing officer approves the resumption of work. (Montana Mountains Cooperative Fuels Management EA)

4. Prior to implementation of treatments, pygmy rabbit surveys will be conducted in areas of suitable habitat. A 400 ft. avoidance buffer would be established around any active pygmy rabbit burrows and burrow complexes found. No removal or manipulation of sagebrush would occur within any 400ft. avoidance buffers established. (Montana Mountains Cooperative Fuels Management EA)

5. Existing vegetation will not be treated within ten feet of perennial drainages with mechanical or chemical treatments. (Montana Mountains Cooperative Fuels Management EA)

6. All terrestrial equipment (e.g., vehicles, hand tools, tractors, etc.) to be used in treatments will be washed offsite prior to being brought to the project site, to avoid spreading noxious weed seeds. (Montana Mountains Cooperative Fuels Management EA)

7. If any significant paleontological resources are found during operations, impacts will be mitigated through avoidance and/or data recovery. Any unanticipated vertebrate fossil discovery on BLM lands will be reported immediately to the Project Archaeologist. (Montana Mountains Cooperative Fuels Management EA)

8. At least two weeks before herbicides are applied, the tribal council of the Fort McDermitt Paiute and Shoshone Reservation will be notified of when, where and how herbicides would be applied. (Montana Mountains Cooperative Fuels Management EA)

9. Treatments will not be applied within the North Fork of the Little Humboldt Wilderness Study Area (WSA). All treatment near the WSA will occur outside the boundary on the east side of the WSA that follows a previously treated roadway. Treatment will only occur east of this boundary road adjacent to the eastern WSA boundary.

10. BLM Nevada State Sensitive plant populations, including populations of Davis Peppercress, will be avoided during all treatments. If any plants are located during surveys, a 50ft buffer would be

implemented for ground based treatments and a 150ft buffer would be implemented for aerial treatments. No treatments would occur within identified buffer zones.

Shale/Wildhorse Fuel Breaks Vegetation Treatment Project - Idaho 2019

The proposed action is to implement the Shale Butte/Wildhorse Fuel Breaks Project (See maps). Implementation would entail aerial herbicide treatment with Imazapic (Plateau®), Glyphosate (Roundup®) and Aminopyralid (Milestone®), mowing, drill seeding (grasses and forbs), a livestock grazing closure and temporary protection fence, road improvements by ditch and crowning, and monitoring.

The Shale Butte project coincides with a previous fuel break project (Wildhorse Fuel Breaks). An aerial herbicide treatment would be implemented on the proposed treatment area. The herbicide treatment would be utilized to reduce fuel loads from invasive annuals and noxious weeds along approximately 6 miles of the Shale Butte Road (See Shale Butte Road Treatment map). The sprayed roadsides would act as a fuel break.

The Shale Butte project comprises approximately 2,924 acres on BLM land located in Lincoln County. Included within the project area are 4.6 linear miles of the Shale Butte Wilderness Study Area (WSA). The only treatment proposed in the WSA would be the herbicide treatment.

The Wildhorse Fuel Breaks treatment segments (west and east units) would receive a drill seeding treatment of 'Stabilizer' crested wheatgrass in the portions that have already been sprayed in the fall of 2018 as part of the Wildhorse Fuel Breaks project. There is approximately 8 miles of the Wildhorse Fuel Breaks to be drill seeded. The proposed fuel break consists of a ¼ mile-wide perennial vegetation buffer. The seeding will stabilize the site and compete against cheatgrass.

The Shale Butte and Wildhorse fuel breaks will occur on both sides of the road, unless perennial vegetation is dominant and invasive non-native annual grass cover is <10%.

The Wildhorse Fuel Break treatment areas (east and west units) are approximately 2,177 acres total (486 acres west unit and 1,691 acres for the east unit), just west of the Shale Butte project location. Mechanical treatments would avoid intact stands of sagebrush with a dominant perennial understory.

As a result of high fire frequencies and limited success of past Emergency Stabilization and Rehabilitation (ESR) treatments invasive annual vegetation and noxious weeds are present in the area. These include diffuse knapweed (*Centaurea diffusa*), rush skeletonweed (*Chondrilla juncea*), and leafy spurge (*Euphorbia esula*). Herbicide treatments and drill seedings are proposed to improve habitat conditions, protect intact sagebrush steppe communities outside of the project area, and reduce hazardous fuels.

The Shale Butte project is within 1,484 acres of sage-grouse General Habitat Management Area (GMHA) and 1,440 acres sage-grouse Priority Habitat Management Area (PHMA) (See sage-grouse habitat map). The project area falls within the Magic Project Planning Area (USDI-BLM 2015).

Soil-vegetation correlation information indicates that the project area is located primarily on a loamy 8-12" Basin big sagebrush/bluebunch wheatgrass ecological site, a shallow loamy 8-12" Basin big sagebrush/bluebunch wheatgrass ecological site, or a shallow loamy 8-12" Wyoming big sagebrush/bluebunch wheatgrass ecological site. The potential natural plant communities on these sites would be comprised of a big sagebrush (*Artemisia tridentata*) shrub overstory with principal understory plants dominated by bluebunch wheatgrass (*Pseudoroegneria spicata*).

Ecological Site(s):
Loamy 8-12" Basin Big Sagebrush/Bluebunch Wheatgrass
Shallow Loamy 8-12" Basin Big Sagebrush/Bluebunch Wheatgrass
Shallow Loamy 8-12" Wyoming Big Sagebrush/Bluebunch Wheatgrass
Invasive annual vegetation and noxious weeds dominate the proposed seeding treatment area and are expected to negatively impact sage-grouse PHMA habitat long-term. The current vegetation condition also negatively affects year-round big game habitat. Rush skeletonweed and diffuse knapweed are the primary noxious weed of concern present.

Diffuse knapweed is common in the project area with varying levels of dominance. Leafy spurge is a new noxious weed invader that has been found in the project boundary.

Figure K-22. Leafy Spurge infestation west of Shale Butte

Due to past wildfire impacts and invasive plant and noxious weed infestation, current conditions in some areas of the project unit are not optimum for sage-grouse or big game habitat. Existing sagebrush stands within the project unit is in occupied sage-grouse habitat. Occupied leks are in close proximity to the project unit. Sage-grouse were observed at the project site in December 2018, indicating the existing sagebrush stand provides winter habitat. However, habitat conditions within and outside the treatment area are expected to further decline due to large invasive annual fuel loads, threat from wildfire, and noxious weeds infestation, unless fuels reduction project targeting invasive annual vegetation and noxious weeds in this the Shale Butte/Wildhorse Fuel Break is implemented.

There are 10 leks within 3.1 miles of the project area. Two of those leks are "occupied", two are "pending", two are "undetermined", and 4 are "unoccupied". Two of these leks are within 0.25 miles of the fuel break, including one occupied and one unoccupied. The project includes GHMA and PHMA (approx. 4 miles), and Idaho Desert Conservation Area-Priority (BSU, approx. 4 miles). The treatments will follow all prescriptions and conservation measure identified in ARMPA and the TFD NWIPT EA. The treatments are identified to occur only in the Fall that would avoid the sage-grouse breeding season (lekking, nesting).

Figure K-23. Sagebrush and Perennial Grass Site in Shale Butte Project Area, December 2018.

Proposed Vegetation Treatments

Herbicide Treatment

The aerial herbicide treatment would be implemented to reduce invasive annual vegetation and noxious weed cover on the project area. The treatment would be applied to the roadside/fuel break area. The aerial herbicide treatment would be implemented in fall (September 1-November 15) before ground freeze-up. Imazapic (Plateau®), Glyphosate (Roundup®), and Aminopyralid (Milestone®) herbicides would be applied at the following rates and timing.

Shale Butte Aerial Herbicide Treatment-2,924 Acres			
Herbicide	**Rate-oz./acre**	**Target Vegetation**	**Application Timing**
Imazapic (Plateau®)	6-8	Exotic annuals-cheatgrass, mustard	Fall
Aminopyralid (Milestone®)	5-7	Rush skeletonweed, diffuse knapweed, leafy spurge	Fall
Glyphosate (Roundup®)	16-32	Exotic annuals-cheatgrass, mustard	Fall

Application of Glyphosate could be used to re-treat small areas with new growth of invasive annuals in order for a successful drill seeding take place, and also if the fall growth of cheatgrass is greater than can be controlled with only an application of Imazapic. Herbicide applications would occur in the fall (September 5 – November 15). The only treatment occurring in the WSA will be the herbicide treatments. Mowing could also be used to reduce vegetation cover, coinciding with proper wildlife windows, outside of nesting and brood rearing seasons (fall).

Drill Seed Treatments

The fall following the herbicide seed bed treatment, the proposed vegetation treatment area would be drill seeded if perennial vegetation does not dominate and invasive annuals comprise <10% cover. Any seeding completed on the Shale Butte segment would occur following an ID Team assessment. If a drill seeding is necessary, the same Wildhorse Fuel Breaks Seed mix will be used. Drill seeding would only occur in the segments outside of the WSA.

The Wildhorse Fuel Break segments (east and west units; see treatment map) were chemically treated in the fall of 2018 and are now ready to be drill seeded. These segments will be drill seeded with the mix listed below as part of this DNA. Drill seeding will be completed with a standard rangeland drill. Drill seeding would occur within the ¼ mile herbicide application area, and at roughly 100 feet width in a continuous path following the road, determined by the landscape features. Drill seeding would occur in the fall.

Wildhorse Fuel Breaks Drill Seed – 2,177 acres	
Species and Variety	**Seed Rate Lbs/Acre PLS**
Grass and Forbs	
1.'Stabilizer' Crested Wheatgrass	8.00
2. 'Eagle' Yarrow	0.10
3. 'Lewis' Flax	0.10

Monitoring

Exclusion of livestock is critical for the establishment and protection of new seedings. The seeded treatment area would be closed to livestock grazing for a minimum period of two growing seasons to promote recovery of existing vegetation and to facilitate the establishment of seeded species as specified in the 2017 Twin Falls District Noxious Weed and Invasive Plant Treatment EA# BLM-ID-T000-2012-0001-EA (TFD-NWIPTEA). Additionally, livestock will be excluded from treatment areas during herbicide application. Typically, the Wildhorse allotment has utilized flexibility in grazing schedules and rotations to avoid closing areas and reducing availability of AUM's to permittees. It is likely that the existing grazing system would provide adequate rest of the seeded areas; if not, then a pasture closure would be implemented. A grazing decision or agreement could be issued closing the project area to livestock grazing if the grazing rotation schedule is not sufficient to rest the area until objectives are met. Alternatively, temporary fencing may be used to protect the seeded areas from livestock grazing.

Resumption of livestock grazing would ultimately depend on monitoring and meeting of seeding objectives. Recovery of the treated area would be monitored for availability to grazing on a yearly basis. The monitoring for grazing availability and recommendations for opening the area to livestock grazing would be the responsibility of an interdisciplinary team.

The drill seed treatment area would be considered recovered and available for grazing when:

- The amount of bare mineral soil (lacking cover of plants, litter, or biological soil crust) is within 10% of what would be expected for the site,
- Desirable herbaceous perennial plants are producing seed, and
- Desirable perennial vegetation have developed extensive root and shoot systems to provide for soil stabilization and are sustainable under livestock grazing.

A qualitative visual assessment of the following would also be considered:

- Plant vigor (perennial plants),
- Precipitation information during the non–growing (winter) and growing (spring through early summer) seasons,
- Competition with invasive annual plants and noxious weed species, and
- Seed production.

An evaluation of collected monitoring data would be completed documenting that reintroducing grazing to the area would not cause a downward trend in vegetation establishment and recovery before grazing would be allowed to resume.

Targeted Grazing Fuel Breaks - Nevada 2016

Targeted Grazing Fuel Breaks

The Proposed Action is to utilize targeted grazing and minimal mechanical treatment to strategically reduce fuel loads on degraded sagebrush steppe now dominated by annual invasive grasses. Treatment areas have been identified within four allotments in the Tuscarora Field Office: the Hadley, Carlin Field, T Lazy S, and Blue Basin Treatment Areas (see Maps 1-1 through 1-4 in Appendix A). A decision would be issued to allow for targeted grazing of the designated fuel break areas. The decision would allow for the authorization of targeted grazing annually for up to a ten year duration. Current permittees would be asked to implement fuel treatment actions as part of a strategic, landscape effort to protect and conserve sagebrush-steppe habitats (BLM, An Integrated Rangeland Fire Management Strategy, 2015). Priority Habitat Management Areas (PHMAs) exist on the leeward side of the grazing treatments, and would be at reduced risk of wildland fire spread when objectives are met in the proposed treatment areas. Free Use Permits would be issued to the current permittees on Hadley, Carlin Field, T Lazy S, and Blue Basin for periodic biologic treatment of annual fine fuels. A 'Free Use Permit' is addressed in 43 CFR Sec. 4130.5, which states:

"(a) A free-use grazing permit shall be issued to any applicant whose residence is adjacent to public lands within grazing districts and who needs these public lands to support those domestic livestock owned by the applicant whose products or work are used directly and exclusively by the applicant and his family. The issuance of free-use grazing permits is subject to Sec. 4130.1-2. These permits shall be issued on an annual basis. These permits cannot be transferred or assigned.

(b) The authorized officer may also authorize free use under the following circumstances:

(1) The primary objective of authorized grazing use or conservation use is the management of vegetation to meet resource objectives other than the production Chapter 2. Proposed Action and Alternatives Page 14 Targeted Grazing Fuel Breaks EA of livestock forage and such use is in conformance with the requirements of this part;
(2) The primary purpose of grazing use is for scientific research or administrative studies; or
(3) The primary purpose of grazing use is the control of noxious weeds." The treatment would be accomplished with livestock concentrated within the identified treatment areas to accomplish the fuels management objectives.

Grazing treatments would be restricted to specific areas dominated by cheatgrass or other annual or introduced grasses, and conducted across BLM public and private ownerships. With the exception of one section of the Hadley Allotment (legal description T 32 N R 52 E Section 11) which is owned by New Nevada Lands, the private inholding within the treatment areas are owned or controlled by the permittees of the associated allotments, and all are amenable to applying this treatment on the associated private lands. Twenty foot easements will be acquired from the private landowners for the installation of fences. BLM would retain ownership of the portions of fence located on private lands.

Fencing would be used to confine livestock and to achieve grazing objectives in the targeted grazing treatment areas. Approximately 40 miles of new fencing would be constructed and tied to existing fencing, to provide control of livestock and allow specific targeted grazing on cheatgrass and/or introduced grass dominated areas. Mowing would be done in very limited areas that have components of shrubs.

Table K-4
Treatment Acres Across All Ownerships

Treatment Area	Private Acres	BLM Acres
T Lazy S	5195	2984
Hadley	201	241
Carlin Field	0	59
Blue Basin	15	133

The Proposed Action would provide a net conservation gain for greater sage-grouse in the form of protecting PHMA from loss by wildland fire and providing an opportunity for previously burned areas to rehabilitate back to sagebrush steppe.

A core component of the proposed project is monitoring the implementation and effects of targeted grazing. A detailed monitoring plan is provided in Appendix B and is part of the Proposed Action.

Treatment objectives:

- Grazing cheatgrass to maintain a stubble height of 2 to 3 inches during the fire season is the objective (Mosley & Roselle, 2006). Stubble heights will be monitored during implementation of targeted grazing, and livestock will be removed when the objective is attained or plants become unpalatable to livestock, whichever comes first (Mosley & Roselle, 2006; Vallentine & Stevens, 1992; Hempy-Mayer & Pyke, 2008). Reentry into already treated areas may be necessary if sufficient precipitation induces regrowth of cheatgrass (Diamond, Call, & Devoe, Effects of Targeted Cattle Grazing on Fire Behavior of Cheatgrass-Dominated Rangeland in the Northern Great Basin, 2009; Mosley & Roselle, 2006).
- Fall grazing may be used, as needed, to assist in residual fuel reduction. Fall grazing would also reduce litter, further reducing germination of cheatgrass. The stubble height objective would not be exceeded (Launchbaugh, et al., 2008; Schmelzer, et al 2014; USDA, 2012).
- Upon attainment of targeted grazing objectives for the treatment area, livestock will be removed within 48 hours of the BLM notifying the permittee. No motorized herding or vehicle travel off designated routes will be authorized.

The following management tools may be used singly or in aggregate to achieve treatment objectives:

Grazing Season of Use − Strategic targeted spring grazing would take place on specific cheatgrass dominated areas or existing greenstrips (seedings of introduced grasses planted to reduce wildland fire spread) to reduce fine fuel loads for the upcoming fire season (Diamond, Call, & Devoe, Effects of Targeted Cattle Grazing on Fire Behavior of Cheatgrass-Dominated Rangeland in the Northern Great Basin, 2009). Substantial data collection would accompany the grazing treatments which would be administered through free use grazing permits (43 CFR §4130.5(b)(2)). Cheatgrass phenology would determine when livestock grazing could begin. Grazing in the springtime would begin when cheatgrass or introduced species were still palatable to livestock, prior to the dough stage (Vallentine & Stevens, 1992). Since cheatgrass has been shown to germinate readily in residual fall litter (Foster, et al., 2015), fall targeted grazing treatments may be used, as necessary, to further reduce spring fuel loads.

Livestock Numbers– Annually, when free-use grazing permits are authorized, they will include the kind and number of livestock, the period use, and the amount of use in AUMs. These terms and conditions would be based on annual conditions, and will change with each free-use grazing permit issuance, as appropriate for the annual fuel growth and conditions of that given year. For the purpose of scientific research or administrative studies, free use grazing permits, as defined in 43 CFR 4130.5, would be issued annually to provide fluidity to attain the stubble height objective, at the appropriate time, solely on treatment areas. Regular term permits for each allotment would not be affected. Permittees for the T Lazy S, Hadley, Carlin Field, and Blue Basin allotments would be required to fill out annual, free use, applications for their respective targeted grazing treatment areas. Applications would have to be received by the Tuscarora Field Office no later than 7days prior to proposed implementation. Authorization to implement grazing treatments would be mutually agreed upon between the authorized officer and grazing permittees for the T Lazy S, Hadley, Carlin Field, and Blue Basin allotments. Both livestock numbers and timing will be adjusted and varied to attain the aforementioned grazing stubble height objective. Removal will be dictated by stubble height objective being met, or cheatgrass becoming unpalatable, whichever comes first. Actual use reports for the targeted grazing treatment areas would be received by the BLM within 15 days of livestock removal for each seasonal treatment.

Livestock Management with Fencing – Fencing would be used to confine livestock and to achieve grazing objectives in the targeted grazing treatment areas. Approximately 40 miles of new fencing would be constructed and tied to existing fencing, to provide control of livestock and allow specific targeted grazing on cheatgrass and/or introduced grass dominated areas. Wire gates and cattle guards would be put in to maintain access on existing roads where needed. The fences would be three-strand (two barbed with smooth bottom) and built to BLM Handbook 1741-1 wildlife friendly standards. Fences would be marked with flight diverters to prevent bird strikes.

Livestock Water Distribution– Water hauling to portable troughs would be used to manage livestock distribution and meet fuels management objectives (Maps 2-2 through 2-4 in Appendix A). Watering locations would be next to existing roadways. Roads maintained by BLM may not be improved for this project unless authorized by the BLM. The existing road, combined with targeted grazing treatment areas, would enhance fire suppression activities (direct attack or conducting burnout operations). Water troughs must have wildlife escape ramps and would be removed within 72 hours of livestock removal from the targeted grazing treatment areas. Troughs would be placed more than twenty feet from fences to prevent flying animal strikes. Troughs will be excluded within 50 meters of areas with known archeological sites.

Supplements – Mineral supplements, salt, and/or protein supplements (blocks or liquid) would be used to distribute livestock and meet fuels objectives. Mineral, salt, and/or protein supplements would be next to existing roadways and may be placed with water troughs. All supplements would be removed within 72 hours of livestock removal from the targeted grazing treatment areas. Supplements will be excluded within 50 meters of areas with known archaeological sites.

Mowing − Some locations within treatment areas contain scattered shrubs that may compromise the efficacy of grazed fuel breaks. In these areas, mowing would be conducted up to 300 feet from the windward border of the treatment area to enhance the targeted grazing treatment. Mowing these areas would reduce these taller, woody fuels that contribute to increased flame length and fire spread. Mowing height would be four to eight inches, ground conditions permitting. After initial mowing, these areas would be maintained through targeted grazing unless woody shrubs re-establish and interfere with ability to meet the stated fuels objectives. − Where the condition of the road, terrain and vegetation would allow, a deck mower (or any mechanical equipment designed to mow brush) could be used to reduce vegetation height on sites having vegetation comprised of shrubs on either side of roads in strategic locations.

- Mowing can serve as an alternative fuels treatment tool in areas where livestock grazing cannot fully meet the fuels management objective or where scattered shrubs create a fire hazard in the targeted grazing fuel break.
- Mowing would be predominately completed using agricultural tractor(s) and rotary cutter(s). Treatment areas would be focused in areas where residual herbaceous vegetation is abundant.
- Shrub mowing would occur during the cooler seasons (outside of the migratory bird nesting period, April 1 to July 31) when wildland fire risk is low and required design features (Appendix C) would be followed.

Monitoring

This project has a significant monitoring component. The Assessment Inventory Monitoring (AIM) protocol will be used. The BLM has adopted this protocol nationally and will allow the data to be used as part of a national data set. The AIM protocol can provide data such as Bare Ground, Foliar and Basal Cover, Vegetation Composition, and Vegetation Height among others. Soil Surface Resistance to Erosion will also be collected. Additional data that will be collected include Bulk Density, Production (post treatment), and Stubble height.

Twin Springs Fuel Break Herbicide Treatment Project - Idaho 2018

The proposed action is to implement an aerial herbicide treatment on an existing fuel break within the West Shoshone Basin area (See Twin Springs Fuel Break Herbicide Treatment map). The Twin Springs Fuel Break was constructed in 1990 by mowing sagebrush and then again in 2012. Since the last mowing the fuel break has filled in with cheatgrass. Implementation will entail aerial and/or ground based broadcast application treatment of herbicide with Imazapic (Plateau®), spot-herbicide application and biologic-control for noxious weeds and monitoring would be implemented as necessary.

The Twin Springs Fuel Break Herbicide Treatment project will sufficiently reduce cheatgrass cover and restore effectiveness of the fuel break. Cheatgrass has encroached into the fuel break area, increasing the risk of fire, and decreasing the health and vigor of the existing perennial plant species. Aerial application of herbicide will reduce threat of wildfire to existing native perennial plant species and protect the sagebrush steppe habitat.

The Twin Springs Fuel Break Herbicide Treatment project area is 548 acres. The project falls within a sage-grouse Priority Habitat Management Area (PHMA). Soil-vegetation correlation information indicates that the project area is located primarily on a loamy 8- 16" Wyoming sagebrush/bluebunch

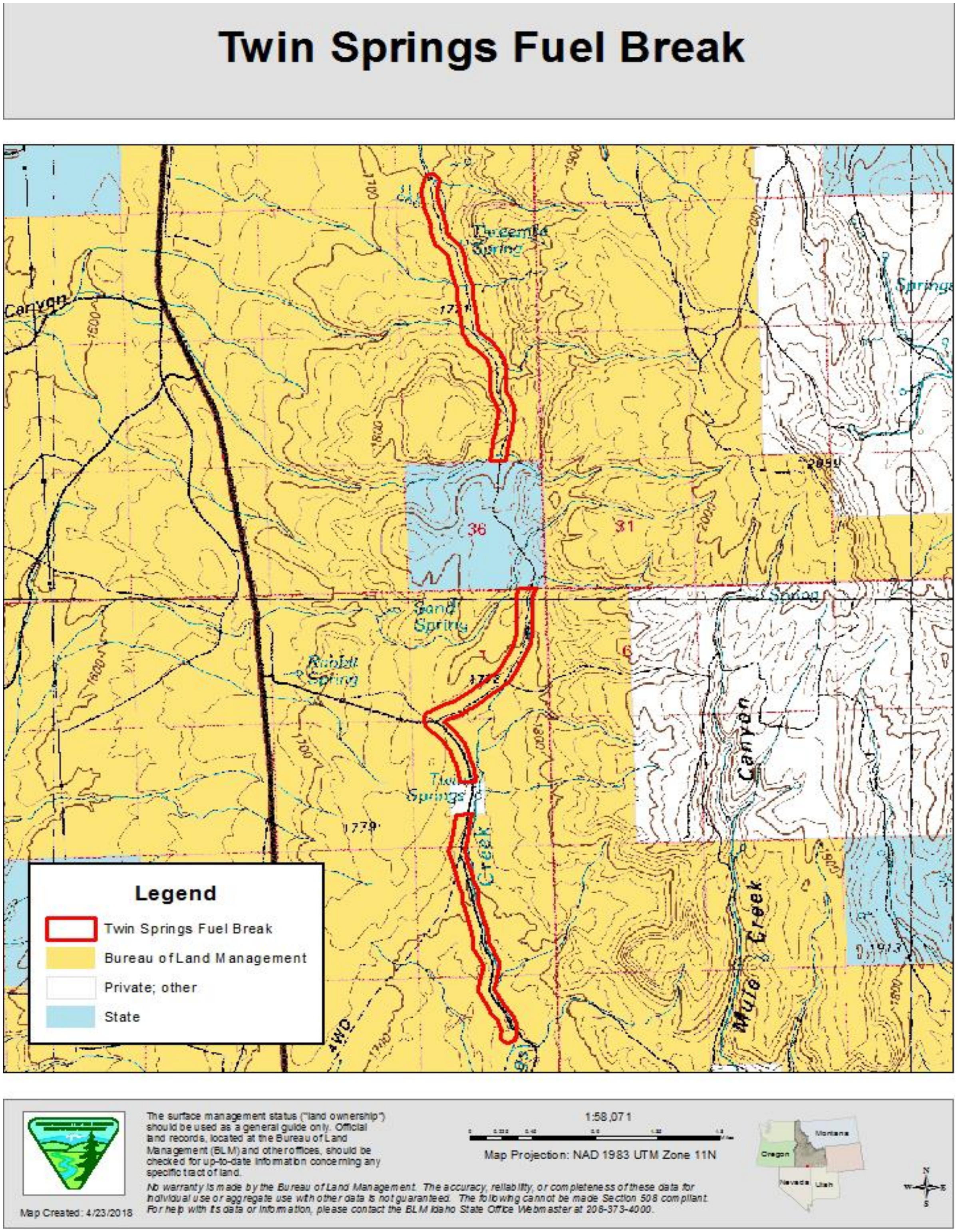

Figure K-24. Twin Springs Fuel Break Project Location

Ecological Site(s):

Loamy 8-12" Wyoming Sagebrush/Bluebunch Wheatgrass – Thurber's needlegrass

Loamy 10-13" Wyoming Sagebrush/Bluebunch Wheatgrass

Loamy 13-16" Mountain Big Sagebrush/Bluebunch Wheatgrass – Idaho fescue wheatgrass, Thurber's needlegrass ecological site and loamy 8-13" Mountain big sagebrush/bluebunch wheatgrass – Idaho fescue ecological site. The potential natural plant communities on these sites would be comprised of a sagebrush shrub overstory with principal understory plants dominated by bluebunch wheatgrass, Idaho fescue and Thruber's needlegrass.

Annual exotic vegetation and noxious weeds do not dominate the treatment area. However, they are present in significant amounts in the project area. This presents a threat of potential wildfire, due to continuity of fine, burnable fuels. Cheatgrass effects the integrity of the existing fuel break and without herbicide treatment over time the annual grass could completely dominate the fuel break. Due to past wildfire impacts around the project area and the presence of invasive plant/noxious weeds, current conditions are not optimum for sage-grouse or big game habitat. Additionally, the Twin Springs Herbicide Treatment project aids in the investment of the initial fuel break project.

Proposed Vegetation Treatments

Herbicide Application – Annual Invasives Control

The aerial herbicide treatment would be implemented as a primary treatment to reduce exotic annual vegetation cover over the project area. The aerial herbicide treatment would be implemented in fall (August 1 – October 31) before ground freeze-up. Spring treatments are not expected to occur but if treatments occur they would be implemented from March 1 through May 15. Spring treatments would be conducted between 9:00 a.m. and 6:00 p.m. (MD-FIRE-19) and would be in compliance with the Migratory Bird Treaty Act stipulations. Any application buffers and/or restrictions would be followed by BLM staff and contractors at the time of implementation. Imazapic herbicide would be applied at the following rates and timing:

Twin Springs Fuel Break Aerial Herbicide Treatment 548 Acres			
Herbicide	**Rate- oz./acre**	**Target Vegetation**	**Application Timing**
Imazapic	6-8	Exotic annuals-cheatgrass, tumble mustard	Fall

Spot Herbicide and Biologic Control

Spot herbicide and biologic control efforts would be utilized to further control noxious weeds following the seed bed and seeding treatments. Primary noxious weeds include Black henbane, Mediterranean sage and Canada thistle. Treatments will avoid private and state lands within the project area, unless otherwise identified during the planning process.

Monitoring

Monitoring of non-native invasive plants and noxious weeds effectiveness can be qualitative or quantitative and should include comparisons of pre- and post-treatment information. Baseline vegetation inventories would be conducted to determine pre-treatment conditions and to determine needed future treatments. Post-treatment monitoring would occur to evaluate treatment effects and success. Methods used to monitor treatments could include field observations, photo plots, and quantitative methods such as vegetation cover, density, or belt transects. Short-term post-treatment monitoring would occur annually for three years. Long-term monitoring for successful treatments would occur at five years post-treatment, then at five year intervals, dependent on available funding.

Monitoring activities will be conducted according to the Twin Falls District Land Treatment Monitoring Guidelines outlined in Instruction Memorandum IDIMT000-2012-001.

Applicant (if any): N/A

B. Conformance with the Land Use Plan (LUP) and Consistency with Related Subordinate Implementation Plans.

The applicable land use plans and amendments for the Twin Springs Herbicide Treatment Project are the:

- Twin Falls Management Framework Plan (MFP), 1982
- Fire, Fuels, and Related Vegetation Management Direction Plan Amendment (FMDA), 2008
- Idaho & Southwestern Montana Greater Sage-Grouse Approved Resource Management Plan Amendments (ARMPA)/Final EIS, 2015
- Fire, Fuels, and Related Vegetation Management Direction Plan Amendment (FMDA), 2008
- The FMDA amended the 1985 Twin Falls MFP. The FMDA specifically provides for using chemical, mechanical, and seeding treatments with appropriate plant materials to attempt to stabilize sites and prevent dominance of invasive, annual vegetation, and noxious weeds (BLM 2008, pp. 17 and 18).

The proposed action is in conformance with the following landscape-level objective and management action set forth in the FMDA (BLM 2008, pp. 17):

- Objective - Make Progress toward Desired Future Condition (DFC) in Low-elevation Shrub, Perennial Grass, Invasive Annual Grass, Mid-elevation Shrub, and Juniper vegetation types.
- Management Action

Use chemical, mechanical, seeding, and prescribed fire treatments as appropriate to achieve DFC. Strategically place treatments on a landscape scale to prevent fire from spreading into important sagebrush steppe habitat or WUI.

Idaho & Southwestern Montana Greater Sage-Grouse Approved Resource Management Plan Amendments (ARMPA)/Final EIS, 2015

The Twin Falls MFP is amended by the ARMPA to incorporate appropriate sage-grouse conservation measures. Management objectives, decisions and required design features contained in the ARMPA were incorporated into the proposed action. The proposed action is in conformance with the ARMPA as sage-grouse habitat would be protected, restored, and connected to suitable habitat. Applicable objectives, management decisions or required design features are listed below.

Objectives

- Objective VEG 1: Reconnect and expand areas of higher native plant community integrity/rangeland health to increase the extent of high quality habitat and, where possible, to accommodate the future effects of climate change.
- Objective VEG 2: Increase the amount and functionality of seasonal habitats by:
- Reducing the extent of annual grasslands within and adjacent to PMHA and IMHA.
- Objective FIRE 1: Design fuel treatments to restore, enhance, or maintain GRSG habitat.
- Management Decisions
- MD VEG 10: Implement noxious weed and invasive species control using integrated vegetation management actions per national guidance and local weed management plans for Cooperative Weed Management Areas in cooperation with State and Federal agencies, affected counties, and adjoining private lands owners.
- MD VEG 13: Treat areas that contain cheatgrass and other invasive or noxious species to minimize competition and favor establishment of desired species.
- MD FIRE 17: Design and implement fuels treatments that will reduce the potential start and spread of unwanted wildfires and provide anchor points or control lines for the containment of wildfires during suppression activities with an emphasis on maintaining, protecting, and expanding sagebrush ecosystems and successfully rehabilitated areas and strategically and effectively reduce wildfire threats in the greatest area.
- MD FIRE 19: Apply appropriate seasonal restrictions for implementing vegetation and fuels management treatments according to the type of seasonal habitats present. Allow no treatments in known winter range unless treatments are designed to strategically reduce wildfire risk around and/or in the winter range and will protect, maintain, increase, or enhance winter range habitat quality. Ensure chemical applications are utilized where they will assist in success of fuels
- treatments. Strategically place treatments on a landscape scale to prevent fire from spreading into PHMA or WUI.
- MD FIRE 22: Fuel treatments will be designed through an interdisciplinary process to expand, enhance, maintain, and protect GRSG habitat which considers a full range of cost effective fuel reduction techniques, including: chemical, biological (including grazing and targeted grazing), mechanical and prescribed fire treatments.
- MD FIRE 30: Maintain effectiveness of fuels projects, including fuel breaks, to ensure long-term success, including persistence of seeded species and/or other treatment components while maintaining the integrity of adjacent vegetation.
- MA SSS-38: Monitor the effectiveness of projects (e.g., fuel breaks. fuels treatments) until objectives have been met or until it is determined that objectives cannot be met, according to the monitoring schedule identified for project implementation.
- MA SSS-39: Monitor invasive vegetation post vegetation management treatment.

Required Design Features

- Where applicable, design fuels treatment objectives to protect existing sagebrush ecosystems, modify fire behavior, restore native plants, and create landscape patterns which most benefit sage-grouse habitat.
- Use site preparation techniques that retain existing desirable vegetation.

- Reduce annual grass densities and competition through herbicide, targeted grazing, tillage, prescribed fire, etc. (Pyke 2011).
- Where applicable, incorporate roads and natural fuel breaks into fuel break
- design.
- Design vegetation treatments which facilitate firefighter safety, reduce the potential acres burned, and reduce the fire risk to sage-grouse habitat. Additionally, develop maps for sage-grouse habitat which spatially display existing fuels treatments that can be used to assist suppression activities.
- Utilize post-treatment control of annual grass and other invasive species.
- 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.
- Schedule construction and maintenance activities to avoid or minimize disturbance to priority species and their habitat during their important seasonal periods.
- Sage-grouse, other special species, mule deer and pronghorn are priority species for habitat management.
- No repeated or sustained behavioral disturbance (e.g., visual, noise over 10 dbA at lek, etc.) to lekking birds from 6:00 pm to 9:00 am within 2 miles (3.2 km) of leks during the lekking season.

Fuel Breaks to Restore and Maintain Sage-grouse Habitat - Idaho 2009

Alternative B – Proposed Action –Mowed and Greenstrip Fuel Breaks

BLM proposes to develop and maintain a network of fuel breaks along 128 miles of roadsides in the Bruneau Field Office. Fuel breaks would be established next to roads to augment the road surface effects in reducing fuel continuity. Roads were selected for treatment if vegetation conditions met specific criteria, identified below, and the road's suitability for firefighting and heavy equipment access. Roads identified for treatment were evaluated during fall 2010 and spring 2011.

Of 185 miles of roadsides evaluated, 128 miles were identified for treatment (Map 5). Greenstrips would be up to 300 feet wide (i.e., 150 feet on each roadside or 300 feet on one side) along roads; mow strips would be up to 100 feet wide (i.e., 50 feet on each side or 100 feet on one) along roads. Of the 11 miles of greenstrip development only 3 miles have not had sagebrush burned by wildfire.

<u>Mowed Fuel Breaks</u>

The interdisciplinary team identified roads to treat by evaluating vegetation characteristics across the project area. Roads were evaluated against criteria that helped identify where fuel breaks are most needed, and the appropriate treatments necessary to slow wildfire spread and reduce flame lengths. Modifying wildfire behavior both increases the safety margin for firefighters and reduces the number of firefighting resources needed for successful suppression. The criteria, developed by an interdisciplinary team, are identified below. Criteria to mow roadside vegetation: Shrubs taller than 15 inches of moderate density (greater than 20% cover) with a moderate understory (greater than 20% cover) of mid-stature or taller vegetation (greater than 6 inches tall) or with a moderate understory of cheatgrass.

Mowing under this scenario would be followed up with herbicide treatments. Criteria to not mow roadside vegetation: Shrubs less than 15 inches tall or moderate density shrubs greater than 15 inches tall or grasslands with no shrubs.

Goodrich (2005) indicates that the height of low sagebrush is commonly 7.9 to 15.7 inches, so the criterion of targeting sagebrush greater than 15 inches tall would reduce impacts to low sagebrush. Low sagebrush areas were not targeted for treatment because typically these plant communities do not effectively carry fire, resulting in fire slowly burning in "fingers" with lower flame lengths.

A moderate density of big sagebrush with adequate herbaceous understory composition effectively carries fire, often resulting in complete combustion of biomass. Reducing sagebrush density and stature, would reduce flame lengths and fire spread rates. The 128 miles proposed for treatment include 11 miles of greenstrip development, 42 miles of existing greenstrip maintenance, and 75 miles of mowing. The 42 miles of greenstrips, identified for future maintenance, already exist from established seedings or the presence of suitable native vegetation, mostly Sandberg bluegrass.

Mowed fuel breaks would be created using a mower attached to a rubber-tired tractor (Figure 1), and sagebrush would be mowed to a height of 6 to12 inches. Mowing only one side of a road could occur where only one side meets the mowing criteria or if there is a restriction, such as a wilderness boundary or steep slopes. Mowing would be completed when fall weather reduces fire risk.

Implementation could occur September through February as long as conditions are appropriate (i.e., soils are not saturated). Dalke and others (1963) indicated that in the Big Desert area of Idaho, male lek attendance begins in March and increases rapidly during the first two weeks of April. Activity restrictions near leks normally begin March 15 at lower elevations in Idaho (Idaho BLM IB 2010-39). Ceasing project implementation before March provides a longer buffer and addresses the

Tribes' concerns about sage-grouse congregating on leks before the March 15 deadline that is normally used.

Maintenance mowing would occur once sagebrush has re-grown to an average height greater than 15 inches. Mow strips that show the establishment or proliferation of annual grasses (e.g. cheatgrass) will be treated with the appropriate herbicide as needed. These mow strips would be monitored annually, for the first 3 to 5 years following treatment, and re-treated as necessary to maintain suitable vegetative conditions in the fuel breaks.

Figure K-25. Rubber-wheeled tractor and roto-mower establishing a fuel break on the Idaho Falls District.

Greenstrips

Greenstrip fuel breaks consist of low-growing, fire-resistant vegetation that alters fire behavior by reducing flame lengths and fire intensity. A total of 53 miles of greenstrips are proposed including 42 miles of roadside which have been identified as currently supporting suitable greenstrip vegetation (existing greenstrips) and 11 miles of roadside where greenstrips would need to be developed.

The existing 42 miles of greenstrip would be enhanced and maintained as necessary by seeding desirable species and application of herbicide to control unsuitable greenstrip vegetation from establishing. Of the 11 miles of greenstrip to be developed, 3 of those miles are in an area where cheatgrass is mostly north of the existing road and could gain greater dominance on the southern side of the road if a fire burns the area. The 3 miles would require removing some scattered sagebrush, but no more than 20 total acres. Existing vegetation would be removed by prescribed fire, plowing, mowing or a combination of methods. The other 8 miles of proposed greenstrips are within the 2011 Big Hill Fire perimeter; negligible sagebrush loss would result. Greenstrips would be developed using a rangeland drill for seeding, and herbicide treatment. Maintenance of greenstrips could include re-seeding, herbicide application or a combination of both.

Native species would be emphasized for seeding per IM 2010-149, Sage-grouse Conservation Related to Wildfire and Fuels Management; however, certain non-native species or cultivars may be better suited to compete with invasive annuals. Preferred greenstrip species would be low stature plants, that remain green late into fire season, and would be appropriate for the ecological site. Seeding would be accomplished using a standard rangeland drill. Follow-up herbicide treatments would occur as necessary to maintain the integrity of established greenstrips.

Vegetation selected for seeding greenstrips would consist of a combination of bluegrass and fescue species, squirreltail, inland saltgrass, and other low-statured grasses that are determined to be effective greenstrip species and appropriate for the ecological sites. Forage kochia would be used where competition from annual grasses is high and grass species would have difficulty becoming established. Forage kochia would not be seeded within 0.5 miles of playas supporting Davis' pepperweed (*Lepidium davisii*), an Idaho BLM Sensitive Species that inhabits these playas. Areas currently supporting crested wheatgrass within greenstrip areas could be re-seeded with greenstrip vegetation. Areas where vegetation consists mostly of Sandberg bluegrass would be maintained and enhanced by treating cheatgrass with an appropriate herbicide.

Areas excluded from treatment include a 100-foot buffer adjacent to playas, wet meadows, and riparian greenline areas, 50-foot buffer from occupied pygmy rabbit burrows, unevaluated or significant archeological sites in proposed greenstrips only, or any area that does not meet the above mowing criteria. Map 5 shows locations of proposed greenstrips.

Livestock use would be restricted from greenstrips until the seeded vegetation becomes established. Livestock grazing would be controlled through deferred use, construction of temporary fencing or salting and watering in a disturbed site at least 0.5 miles away from developing greenstrips.

Greenstrips would be monitored annually for weeds and seeding success, and re-treated, as necessary, until the desired greenstrip vegetation becomes established. Once desired vegetation is established, monitoring would occur on a 3-year cycle to determine maintenance needs.

<u>Herbicide Treatment</u>

Chemical treatment involves the application of herbicides at specific plant growth stages to suppress or kill targeted plant species. Herbicides would be used to augment the establishment of greenstrip vegetation by reducing competition with undesirable species, and to reduce the presence of invasive annuals in order to maintain the effectiveness of both mow and greenstrip treatment areas.

The BLM completed an analysis for use of herbicides on public lands managed by the BLM in the Programmatic Environmental Impact Statement, Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (PEIS) (USDI BLM 2007a). The analysis for use of herbicides for the fuel breaks proposed in this EA is tiered to the PEIS. The herbicides proposed for use in this EA were analyzed in the PEIS and selected for use in ROD. The relevant standard operating procedures identified in the ROD are included in appendix section 7.5 of this EA.

Only ground-based application methods would be employed. Herbicides proposed for use are presented in the table below. Herbicides would be applied according to label recommendations and the standard operating procedures in the PEIS.

Herbicides would be applied to the 11 miles (400 acres) of new greenstrips proposed. Herbicide use may or may not occur along the entire fuel break network; however, for the analysis BLM assumes herbicides would be applied to the entire 128 miles (2,836 acres) although the actual miles treated may be much less. Treatments during the life of the project would be completed as needed to maintain the effectiveness of fuel breaks.

Herbicide	Herbicide Characteristics*
2,4-D	Selective; foliar absorbed; post-emergent; annual/perennial broadleaf weeds.
Chlorsulfuron	Selective; inhibits enzyme activity, broadleaf weeds and grasses.
Clopyralid	Selective, mimics plant hormones; annual and perennial broadleaf weeds.
Dicamba	Growth regulator; annual and perennial broadleaf weeds and grasses.
Imazapic	Selective pre and post-emergent systemic; inhibits annual grasses and some perennial grasses and broadleaf forbs.
Glyphosate	Non-selective systemic, annual and perennial grasses and broadleaf weeds, sedges, shrubs, and trees.
Metsulfuron methyl	Selective; post-emergent; inhibits cell division in roots and shoots; annual and perennial broadleaf weeds, brush, and trees.
Picloram	Selective; foliar and root absorption; mimics plant hormones; certain annual and perennial broadleaf weeds, vines, and shrubs.
Tebuthiuron	Relatively non-selective soil activated herbicide; pre and post-emergent control of annual and perennial grasses, broadleaf weeds and shrubs.
Triclopyr	Growth regulator; broadleaf weeds and woody plants.

*Information compiled from (USDI BLM 2007a).

Standard Operating Procedures/Design Criteria for Alternative B (Proposed Action)

Recreation/Wilderness

- No mowing would occur along any designated Scenic Byway route.
- No mowing would occur on roads that are bordered on both sides by wilderness.
- In areas where a road borders wilderness on one side, no mowing would occur on the wilderness side, but mowing could occur on the opposite roadside.

Habitat Protection

- No mowing or drill seeding would occur when soils are saturated and easily rutted.
- No mowing or greenstripping would occur within the wetland or riparian zones' greenline (area where riparian vegetation species exist).
- Mowing and seeding equipment, including vehicles and trailers, would be washed, prior to implementation, to reduce the potential for weed spread.
- Any noxious weed populations would be treated prior to fuel break development or avoided to reduce the chance of spread.
- Proposed routes would be surveyed for special status plants; any populations would be avoided.
- Mowing would not occur within 100 feet of playas, to protect the integrity of playas for Davis' pepperweed habitat. Greenstrips within 0.5 miles of playas would not be seeded with forage kochia to protect habitat from encroachment.

Wildlife Protection

- From March 1 through July 31 treatments would be limited to actions and areas where impacts to sage-grouse reproduction including lek attendance, nesting, and early brood rearing would not occur (i.e., spot weed treatments, greenstrip seeding).
- Any temporary fence constructed would be at least 1.25 miles away from active leks and marked in accordance with current marking specifications identified in IM No. ID-100- 2011-001 and guidelines specified in BLM IM 2012-043 to reduce collisions by sage- grouse and impacts to other wildlife species.
- From March 1 through July 31 treatments would be limited to actions and areas where effects nesting migratory landbirds would not occur (i.e., no sagebrush mowing would occur)
- No fuel break development would occur within 50 feet of occupied pygmy rabbit burrows (Wilson et al. 2011).
- Potential and occupied pygmy rabbit habitat would be surveyed one week prior to mowing treatment to identify new burrows.
- No use of 2,4-D within ¼ mile of pygmy rabbit habitat.
- No application of herbicides (not including 2,4D) above the typical application rate would occur within 100 yards of active burrows from one hour before sunset to one hour after sunrise, to minimize the chance of direct contamination.
- Application of herbicides other than 2,4D would be applied using a backpack sprayer within 100 yards of active burrows.

Noxious Weed and Cheatgrass Control, Fuel Break Maintenance

- Herbicide use would be in accordance with the relevant standard operating procedures identified in the Record of Decision for the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (USDI BLM 2007b).
- Herbicide would be applied using a truck, tractor or ATV mounted sprayer, depending on the treatment zone's width. Spot treatments may be completed using a backpack sprayer.
- Herbicide may be applied before or after mowing or seeding, depending on the target species and type of herbicide.
- No use of 2,4-D within ¼ mile of pygmy rabbit habitat.
- No application of herbicides (not including 2,4D) above the typical application rate would occur within 100 yards of active burrows from one hour before sunset to one hour after sunrise, to minimize the chance of direct contamination.
- Application of herbicides other than 2,4D would be applied using a backpack sprayer within 100 yards of active burrows.

Livestock Management

- To reduce disturbance while greenstrips become established, temporary livestock watering and salting may be established in a disturbed site or livestock would be moved to areas with existing watering sites at least 0.5 mile away from newly seeded areas.
- Temporary watering sites would have appropriate clearances completed prior to development. If a cultural site or special status species is discovered during the completion of clearances,

consultation with the appropriate agency would be completed prior to a temporary water site being established. Temporary water sites would be developed by moving existing watering materials from other sites within the allotment.

- An effort would be made to develop greenstrips during any planned deferred/rotational grazing schedules, where practical.
- If grazing deferment cannot be scheduled into the seeding plan, then temporary fencing may be installed to protect the seeding until objectives have been met.
- Livestock trailing on routes in or adjacent to vegetation treatments (e.g., fuels projects or restoration treatments) will be kept on the route until the treatment objectives are met, unless the specific trailing event would not conflict with treatment objectives.

Cultural Resources

- Project areas, which include greenstrips, temporary fences or placement of salt blocks and water troughs, would have the appropriate cultural resource inventories completed prior to project implementation. If National Register-eligible or unevaluated cultural sites are discovered, consultation with SHPO would be completed prior to initiation of any work that could potentially degrade the site.
- If cultural resources are discovered during project implementation, activities shall cease in the discovery area, and the Project Coordinator or Authorized Officer shall be notified immediately (NOTE: This is a standard statement for inadvertent discovery.)
- Pursuant to 43 Code of Federal Regulations (CFR) 10.4 (g), the Authorized Officer must be notified, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4

(c) and (d), all activities must stop in the immediate discovery vicinity and protected for 30 days or until notified to proceed by the Authorized Officer.

Appendix K - Field Trip Reports

The following is a compilation of field visits the members of the Regional Interdisciplinary Team attended during the process of writing the Fuel Break Programmatic Environmental Impact Statement.

Project Name/Location: Boise District Office Fuel Break Review, BLM Idaho

Date: May 23-25, 2017

Attendees: D. Pence, J. Bisson, K. Barnes, S. Lehman, C. Braun

Key Observations: We saw several example of fuel breaks within the Paradigm Project area and the Soda Fire. All fuel breaks were created with the objectives of fire fighter safety and reduction in fire behavior. Green strips were planted with either forage kochia and bur buttercup (older fuel breaks) or Sandberg bluegrass, Poa, or other annual native. Green strips are maintained through the use of herbicides as needed. Mowed fuel breaks had variable maintenance schedules based on vegetation and height within the fuel break. In the future, the District is considering using herbicide treatments following mowing in areas that have a high concentration of invasive annual grasses. Targeted grazing fuel breaks were grazed to a stubble height of 2" or less, along 30 miles. The Boise District worked with the livestock producer to ensure timing was appropriate for targeted species. It was very important to allow for graduated usage (as cows don't graze in a straight line and fencing wasn't used) and using water troughs staged along the road also helps move cattle along the fuel break.

Photos:

Kochia fuel break

Disked fuel break between and during (bare earth) treatments

Targeted grazing area

Mowed fuel breaks

Recently disked brown strip section

Mowed fuel break

Project Name, Location: Owinza Range Restoration Project & Minidoka Fuel Breaks, BLM Shoshone Field Office, Idaho

Date: May 11, 2017

Attendees: K. Barnes, J. Bisson, C. Lund, B. Goerhing, S. Lehman, G. Wigglesworth, S. Bassista, District staff

Key Observations: The 2002 Owinza restoration project treatments of prescribed fire, herbicide application and drill/aerial seeding on a previously invasive annual grass area were successful in establishing a diversity of perennial vegetation including bitterbrush and sagebrush. Overall, the project provided for plant community resiliency, reduced wildfire severity, improved wildlife habitat, and reduction of future wildfire rehabilitation costs. This is demonstrated by the 2012 fire burning a portion of the area at low severity, leaving many large unburned islands representing a natural mosaic burn patter that provides for shrub and other perennial recruitment as needed.

Topics discussed included methods used to establish the kochia fuel breaks, as well as challenges. The first treatments were done by disking (or dozing the area, sometimes twice, cultipacking, and broadcast seeding kochia; and treatments were done at about seven miles per year. More recently, chemical treatments were used prior to seeding kochia. This was more effective in its establishment and increased the number of miles that could be treated per year by decreasing the number of reentry treatments. Kochia seed needs to be new and should be stored cold to ensure viability. Many areas are too wet for Kochia to be successful. Stabilizer is recommended to be used in conjunction with the kochia seeding as it helps to outcompete cheatgrass. Caution needs to be exercised to ensure that kochia does not spread into certain rare plant habitats.

Photos:

Established Kochia prostrata fuel break

Kochia prostrata fuel break visit

Project Name/Location: Highway 95 Fuel Breaks (driving tour), BLM Elko Field Office, Nevada

Date: May 30, 2017

Attendees: G. Wigglesworth, K. Barnes, D. Pence, S. Bassista, S. Lehman, J. Bluma

Key Observations: These fuel breaks were far less visually evident than the Ruby Pipeline corridor due to narrower and less abrupt vegetation changes. They had not been maintained yet that year, and there was substantial new growth in areas.

Photos:

The Ruby Pipeline corridor traversing a burned hill with cheatgrass and intact sage in the foreground near Elko District fuel breaks.

Highway edge fuel breaks adjacent to Elko District fuel breaks in area.

Project Name/Location: Centennial Fire Fuel Break, BLM Jarbidge Field Office, Idaho

Date: September 6, 2017

Attendees: G. Wigglesworth, J. Bisson, K. Barnes, S. Bassista, as well as other Twin Falls District, Idaho State Office BLM staff, USGS, USFWS

Key Observations: Field trip to Centennial Fire, Twin Falls District, Jarbidge Field Office BLM, Idaho burned area where the fire burned into the Jarbidge Fuel Breaks….ADD MORE

Repeated fires in the district were affecting the success of rangeland restoration efforts. Fuel breaks were established to compartmentalize fires and decrease fire size by potentially stopping fires at major roads; to provide a safe line of defense for fire suppression crews; and to provide safer travel corridors for ingress/egress of fire crews, grazing permit holders (permitees), and the public during fires.

The Centennial fire was contained within about a day after burning 18,660 acres, but had the potential to become a very large fire due to rapid spread, high winds, and invasive vegetation. Modeling using Near Term Fire Behavior models estimated that the fire would have exceeded 100,000 acres. However, it burned into established fuel breaks where the fire was not sustained due to a lack of cheatgrass or heavy fuel loading and the incident commander attributed much of the containment success to the presence of the fuel breaks.

The network of fuel breaks includes vegetated (green-strip) and non-vegetated (brown-strip) portions across Department of Defense (DOD-Air Force), State of Idaho, and BLM lands. Establishing Kochia green strip fuel breaks required repeated chemical and mechanical treatments over more than a year (up to three years) to remove existing vegetation and allow Kochia and “Stabilizer” (a short-statured Siberian wheatgrass cultivar developed by the USDA-ARS-FRRL). Some of the Kochia treatments may have been less successful due to allowing some perennial species to persist within them. Russian thistle had colonized some disturbed areas after treatments were initiated, but it does not persist once Kochia is established. Once established, Kochia strips required no annual maintenance as opposed to brown strips maintained annually by the DOD. Various treatment methods and optimal width of fuel breaks were discussed.

Future plans include additional 550’-wide fuel breaks in more invasive-dominated areas to be comprised of: 50’-wide perennial vegetation buffer along the roadway (to deter livestock during trailing in the corridor and decrease the spread of Kochia by vehicles), 200’-wide corridor on each side of the road seeded with Kochia, 25’-wide buffer on the outer edge of the fuel break (to decrease the spread of Kochia into surrounding vegetation). In areas with more intact native vegetation 550’-wide fuel breaks would be maintained by using herbicides to maintain native vegetation, as well as by seeding native vegetation where necessary.

Photos:

Centennial Fire

Edge of fire at fuel break

Aerial herbicide treatment

Project Name/Location: Carson District BLM, Nevada, Fuel Breaks and Restoration site visits

Date: June 1, 2017

Attendees: G. Wigglesworth, K. Barnes, S. Bassista, S. Lehman, C. Lund, J. Bisson, J. Bluma, D. Pence

Key Observations: Restoration treatment for sage grouse habitat improvements. Juniper and pinyon treatments via chaining, lop and scatter in an area that had also been subject to patchy wildfires.

Photos:

Pinyon-Juniper thinning area

Project Name/Location: Society for Range Management site tours of Soda Fire and Soda Fuel Breaks near Graveyard Point, Idaho; Soda Fire Restoration, Outcome-based grazing near Rockville, Oregon

Date: June 14, 2018

Attendees: D. Pence, K. Barnes, S. Lehman, C. Braun, B. Thrift, SRM members

Key Observations: Relative to targeted grazing, active herding (with no temporary fencing) was being used to keep cows within the treatment corridor along Sommercamp Road which is within a WUI area. Water hauls were placed within the treatment corridor to aid in livestock concentration. Careful coordination between range staff and livestock operators was necessary to ensure proper timing of treatments in spring to reduce cheatgrass early in the season. Cheatgrass and other low vegetation was reduced within the grazed corridor, and there was very little soil disturbance visible from the livestock, which had traversed the area that day. The area is part of a multi-regional experiment by Pat Clark with USDA ARS to study fuel break effectiveness in reducing annual grass fuels.

The group also visited post-Soda Fire Restoration areas that had been drill seeded with native species near Graveyard Point in Idaho, and an area near Rockville, Oregon where outcome-based grazing had been used by a local rancher to reduce cheatgrass while it was in its growth phase

Photos:

Soda Fire restoration

Area seasonally grazed to reduce cheatgrass

Project Name/Location: Burley Field Office, Clear Creak Restoration/Burley Landscape

Date: May 16, 2018

Attendees: EMPSi, G. Wigglesworth, C. Braun, J. Bisson, D. Pence, K. Barnes, R. Rosentreter

Key Observations: The team visited portions of the Burley Landscape project on the Cotterel Mountains. Treatments visited included Utah juniper mastication, lop and scatter and pile burns. The team also visited mastication areas of the Burley Landscape project on Jim Sage Mountain. Areas were mostly cleared; however some areas had mountain mahogany and/or raptor nest trees left within treatment areas. The team visited the clear creek restoration area where a seeding was established through plow-and-seed in an annual invasive grassland that had previously established within an untreated portion of a burned area. The plow and seed successfully established a seeding but the interspaces were full of cheatgrass. The team discussed options to reduce the cheatgrass including using fall grazing, chemical treatment and raking the thatch.

Photos:

Burley Landscape Restoration area

Project Name/Location: Owyhee Front targeted grazing, Owyhee Field Office

Date: May 24, 2019

Attendees: G. Wigglesworth, C. Braun, J. Shirley, Boise District fuels staff, Owyhee Field Office staff

Key Observations: The approach to targeted grazing for fuel breaks requires an adaptable operator/contractor in order to accommodate various aspects of targeted grazing such as weather (strongly influences timing), terrain, resources (water, fencing).

Project Name/Location: Curlew Fuel Break Project, Pocatello Field Office, Idaho

Date: October 18, 2019

Attendees: K. Barnes, G. Wigglesworth

Key Observations: Fire return interval within the Curlew Fuel Break area is currently 11-15Y; goal is a decrease closer to the natural 30Y return internal. Treatments are mastication of Phase 3 and Phase 2 juniper to reduce fire risk. Prior to restoration, the area was broadcast seeded. Fuel break was constructed 200' on both sides of improved roads. In dry washes some juniper were left to decrease erosion potential. FIAT fuel break locations were used for this project. Future vegetation treatments will include restoration in areas adjacent to fuel breaks. Fuel break locations are mapped and shared with fire crews via 'Collector' to support initial attack more efficiently.

A nearby sagebrush lop-and-scatter fuel break treatment in the Curlew Fuel Break area and an off-road juniper thinning fuel break at a wildland-urban interface in Pocatello that was successful in aiding wildfire control were also visited during this trip.

Photos:

Juniper mastication, Curlew fuel break

Curlew juniper mastication in progress

Sagebrush lop and scatter fuel break

WUI fuel break in Pocatello, utilized in conjunction with aerial retardant to stop fire

Appendix L

Safe Separation Distance

Safety Zone and Escape Route Guideline Update

Spring 2018

Background: When fires are burning on slopes or under the influence of winds hot gases can extend 5 to 10 times further than radiant heating from flames—thereby requiring larger safety zones.

Safety Zones on Slopes: Current science suggests that safety zones located on slopes greater than 25% (14°) should be 2 to 6 times greater than for flat ground. When slope exceeds 40% (22°) the safety zone should be 6 to 10 times larger than for flat ground.

Safety Zones and Wind: Winds are often the primary driving factor for rapid, high intensity fire spread. Measurements suggest that for fires burning under the influence of winds greater than a 5-7 mph the safety zone size should be increased by 2-3 times over that for flat ground. For stronger winds the increase can be 6 or more times.

Escape Routes: Most entrapments occur not in safety zones, but rather as fire crews are traveling to their safety zone. This implies that: 1) crews are not evacuating soon enough and 2) they are not accurately estimating escape route travel time. Recent studies of human travel rates over rough terrain suggest that the best escape routes are flagged, not overly steep (e.g. less than 20% (11°) in both uphill and downhill directions), and when possible are cleared of vegetation that impedes travel.

Operational Implications: Safety zone and escape routes should be assessed based on the relevant period under consideration. For example, if a crew is working in a specific area for the coming shift their safety zone should be assessed within the context of the expected fire behavior for that shift adjusted for confidence in the weather forecasts. If confidence in the weather forecast is high there is less need to consider historical worst case conditions. However, if a division supervisor is assessing safety zones within the context of expected work on their division for several days or longer then they should adjust the safety zone size appropriately based on historical weather and terrain extremes (i.e. lower confidence implies that larger sizes would be more appropriate).

Management Implications: Line officers must recognize that some fire management tactics and fire conditions will require large safety zones (in some cases much larger than expected). If appropriate safety zones do not exist naturally, they must be constructed. Such action comes with its own set of risk factors and ecological impacts. If adequate sized safety zones cannot be constructed and don't exist than alternative tactics that reduce risk to firefighters should be considered.

Tools:
WindNinja Mobile: Google play or itunes
WindNinja: www.firelab.org
Fire Weather Alert: https://weather.firelab.org/fwas/
WiSE (safety zone app): contact bwbutler@fs.fed.us
Severe Fire Wx Potential Map: https://m.wfas.net/dev/

Summary:

Escape Routes
- -Use trigger points
- -Keep trail steepness to less than 20% (11°)
- -Flag path
- -Clear large obstructions and vegetation

Safety Zones

Wind 0 - 5 mph, slope 0 – 25% SZ Size = 3 to 5 x flame ht

Wind > 5 mph, slope > 30% (17°)
- -Vegetation < 10 ft tall, SZ size = 4 to 10 x Veg Ht
- -Vegetation > 10 ft tall, SZ size = 2 to 5 x Veg Ht
- -Increase SZ size as slope, wind or fire intensity increase

Feedback: This work is preliminary and represents the best synthesis of the science. Feedback from firefighters, incident team members and line officers is critical to this effort. If you have comments, ideas, or criticism, please contact Bret Butler. Email: bwbutler@fs.fed.us Tel: 406 329 4801

$$SSD = 8 \times \text{vegetation height} \times \Delta$$

Slope-Wind Factor (Δ)			
	Terrain Slope (%)		
Wind Speed (mph)	Flat (< 15%)	15-30%	>35%
Light (0-6)	1/0.7/0.7	1/1/1	4/2/2
Moderate (7-15)	2/1/1	4/2/1	6/3/2
Strong (>18)	4/2/2	6/3/2	8/3/2

Fuels < 10' tall / 10' < Fuel > 40 ' / Fuel > 40'
SSD = Safe Separation Distance

Example 1: 3' tall sage brush, 22% slope, 10 mph wind
Δ = 4 SSD = 8 x 3' x 4 = 96' or 0.6 acres

Example 2: 20' tall juniper, 10% slope, 15 mph
Δ = 1 - 2 SSD = 8 x 20' x 1 = 160' - 320' or 2 - 3 acres

ANCHORPOINT
WILDLAND FIRE SOLUTIONS

BLM Fuel Break PEIS

Objective—Calculate the width of a fuel break by determining a separation distance that would allow firefighters to safely engage in suppression efforts against a fast-moving fire. In wildland fire, safety zones are used for this purpose. These same guidelines can be used by local managers to apply on local projects.

Fuel Break[1]*:*

A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Safety Zone[2]*:*

An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas which can be used with relative safety by firefighters and their equipment in the event of blowup in the vicinity.

Methodology—In the last few years a new formula has been created to calculate an adequate safety zone or safe separation distance (SSD)[3]. This formula continues to be adjusted as further research is completed. The most current formula is as follows:

$$SSD = 8 \times \text{vegetation height} \times \Delta$$

Slope-Wind Factor (Δ)			
	Terrain Slope (%)		
Wind Speed (mph)	Flat (< 15%)	15-30%	>35%
Light (0-6)	1/0.7/0.7	1/1/1	4/2/2
Moderate (7-15)	2/1/1	4/2/1	6/3/2
Strong (>18)	4/2/2	6/3/2	8/3/2

Fuels < 10' tall / 10' < Fuel > 40 '/ Fuel > 40'
SSD = Safe Separation Distance

For a more detailed discussion see attached document provided by Bret Butler (Spring 2018_Summary_v4).

[1] https://www.nwcg.gov/term/glossary/fuel-break%C2%A0
[2] https://www.nwcg.gov/term/glossary/safety-zone%C2%A0
[3] https://www.firelab.org/project/firefighter-safety

Example 1: 3’ tall sage brush, 22% slope, 10 mph wind
Δ = 4 SSD = 8 x 3’ x 4 = 96’ or .6 acres

Example 2: 20’ tall juniper, 10% slope, 15 mph
Δ = 1 - 2 SSD = 8 x 20’ x 1 = 160’ - 320’ or 2 to 3 acres

The SSD is a radius so it is multiplied by 2 pi (π) to get a circumference for a safety zone in continuous fuels. However, to determine the width of a linear fuel break, use the formula for a diameter (D = 2xSSD), if it is in a continuous fuel bed. If cutting off of a road, subtract the width of the road.

Discussion—Slope and wind are the two critical variables that can increase the needed spacing. The fuel type (vegetative species) is not factored into the equation, only the height. In email discussions with Bret Butler, Research Scientist that developed the SSD concept, he stated that although he believes there are differences in energy output by different species, he currently doesn't have the data to support it. The primary fuels that will be managed are pinyon-juniper woodlands and sagebrush. Both of these fuel types produce high heat energy when burned due to volatile oils in the needles and leaves. It is recommended that conservative values (worst case scenario) be used for determining spacing.

Submitted by:
Rodrigo Moraga
Fire Behavior Analyst
August 29, 2018

Safe Separation Distance calculation

SSD = 8 x vegetation height x Δ

Slope-Wind Factor (Δ)			
	Terrain Slope (%)		
Wind Speed (mph)	Flat (< 15%)	15-30%	>35%
Light (0-6)	1/0.7/0.7	1/1/1	4/2/2
Moderate (7-15)	2/1/1	4/2/1	6/3/2
Strong (>18)	4/2/2	6/3/2	8/3/2

Fuels < 10 feet height

Example:
Fuel = 6 ft
Slope=20%
Winds 14mph

Fuel Break width = 8 x 6 x 4= 192 = (D26) x 2= 384 (K26) linear feet

Example: Single fuel break on one side of a road

Slope-Wind Factor

Height of Vegetation	8*1	8*2	8*4	8*6	8*8
1	8	16	32	48	64
2	16	32	64	96	128
3	24	48	96	144	192
4	32	64	128	192	256
5	40	80	160	240	320
6	48	96	192	288	384
7	56	112	224	336	448
8	64	128	256	384	512
9	72	144	288	432	576
10	80	160	320	480	640
11	88	176	352	528	704
12	96	192	384	576	768
13	104	208	416	624	832
14	112	224	448	672	896
15	120	240	480	720	960
16	128	256	512	768	1024
17	136	272	544	816	1088
18	144	288	576	864	1152
19	152	304	608	912	1216
20	160	320	640	960	1280

Fuel breaks of 500 feet or less are in yellow.

Example: Two fuel breaks, one on each side of a road

SW factor X 2 = Fuelbreak width

Height of Vegetation	8*1	8*2	8*4	8*6	8*8
1	16	32	64	96	128
2	32	64	128	192	256
3	48	96	192	288	384
4	64	128	256	384	512
5	80	160	320	480	640
6	96	192	384	576	768
7	112	224	448	672	896
8	128	256	512	768	1024
9	144	288	576	864	1152
10	160	320	640	960	1280
11	176	352	704	1056	1408
12	192	384	768	1152	1536
13	208	416	832	1248	1664
14	224	448	896	1344	1792
15	240	480	960	1440	1920
16	256	512	1024	1536	2048
17	272	544	1088	1632	2176
18	288	576	1152	1728	2304
19	304	608	1216	1824	2432
20	320	640	1280	1920	2560

Safe Separation Distance calculation

SSD = 8 x vegetation height x Δ

Slope-Wind Factor (Δ)			
	Terrain Slope (%)		
Wind Speed (mph)	Flat (< 15%)	15-30%	>35%
Light (0-6)	1/0.7/0.7	1/1/1	4/2/2
Moderate (7-15)	2/1/1	4/2/1	6/3/2
Strong (>18)	4/2/2	6/3/2	8/3/2

10' < Fuel > 40 ' height

Example: Single fuel break on one side of a road

Slope-Wind Factor

Height of Vegetation	8*.7	8*1	8*2	8*3
21	117.6	168	336	504
22	123.2	176	352	528
23	128.8	184	368	552
24	134.4	192	384	576
25	140	200	400	600
26	145.6	208	416	624
27	151.2	216	432	648
28	156.8	224	448	672
29	162.4	232	464	696
30	168	240	480	720
31	173.6	248	496	744
32	179.2	256	512	768
33	184.8	264	528	792
34	190.4	272	544	816
35	196	280	560	840
36	201.6	288	576	864
37	207.2	296	592	888
38	212.8	304	608	912
39	218.4	312	624	936
40	224	320	640	960

Fuel breaks of 500 feet or less are in yellow.

Example: Two fuel breaks, one on each side of a road

SW factor X 2 = Fuelbreak width

Height of Vegetation	8*.7	8*1	8*2	8*3
21	235.2	336	672	1008
22	246.4	352	704	1056
23	257.6	368	736	1104
24	268.8	384	768	1152
25	280	400	800	1200
26	291.2	416	832	1248
27	302.4	432	864	1296
28	313.6	448	896	1344
29	324.8	464	928	1392
30	336	480	960	1440
31	347.2	496	992	1488
32	358.4	512	1024	1536
33	369.6	528	1056	1584
34	380.8	544	1088	1632
35	392	560	1120	1680
36	403.2	576	1152	1728
37	414.4	592	1184	1776
38	425.6	608	1216	1824
39	436.8	624	1248	1872
40	448	640	1280	1920

Appendix M

Consultation and Coordination

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Appendix M. Consultation and Coordination

Table M-1
Scoping Open Houses Held in 2018

Location	Date	Venue
California		
Susanville	6 February 2018	BLM Eagle Lake Field Office 2550 Riverside Drive Susanville, CA 96130
Idaho		
Boise	30 January 2018	Wyndham Garden Boise Airport 3300 South Vista Avenue Boise, ID 83705
Twin Falls	13 February 2018	Canyon Springs Red Lion Inn 1357 Blue Lakes Boulevard Twin Falls, ID 83301
Idaho Falls	14 February 2018	Hilton Garden Inn 700 Lindsay Boulevard Idaho Falls, ID 83402
Nevada		
Reno	7 February 2018	UNR – Crowley Student Union, Milt Glick Ballroom C 1664 North Virginia Street Reno, NV 89503
Elko	8 February 2018	Red Lion Hotel, High Desert Inn Ballroom 2065 Idaho Street Elko, NV 89801
Ely	13 February 2018	Bristlecone Convention Center 150 Sixth Street Ely, NV 89301
Tonopah	15 February 2018	Tonopah Convention Center 301 Brougher Avenue Tonopah, NV 89049
Oregon		
Lakeview	7 February 2018	BLM Lakeview District Interagency Office 1301 South G Street Lakeview, OR 97630
Burns	8 February 2018	Harney County Chamber of Commerce/Community Center 484 North Broadway Burns, OR 97720
Utah		
Snowville	31 January 2018	Snowville Elementary School 160 North Stone Road Snowville, UT 84336
Salt Lake City	15 February 2018	Courtyard by Marriott Downtown 345 West 100 South Salt Lake City, UT 84101

Location	**Date**	**Venue**
Cedar City	14 February 2018	Heritage Center – Festival Hall 105 North 100 East Cedar City, UT 84720
Vernal	1 February 2018	Uintah Conference Center 313 East 200 South Vernal, UT 84078
Washington		
Moses Lake	1 February 2018	Moses Lake Best Western 3000 West Marina Drive Moses Lake, WA 98837

Table M-2
Public Draft PEIS Open Houses Held in 2019

Location	Date	Venue
California		
Susanville	10 July 2019	BLM Eagle Lake Field Office 2550 Riverside Drive Susanville, CA 96130
Idaho		
Boise	9 July 2019	Boise Red Lion Hotel 1800 W Fairview Ave Boise, ID 83702
Twin Falls	16 July 2019	BLM Twin Falls District Office 2878 Addison Ave Twin Falls, ID 83301
Idaho Falls	17 July 2019	Pinecrest Event Center 560 E. Anderson Street Idaho Falls, ID 83401
Nevada		
Reno	9 July 2019	City of Reno California Building 75 Cowan Drive Reno, NV 89509
Elko	16 July 2019	Red Lion Hotel, High Desert Inn 3015 Idaho Street Elko, NV 89801
Ely	17 July 2019	Bristlecone Convention Center 150 Sixth Street Ely, NV 89301
Oregon		
Lakeview	11 July 2019	BLM Lakeview District Interagency Office 1301 South G Street Lakeview, OR 97630
Burns	8 July 2019	Harney County Chamber of Commerce/Community Center 484 North Broadway Burns, OR 97720

Location	Date	Venue
Utah		
Salt Lake City	18 July 2019	Hampton Inn and Suites 307 N Admiral Byrd Road Salt Lake City, UT 84116
Cedar City	18 July 2019	Heritage Center – Festival Hall 105 North 100 East Cedar City, UT 84720
Washington		
Spokane	10 July 2019	Mirabeau Park Hotel & Convention Center 1100 N. Sullivan Road Spokane Valley, WA 99037

Table M-3
Tribes Invited to Participate as a Cooperating Agency and Through Government-to-Government Consultation[1]

Alturas Indian Rancheria, California
Bridgeport Indian Colony
Burns Paiute Tribe
California Native American Heritage Commission
Cedarville Rancheria, California
Coeur d'Alene Tribe
Confederated Salish and Kootenai Tribes of the Flathead Reservation
Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of the Colville Reservation
Confederated Tribes of the Goshute Reservation, Nevada and Utah
Confederated Tribes of the Umatilla Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon
Death Valley Timbi-sha Shoshone Tribe
Duckwater Shoshone Tribe of the Duckwater Reservation, Nevada
Eastern Shoshone Tribe of the Wind River Reservation, Wyoming
Ely Shoshone Tribe of Nevada
Fort Bidwell Indian Community of the Fort Bidwell Reservation of California
Fort McDermitt Paiute and Shoshone Tribes of the Fort McDermitt Indian Reservation, Nevada and Oregon
Greenville Rancheria
Hopi Tribe of Arizona
Kaibab Band of Paiute Indians of the Kaibab Indian Reservation, Arizona
Kalispel Indian Community of the Kalispel Reservation
Klamath Tribes
Kootenai Tribe of Idaho
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony, Nevada
Lovelock Paiute Tribe of the Lovelock Indian Colony, Nevada
Moapa Band of Paiute Indians of the Moapa River Indian Reservation, Nevada
Navajo Nation, Arizona, New Mexico & Utah

Nevada Indian Commission
Nez Perce Tribe
Northwestern Band of Shoshone Nation
Paiute Indian Tribe of Utah
Paiute Indian Tribe of Utah - Cedar Band of Paiutes
Paiute Indian Tribe of Utah - Indian Peaks Band of Paiutes
Paiute Tribe of Utah - Kanosh Band of Paiutes
Paiute Indian Tribe of Utah - Koosharem Band of Paiutes
Paiute Indian Tribe of Utah - Shivwits Band of Paiutes
Paiute-Shoshone Tribe of the Fallon Reservation and Colony, Nevada
Pit River Tribe
Pyramid Lake Paiute Tribe of the Pyramid Lake Reservation, Nevada
Reno-Sparks Indian Colony
Shoshone-Bannock Tribes of the Fort Hall Reservation
Shoshone-Paiute Tribes of the Duck Valley Reservation, Nevada
Skull Valley Band of Goshute Indians of Utah
Southern Ute Indian Tribe
Spokane Tribe of the Spokane Reservation
Summit Lake Paiute Tribe
Susanville Indian Rancheria, California
Te-Moak Tribe of Western Shoshone Indians of Nevada
Te-Moak Tribe of Western Shoshone Indians of Nevada - Battle Mountain Band
Te-Moak Tribe of Western Shoshone Indians of Nevada - Elko Band
Te-Moak Tribe of Western Shoshone Indians of Nevada - South Fork Band
Te-Moak Tribe of Western Shoshone Indians of Nevada - Wells Band
The Modoc Tribe of Oklahoma
Ute Indian Tribe of the Uintah and Ouray Reservation, Utah
Ute Mountain Ute Tribe
Walker River Paiute Tribe of the Walker River Reservation, Utah
Washoe Tribe of Nevada and California
Winnemucca Indian Colony of Nevada c/o Reno Law Group
Yerington Paiute Tribe of the Yerington Colony & Campbell Ranch, Nevada
Yomba Shoshone Tribe of the Yomba Reservation, Nevada

[1]No Tribes requested to be a cooperating agency. However, two Tribes – the Burns Paiute Tribe and Shoshone-Paiute Tribes of the Duck Valley Reservation – requested further consultation.

Table M-4
Agencies and Organizations Invited to Participate as a Cooperating Agency

Agency or Organization Invited to be a Cooperator	Accepted	Declined	No Response
California			
Bureau of Indian Affairs, Northern California Agency			X
California Department of Forestry			X
California Department of Fish and Wildlife			X
Commander, Department of Defense, Navy Region Southwest			X
Department of Defense, Navy Region Southwest			X
State Clearinghouse, Governor's Office of Planning and Research			X
Modoc Wildlife Refuge			X
National Park Service Whiskeytown			X
Lava Beds National Monument			X
Klamath National Forest			X
Lassen National Forest			X
Modoc National Forest			X
Plumas National Forest			X
Shasta-Trinity National Forest			X
Modoc County			X
Lassen County			X
Idaho			
Idaho National Guard	X		
Blaine County	X		
Cassia County	X		
Lemhi County	X		
Idaho Department of Lands	X		
Owyhee County		X	
Idaho Association of Counties			X
Idaho Department of Fish and Game			X
Idaho Governor's Office			X
Idaho Governor's Office of Species Conservation			X
Boise National Forest			X
Caribou-Targhee National Forest			X
Salmon-Challis National Forest			X
Sawtooth National Forest			X
Craters of the Moon National Monument			X
Bingham County			X
Custer County			X
Fremont County			X
Madison County			X
Twin Falls County			X
Power County			X

Agency or Organization Invited to be a Cooperator	Accepted	Declined	No Response
Nevada			
Nevada Department of Wildlife	X		
Elko County	X		
Eureka County	X		
Humboldt County	X		
Lincoln County	X		
Storey County	X		
Churchill County		X	
Congressman Mark Amodei			X
Department of Defense, Fallon Naval Air Station			X
Department of Defense, Nellis Air Force Base			X
Nevada Department of Transportation			X
Nevada Department of Conservation and Natural Resources			X
Sagebrush Ecosystem Program			X
Clark County			X
Jefferson County			X
Lander County			X
Nye County			X
Pershing County			X
Washoe County			X
White Pine County			X
Oregon			
Oregon DOT		X	
Oregon Parks and Recreation		X	
Bonneville Power Administration			X
Department of Agriculture			X
Department of Energy			X
Department of Environmental Quality			X
Department of Fish and Wildlife			X
Department of Forestry			X
Department of Geology & Mineral Industries			X
Department of State Lands			X
Department of Transportation			X
Deschutes County Community Development Department			X
Federal Highway Administration, Oregon Division			X
Governor’s Office of Natural Resources			X
Governor of Oregon			X
Harney Soil and Water Conservation District			X
Land Conservation and Development Department			X
State Parks & Recreation Department			X
Water Resources Department			X
US Army Corps of Engineers, Northwest Division			X
USDA Rural Development			X

Agency or Organization Invited to be a Cooperator	Accepted	Declined	No Response
US Forest Service, Pacific Region			X
Baker County			X
Crook County			X
Gilliam County			X
Grant County			X
Harney County			X
Jefferson County			X
Lake County			X
Malheur County			X
Morrow County			X
Umatilla County			X
Union County			X
Sherman County			X
Wallowa County			X
Wasco County			X
Utah			
Carbon County	X		
Duchesne County	X		
Public Lands Policy Coordinating Office	X		
State of Utah, Governor's Public Lands Policy Coordination Office	X		
Beaver County	X		
Forest Service Intermountain Region			X
Box Elder County			X
Daggett County			X
Emery County			X
Garfield County			X
Grand County			X
Iron County			X
Juab County			X
Kane County			X
Millard County			X
Piute County			X
Rich County			X
Sanpete County			X
Sevier County			X
Tooele County			X
Uintah County			X
Utah County			X
Wasatch County			X
Wayne County			X
Washington			
Washington Department of Fish and Wildlife			X
Other			
Natural Resources Conservation Service, Nevada,	X		

Agency or Organization Invited to be a Cooperator	Accepted	Declined	No Response
Utah, Idaho, Oregon			
National Trails Intermountain Region, National Park Service	X		
US Environmental Protection Agency, Regions 9 and 10		X	
Bureau of Reclamation	X		
Department of Defense, Air Force Western Regional Office			X
Department of Defense, Army Regional Energy and Environmental Office, Western Department of Defense			X
Federal Highway Administration			X
Federal Energy Regulatory Commission			X
National Park Service, Washington DC			X
Natural Resources Conservation Service Clearinghouse			X
USDA Soil Conservation Service			X
US Department of Energy			X
US Fish and Wildlife Service, Nevada, California, Utah, Idaho, Oregon			X
US Forest Service, Research and Development			X

Table M-5
List of Preparers

BUREAU OF LAND MANAGEMENT	
Name	**Role/Responsibility**
Interdisciplinary Team	
Marlo Draper	BLM Project Manager
Sheila Lehman	ID NEPA Specialist
Dusty Pence	Fire/Fuels
Sandy Gregory	Fire/Fuels
Gillian Wigglesworth	Vegetation
Jeremy Bisson	Fish and Wildlife, Special Status Species
Shannon Bassista	Special Designations, Lands with Wilderness Characteristics, Recreation and Travel Management
Brianna Goehring	Livestock Grazing, Wild Horses and Burros
Kim Allison	Livestock Grazing, Wild Horses and Burros
Justin Shirley	Livestock Grazing, Wild Horses and Burros
Jeremy Bluma	Lands and Realty
Kelli Barnes	Cultural Resources and Tribal Interests, Paleontological Resources
Nick Pay	Cultural Resources and Tribal Interests, Paleontological Resources
Christa Braun	GIS
EMPSi	
Name	**Role/Responsibility**
Management Team	
Meredith Zaccherio	Project Manager
Peter Gower	Deputy Project Manager
Becky Boyle	Project Assistant
Interdisciplinary Team	
Morgan Trieger	Vegetation
Dan Morta	Vegetation
Andy Spellmeyer	Recreation, Lands with Wilderness Characteristics
Lindsay Chipman	Wildlife, Special Status Species
Kevin Rice	Wildlife
Kate Krebs	Lands with Wilderness Characteristics
Sarah Crump	Lands with Wilderness Characteristics, Socioeconomics
Derek Holmgren	Fire and Fuels
Laura Patten	Water and Soil Resources
Amy Cordle	Air Quality
Holly Prohaska	Livestock Grazing, Wild Horses and Burros
Zoe Ghali	Socioeconomics
Kevin Doyle	Cultural Resources, Tribal Interests, Paleontological Resources
Jacob Accola	GIS
Marcia Rickey	GIS

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Appendix N

Comment Analysis Report for the Draft PEIS

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Appendix N. Comment Analysis Report for the Draft PEIS

This volume presents comments Bureau of Land Management (BLM) received on the Programmatic EIS for Fuel Breaks in the Great Basin (PEIS). It also includes a description of the public comment process, how all comments were considered, and responses to all substantive comments.

N.1 Draft EIS Comment Process

The National Environmental Policy Act (NEPA) requires that all substantive comments received before reaching a decision must be considered to the extent feasible, and that agencies must respond to all substantive written comments submitted during the public comment period for an EIS (40 CFR 1503.4). Comments must be in writing (including paper or electronic format or a court reporter's transcript taken at a formal public meeting or hearing), substantive, and timely, in order to merit a written response.

Although the BLM diligently considered each comment letter, the comment analysis process involved determining if a comment was substantive or non-substantive. In performing this analysis, the BLM relied on Section 6.9.2, Comments, in the BLM NEPA Handbook H-1790-1 to determine what constituted a substantive comment.

A substantive comment does one or more of the following

- Questions, with a reasonable basis, the accuracy of the information or analysis in the EIS
- Questions, with a reasonable basis, the adequacy of the information or analysis in the EIS
- Presents reasonable alternatives other than those in the Draft EIS that meet the purpose and need of the proposed action and address significant issues
- Questions, with a reasonable basis, the merits of an alternative or alternatives
- Causes changes in or revisions to the proposed action
- Questions, with a reasonable basis, the adequacy of the planning process itself

Additionally, the BLM's NEPA handbook identifies the following types of substantive comments:

- <u>Comments on the Adequacy of the Analysis</u>—Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate are considered substantive; they may or may not lead to changes in the Final EIS. Interpretations of analyses should be based on professional expertise. Where there is disagreement within a professional discipline, a careful review of the various interpretations is warranted. In some cases, public comments may necessitate a reevaluation of analytical conclusions. If, after reevaluation, the BLM Authorized Officer responsible for preparing the EIS does not think that a change is warranted, the response should provide the rationale for that conclusion.
- <u>Comments That Identify New Impacts, Alternatives, or Mitigation Measures</u>—Public comments on a Draft EIS that identify impacts, alternatives, or mitigation measures that were not

addressed in the draft are considered substantive. This type of comment requires the BLM Authorized Officer to determine if it warrants further consideration; if so, he or she must determine if the new impacts, new alternatives, or new mitigation measures should be analyzed in the Final EIS, in a supplement to the Draft EIS, or in a completely revised and recirculated Draft EIS.

- Disagreements with Significance Determinations—Comments that directly or indirectly question, with a reasonable basis, determinations on the significance or severity of impacts are considered substantive. A reevaluation of these determinations may be warranted and may lead to changes in the Final EIS. If, after reevaluation, the BLM Authorized Officer does not think that a change is warranted, the BLM's response should provide the rationale for that conclusion.

Comments that failed to meet the above description were considered non-substantive.

After publishing the Draft PEIS on June 21, 2019, the 45-day comment period officially ended on August 5, 2019. The BLM received written comments by mail, fax, email, online comment form via the project website in ePlanning (https://go.usa.gov/xnQcG), and handwritten submissions at public meetings.

The BLM held public meetings during the comment period in locations throughout the Great Basin. Comment stations with computers were set up at these meetings for those who wished to submit comments electronically. A list of the meeting dates and locations are provided below.

- July 8, 2019: Burns, OR
- July 9, 2019: Boise, ID
- July 9, 2019: Reno, NV
- July 10, 2019: Spokane, WA
- July 10, 2019: Susanville, CA
- July 11, 2019: Lakeview, OR
- July 16, 2019: Elko, NV
- July 16, 2019: Twin Falls, ID
- July 17, 2019: Ely, NV
- July 17, 2019: Idaho Falls, ID
- July 18, 2019: Cedar City, UT
- July 18, 2019: Salt Lake City, UT

Comments received covered a wide spectrum of thoughts, opinions, ideas, and concerns. The BLM recognizes that commenters invested considerable time and effort to submit comments on the Draft PEIS. The agency developed a comment analysis method to ensure that all comments were considered, as directed by NEPA regulations. This systematic process ensured that all substantive comments were tracked and considered.

On receipt, each comment letter was assigned an identification number and logged into a database that allowed the BLM to organize, categorize, and respond. Substantive comments from each letter were coded to appropriate categories, based on content, and the link to the commenter was retained. The categories generally follow the sections presented in the Draft PEIS, though some related to the planning process or editorial concerns.

A total of 1,045 comment letter submissions were received; 138 of these were considered unique submissions and 907 were part of form letter campaigns (discussed further below in **Section N.1.1**). Many comments received throughout the comment analysis process expressed personal opinions or preferences, had little relevance to the adequacy or accuracy of the Draft PEIS, or represented commentary on management actions that are outside the scope of this NEPA analysis. These commenters did not provide specific information to assist the BLM in making a change to the existing action alternatives, did not suggest new alternatives, and did not take issue with methods used in the Draft PEIS; these comments are not addressed further in this document.

The BLM read, analyzed, and considered all comments of a personal or philosophical nature and all opinions, feelings, and preferences for one element or one alternative over another. Because such comments were not substantive, the BLM did not respond to them. It is also important to note that, while the BLM reviewed and considered all comments, none were counted as votes. The NEPA public comment period is neither an election nor does it result in a representative sampling of the population. Therefore, public comments are not appropriate to be used as a democratic decision-making tool or as a scientific sampling mechanism.

Comments that recommended additional studies, data, or scientific literature to be incorporated into the analysis were reviewed by subject matter experts; new information and citations were incorporated into the Final PEIS as appropriate. Comments citing editorial changes to the document were reviewed and incorporated. The Final PEIS has been technically edited and revised to fix typos, missing references, definitions, and acronyms and provides other clarifications as needed.

N.1.1 Letter Campaigns

Several organizations and groups held standardized letter campaigns to submit comments during the public comment period for the Draft PEIS. Through this process, their constituents were able to submit the standard letter or a modified version of the letter indicating support for the group's position on the BLM management actions. Individuals who submitted a modified standard letter generally added new comments or information to the letter or edited it to reflect their main concerns. The BLM received 907 form letter campaign letters, 857 of which were identical to the master letter. Modified letters with unique substantive comments were given their own submission number and were coded appropriately.

N.2 How to Read This Volume

BLM assigned a letter number to every unique communication received during the Draft EIS public comment period. **Table N-1** contains all substantive comments with BLM's responses and is organized by the category comments were regarding. Commenter names and applicable organization or agency are provided for letter submissions that did not request their information be withheld.

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Table N-1
Substantive Public Comments and BLM Responses

Letter #	Comment Number	Comment Code Name	Concern Statement Number (if applicable)	Comment Text	Concern Statement Text	Draft Response
74	1	Best available information-baseline data	BA-1	I fear that the BLM is embarking on a large-scale effort that is not supported by science. The draft EIS repeatedly states that "A system of strategically placed fuel breaks in the Great Basin region would slow the spread of wildfires; thereby reducing wildfire size…," but the draft EIS provides no data to support or quantify this assertion. I am aware that some fuel breaks have slowed some wildfires, but there are also many cases when wildfires have jumped wide highways and fuel breaks. I think the value of fuel breaks has been oversold and overstated; I don't believe it is the panacea that everyone is seeking. The BLM's proposal would result in an extensive, unprecedented landscape change that could never be reversed. There is very little peer-reviewed science about the ecological effects of fuel breaks (Shinneman et al. 2019). However, there is no question that fuel breaks will alter ecosystems by creating edges and edge effects, creating pathways for invasive species, and fragmenting contiguous sagebrush landscapes (Shinneman et al. 2019).	There is not currently adequate scientific evidence to support the effectiveness of fuel breaks.	The considerations that influence fuel break effectiveness are disclosed in Section 3.1 of the Draft PEIS. Further, monitoring and adaptive management described in Section 2.2.7 of the Draft PEIS would help to ensure that fuel breaks are modified if they are not meeting objectives. The potential effects from fuel breaks have been disclosed for each applicable resource in Chapter 4 of the PEIS. Text has been added to the Executive Summary, Section 1.1, Section 2.3, Section 3.1, and Section 4.1 describing the role of fuel breaks as part of a larger fuels management strategy and factors influencing fuel break effectiveness. In addition, Appendix K has been added to the PEIS with more discussion regarding the effectiveness of existing fuel breaks.
121	15	Best available information-baseline data	N/A	The USGS 2018 report assessing the effectiveness of fuel breaks(FB) in sagebrush landscapes (reference/link below) begins to fill in a gaping lack of science on FBs as a fire prevention tool. It expresses in greater scientific terms than we can, our hopes for the effectiveness of that tool, along with our significant fears of unintended consequences of their use, potentially resulting in grave negative impacts to key wildlife (including sage grouse) habitat. The fact that USFWS will again be assessing sage grouse(SG) for potential listing next year, heightens our wariness of when and where FB projects are implemented. Shinneman, D.J., Aldridge, C.L., Coates, P.S., Germino, M.J., Pilliod, D.S., and Vaillant, N.M., 2018, A conservation paradox in the Great Basin-Altering sagebrush landscapes with fuel breaks to reduce habitat loss from wildfire: U.S. Geological Survey Open-File Report 2018-1034, 70 p., https://doi.org/10.3133/ofr20181034.	See Public Concern Statement BA-1	
71	1	Best available information-baseline data	N/A	We encourage the Bureau to recognize that green strips of ¼ mile or less have proven to be ineffective in stopping or slowing wildland fire, especially when they are far removed from suppression resources. Fuel breaks of a mile or more, with a thought to the prevailing wind to maximize width, or large fuel breaks in lowland areas to protect uplands seem to make more sense.	See Public Concern Statement BA-1	
131	23	Best available information-baseline data	N/A	The DEIS ignores evidence that fuel breaks are not effective in stopping or slowing large fires. It also ignores climactic factors that will influence fuel break effectiveness within the lifetime of the proposed project. The EIS assumes throughout that fuel breaks will be effective, but this assumption is unsupported, and in fact directly contradicted by U.S. government research. According to a recent USGS report by Shinneman et al. (2018), "[t]here is relatively little published science that directly addresses the ability of fuel breaks to influence fire behavior in dryland landscapes or that addresses the potential ecological effects of the construction and maintenance of fuel breaks on sagebrush ecosystems and associated wildlife species."	See Public Concern Statement BA-1	
26	1	Best available information-baseline data	N/A	The idea that fuel breaks will prevent large fires is not based on the best available science. There is a tremendous amount of literature suggesting that during extreme weather conditions, fuel breaks fail since winds blow burning material over any fuel breaks.	See Public Concern Statement BA-1	
122	3	Best available information-baseline data	N/A	The science supporting the strategic value of fuel breaks remains unclear, and further research is needed to understand what constitutes high-value locations for various types of fuel breaks.	See Public Concern Statement BA-1	
6	2	Best available information-baseline data	N/A	Fuel breaks do not stop big fires; large fires are driven by climate and weather: hot, dry conditions and winds. Under these conditions, embers can be driven for miles. Neither fuel breaks nor fire fighters can stop them and fire fighters risk their very lives [Wuerthner 2019].	See Public Concern Statement BA-1	
6	3	Best available information-baseline data	N/A	Research questions the efficacy of fuel breaks. Douglas Shinneman writes, "There is relatively little published science that directly addresses the ability of fuel breaks to influence fire behavior in dryland landscapes or that addresses the potential Klitz comments, Fuel Breaks August 2019 2 ecological effects of the construction and maintenance of fuel breaks on sagebrush ecosystems and associated wildlife species" [Shinneman 2019, pg 1].	See Public Concern Statement BA-1	

Letter #	Comment Number	Comment Code Name	Concern Statement Number (if applicable)	Comment Text	Concern Statement Text	Draft Response
131	88	Best available information-baseline data	N/A	However, as discussed in more detail below, there is no reliable evidence of fuel breaks' effectiveness. A 2018 report from the U.S. Geological Survey (USGS) concluded that there is a lack of empirical evidence to validate the overall effectiveness of fuel breaks as a means of reducing fire spread (Shinneman et al. 2018). At the same time, the report found ample evidence that fuel breaks negatively impact wildlife and can facilitate the establishment and spread of invasive species.	See Public Concern Statement BA-1	
15	1	Best available information-baseline data	N/A	Despite the potential for fuel breaks to help reduce unwanted wildfire, scientific research on their ecological effects as well as their effectiveness (ie to restrain wildfire) is scarce for many ecosystems (Shinneman et al. 2018). Many scientists and resource managers are therefore concerned that the ecological costs associated with fuel breaks may outweigh any potential benefits (eg Keeley 2006).	See Public Concern Statement BA-1	
26	6	Best available information-baseline data	BA-2	In a recent paper on fuel breaks with the title: "The ecological uncertainty of wildfire fuel breaks: examples from the sagebrush steppe" the authors warn that fuel breaks are of unproven effectiveness in the face of extreme fire weather. The authors suggest that an extensive system of fuel breaks would "create edges and edge effects, serve as vectors for wildlife movement and plant invasions (like cheatgrass), and fragment otherwise contiguous sagebrush landscapes."	The best available data suggests that fuel breaks would cause adverse impacts on the environment without benefits, particularly during extreme weather conditions.	The BLM used the most appropriate information available that was relevant to the scope and scale of the PEIS. Adverse impacts on the environment are disclosed in Chapter 4. Appendix H and L in the Draft PEIS provide the correlation between windspeed, terrain and height to identify the minimum fuel break width needed. In particular, Appendix L provides the rationale behind the minimum fuel break widths. These minimum fuel break widths would modify fire behavior, allowing wildland fire fighters to safely engage in direct suppression actions. Further, fuel breaks change fire behavior by slowing the rate of spread. This change indirectly reduces invasive plant species expansion and protects restoration efforts and sagebrush communities. Appendix H identifies rates of spread according to vegetation type and the reduction of rates of spread. Text has been added to Chapter 1 clarifying the role that fuel breaks may play in a larger fuels management strategy. In addition, a new appendix (Appendix K) has been added to the Final PEIS describing examples of how fuel breaks within the project area have been used effectively.
68	9	Best available information-baseline data	N/A	In a recent paper on fuel breaks with the title "The ecological uncertainty of wildfire fuel breaks: examples from the sagebrush steppe," the authors warn that fuel breaks are of unproven effectiveness in the face of extreme fire weather. The authors suggest that an extensive system of fuel breaks would "create edges and edge effects, serve as vectors for wildlife movement and plant invasions (like cheatgrass), and fragment otherwise contiguous sagebrush landscapes."	See Public Concern Statement BA-2	
129	1	Best available information-baseline data	N/A	In the EIS news release, it states: "Each fuel break would extend 500 feet from the edge of a roadway. When a wildfire meets a fuel break, the flame lengths decrease and its progress slows, making it safer and easier for firefighters to control." However, there is limited science to back up these claims (see Shinneman et al. 2019 - The ecological uncertainty of wildfire fuel breaks: examples from the sagebrush steppe). The proposed project would harm wildlife habitat by fragmentation (sagebrush proposed for mowing or replacing is home to the Greater Sage Grouse, a threatened bird species), by spreading invasive and noxious weeds, and by the use of polluting herbicides. The large and heavy equipment used to create fuel breaks are themselves vectors in the spread of weeds, and in the introduction of new weeds to local areas.	See Public Concern Statement BA-2	
33	1	Best available information-baseline data	N/A	Not only will this series of fuel breaks fragment sagebrush ecosystems, but there is significant evidence that this kind of disturbance enhances the spread of cheatgrass, an annual grass that is highly flammable. Climate/weather conditions primarily drive large wildfires. Extreme fire weather with low humidity, high temperatures, extended drought and, most importantly, high winds is the primary driver of large blazes. Under such conditions, windblown embers easily cross any “fuel break.”	See Public Concern Statement BA-2	
123	2	Best available information-baseline data	N/A	There is limited science demonstrating that fuel breaks are an effective tool in sagebrush ecosystems (Shinneman et al. 2019). Rather, fuel breaks directly alter ecosystems, create extensive edges and edge effects, serve as vectors for plant invasions, and further fragment contiguous sagebrush landscapes critical for Western Sage-grouse and other important wildlife.	See Public Concern Statement BA-2	

Letter #	Comment Number	Comment Code Name	Concern Statement Number (if applicable)	Comment Text	Concern Statement Text	Draft Response
6	4	Best available information-baseline data	N/A	Shinneman also noted, "fire managers acknowledge that, under extreme fire weather conditions, fuel breaks are unlikely to adequately reduce fireline intensity, flame length, or rate of spread" [USGS, 2018]. The efficacy of fuel breaks is not supported by this USGS report: "These projects are likely to result in thousands of linear miles of fuel breaks that will have direct ecological effects across hundreds of thousands of acres through habitat loss and conversion. These projects may also affect millions of acres indirectly because of edge effects and habitat fragmentation created by networks of fuel breaks" [USGS, 2018].	See Public Concern Statement BA-2	
2	2	Best available information-baseline data	BA-3	#2 No scientific data is presented showing that Fire breaks are effective. If some data are available, up to what wind speeds can they work, correlated with break width and type, and correlated with type and height of plants burning. How do these data compare with conditions seen occasionally in the Great Basin?	Additional scientific literature should be incorporated into the PEIS regarding the effectiveness of fuel breaks in preventing the spread of wildfire in sagebrush communities and the associated impacts of such fuel breaks.	Of the suggested studies and references put forth by the commenters, the BLM reviewed them to determine if they: (1) presented new information that would need to be incorporated into the Final PEIS, (2) were references were already included in the Draft PEIS, or (3) provided the same information as already used or described in the Draft PEIS. The BLM determined that several of these references contained new or relevant information, and subsequently clarified the baseline and analysis in Chapter 3 (e.g., Sections 3.1 and 3.7) and Chapter 4 (e.g., Section 4.1), and updated the references cited in Appendix B of the Final PEIS. Inclusion of this information does not present a seriously new or different picture of the impacts from what was analyzed in the Draft PEIS and/or that information submitted/used in the Draft PEIS would not result in impacts that were not previously considered and analyzed within the spectrum of the alternatives in the Draft PEIS. In some cases, the additional literature was essentially the same as the sources used in the Draft PEIS or did not provide additional relevant information and was therefore not incorporated in the Final PEIS. Appendix H and L in the Draft PEIS provide the correlation between windspeed, terrain and height to identify the minimum fuel break width needed. In particular, Appendix L provides the rationale behind the minimum fuel break widths. These minimum fuel break widths would modify fire behavior, allowing wildland fire fighters to safely engage in direct suppression actions. Further, fuel breaks change fire behavior by slowing the rate of spread. This change indirectly reduces invasive plant species expansion and protects restoration efforts and sagebrush communities. Appendix H identifies rates of spread according to vegetation type and the reduction of rates of spread. Text has been added to Chapter 1 clarifying the role that fuel breaks may play in a larger fuels management strategy. In addition, Section 3.1 has been augmented to describe the current extent of fuel breaks within the project area. A new appendix (Appendix K) has been added to the Final PEIS describing ways in which fuel breaks have been used effectively in the Great Basin. Text has been added to Section 2.2.4 to describe fuel break placement hierarchy that would influence fuel break siting. Additional analysis would be needed at the site-specific level for fuel breaks greater than the 500 feet analyzed within this PEIS. To ensure fuel break effectiveness implementation at the site-specific level, the BLM would adhere to guidelines described in Section 2.2.7, Monitoring, Maintenance, and Adaptive Management.
84	12	Best available information-baseline data	N/A	Section 2.4 Methods - Is a fuel break of 500 feet effective in all vegetation types within the state of Nevada? Are there instances where a larger fuel break of 500 feet may be inadequate, and a larger fuel break may be necessary? Is there any science to support the desired width? Section 4.1.1 indicates the 500-foot distance is based on firefighter safety, and not on efficacy of fuel breaks or suitability for different vegetation types. Please provide more information or data supporting use of 500 feet as suitable for effectiveness.	See Public Concern Statement BA-3	

Letter #	Comment Number	Comment Code Name	Concern Statement Number (if applicable)	Comment Text	Concern Statement Text	Draft Response
27	1	Best available information-baseline data	N/A	Fuel breaks act as corridors for invasion by invasive species due to reductions in canopy cover and competing vegetation. [FUEL BREAKS AFFECT NONNATIVE SPECIES ABUNDANCE IN CALIFORNIAN PLANT COMMUNITIES] Merriam K.E., J.E. Keeley, and J.L. Beyers (Ecological Applications, 16(2), 2006, pp. 515-527) Abstract. "We evaluated the abundance of nonnative plants on fuel breaks and in adjacent untreated areas to determine if fuel treatments promote the invasion of nonnative plant species. Understanding the relationship between fuel treatments and nonnative plants is becoming increasingly important as federal and state agencies are currently implementing large fuel treatment programs throughout the United States to reduce the threat of wildland fire. Our study included 24 fuel breaks located across the State of California. We found that nonnative plant abundance was over 200% higher on fuel breaks than in adjacent wildland areas. Notably, while the EA purports to monitor invasive species, given the expansive use of fuel beaks, mitigation appears grossly inadequate. We request that you include a literature review on problems and limitations of fuel breaks, and more substantial invasive species containment measures. This is of particular concern as fuel breaks will require periodic maintenance (adding to undisclosed project costs), could become roads for ORVs and cattle that act as vectors of invasive species spread along with uncharacteristic fire ignitions. In particular, if fuel breaks are colonized by grasses (especially cheatgrass), they will contribute to fire spread and dangerous conditions for firefighters."	See Public Concern Statement BA-3	
131	97	Best available information-baseline data	N/A	Much of the best available science on the effects of fire on sage-grouse populations and habitat is contained in the 2011 Studies in Avian Biology sage-grouse monograph (Baker 2011; Knick et al. 2011). These studies explain that sagebrush fires are nearly all high-severity or stand-replacing, not low- or mixed-severity	See Public Concern Statement BA-3	
7	2	Best available information-baseline data	N/A	Where is the evidence that breaks would slow the spread of wildfires, reduce invasive plant species expansion, protect habitat restoration and sagebrush communities, etc.??	See Public Concern Statement BA-3	
84	1	Best available information-baseline data	N/A	We see little data provided about the effectiveness of fuel breaks. We recommend including data and/or statistics regarding the effectiveness of fuel breaks to support the PEIS.	See Public Concern Statement BA-3	
106	4	Best available information-baseline data	N/A	The previously mentioned newspaper article by McCombs includes the unsourced statement, "A U.S. Geological Survey report issued last year found that fuel breaks could be an important tool to reduce damage caused by wildfires, but the agency cautioned that no scientific studies have been done to prove their effectiveness." It also includes the unsourced assertion that "The Bureau of Land Management says it has done about 1,200 assessments of fuel breaks since 2002 and found they help control fires about 80 percent of the time." Neither statement is presented, supported, or refuted in the draft EIS. As a result, decision-makers and the concerned public are unable to make an informed judgement regarding the effectiveness of the project in fulfilling the stated purpose and need. Solution: Add information to the EIS that conclusively demonstrates the effectiveness of fire breaks in achieving fire suppression Great Basin ecological settings. Provide contrasting viewpoints, such as those of the USGS and convincingly explain why those viewpoints are incorrect.	See Public Concern Statement BA-3	
11	1	Best available information-baseline data	N/A	Suggest including a discussion of Fuelbreak Effectiveness titled Fuelbreak Effectiveness and cite from J.K Agee, section 4. Fuelbreak Effectiveness page 60. The use of shaded fuelbreask in landscape fire management. Language to be added to Chapter 2; Section 2.3 Paragraph 1Fuelbreak Effectiveness" Fuelbreak construction standards, the behavior of the approaching wildland fire, and the level of suppression contribute to the effectiveness of a fuelbreak. " (Agee et.al 1999) Fuelbreaks are a part of a fuels management strategy and can aid in wildland fire control and help to achieve more broad-based ecosystem management goals. (Agee and Edmonds, 1992; Weatherspoon 1996; Weatherspoon and Agee, 1996). Fuelbreaks can be created as initial fuel treatments with the intent fo follow up with more extensive landscape fuel treatments, gradually reducing potential fire damage interior untreated areas as more of the landscape becomes treated.[comment end]	See Public Concern Statement BA-3	
98	39	Best available information-baseline data	N/A	Both FMPs and Fire and Invasives Assessment Tool (FIAT) recommendations should be incorporated into the PEIS.	See Public Concern Statement BA-3	

Letter #	Comment Number	Comment Code Name	Concern Statement Number (if applicable)	Comment Text	Concern Statement Text	Draft Response
109	2	Best available information-baseline data	N/A	1) The PEIS assumes that fuel breaks are effective at reducing and controlling wildfire but offers no evidence and no science to clearly demonstrating percentage rates of fuel breaks stopping wildfires and analyze success rates by miles of fuel breaks placed on the landscape. No information was provided to clearly show that implementation of 11,000 miles of fuel breaks would definitely reduce wildfire across the Great Basin. Furthermore, there is very little research and science on the effectiveness of fuel breaks so the proposed system of fuel breaks is a large experiment with no information to backup the claims of effectiveness in reducing wildfire made in the PEIS.	See Public Concern Statement BA-3	
98	2	Best available information-baseline data	N/A	1. Ineffective: We reviewed the PEIS to learn if fuel breaks actually stop fires or slow fires down and/or if fuel breaks will simply become corridors for the spread of invasive weeds into sagebrush habitats, further enhancing the cheatgrass-wildfire cycle in Nevada. We found little information or scientific data analysis on whether, which, where or how often fuel breaks are successful or are unsuccessful in stopping or slowing down wildfires in Nevada. In addition, the PEIS does acknowledge that fuel breaks will not stop the wind-driven catastrophic fires increasingly prevalent in Nevada, and, unfortunately, often uses "can" or "may" in describing possible benefits of fuel breaks rather than providing scientific data on why and how fuel breaks are successful or not.	See Public Concern Statement BA-3	
118	7	Best available information-baseline data	N/A	5. Regarding strategic location of fuel breaks, we point to a study by Syphard et al. (2011) that found over a 28-year period fuel breaks stopped fires 46% of the time and almost invariably owing to fire suppression activities. In other words, fuel breaks were most effective when firefighters had ready access to fuel breaks. Providing access for firefighting activities also should be analyzed and considered when modeling and planning strategic locations for future fuel breaks. Also, to this end, there needs to be better discussion in the PEIS as to how fire-fighting strategies will compliment fuel breaks.	See Public Concern Statement BA-3	
98	12	Best available information-baseline data	N/A	One of the references cited in the PEIS is a study done by the US Geological Survey (USGS), After, examining the lack of scientific data on fuel breaks and the enormous potential impacts of proposed fuel breaks on sagebrush plant and animal communities of BLM proposals, the USGS made a series of recommendations on the need to enhance record-keeping, monitoring, and scientific assessment of fuel breaks by the BLM and its science partners; unfortunately, the PEIS appears to totally ignore this scientific analysis of fuel breaks as well as its recommendations. Therefore, we include here the study's conclusions and findings and urge the BLM to incorporate them into its fuel break PEIS. Shinneman, D.J., Aldridge, C.L., Coates, P.S., Germino, M.J., Pilliod, D.S., and Vaillant, N.M., 2018, A conservation paradox in the Great Basin-Altering sagebrush landscapes with fuel breaks to reduce habitat loss from wildfire: U.S. Geological Survey Open-File Report 2018-1034, 70 p., https://doi.org/10.3133/ofr20181034.	See Public Concern Statement BA-3	
131	92	Best available information-baseline data	N/A	If BLM would increase this buffer distance in its analysis based on new criteria derived from research on the Camp Fire in California, the alternative could fulfill the purpose and need of protecting communities much more effectively than cutting fuel breaks into remote wildlands, where fire crews often cannot reach ignitions in time to control and suppress wildfires.	See Public Concern Statement BA-3	
69	3	Best available information-baseline data	N/A	Several resources exist to assist in developing effective management strategies to address wildfire, invasive annual grasses, and conifer expansion in sagebrush ecosystems. The Service believes the Fuel Breaks PEIS could be strengthened by more recent scientific publications, especially those specific to the Great Basin region, and through the incorporation of the best available science. See the attached document for suggested citations.	See Public Concern Statement BA-3	
109	6	Best available information-baseline data	N/A	The BLM failed to use all easily available science necessary to determine the impact and effectiveness of fuel breaks. Much scientific information, recommended fuel break placement strategies, and management scenarios is available in Chambers et al. 2017, The Science Framework for Conservation and Restoration of the Sagebrush Biome: Linking the Integrated Rangeland Fire Management Conservation Actions, Part 1. Science Basis and Applications and Crist et al 2019, Chambers et al. 2017, The Science Framework for Conservation and Restoration of the Sagebrush Biome: Linking the Integrated Rangeland Fire Management Conservation Actions, Part 2. Management Applications. and Shinneman et al. 2019 The ecological uncertainty of wildfire fuel breaks: examples from the sagebrush steppe. Jon Keeley (USGS) also has numerous publications on the effectiveness and impacts of fuel breaks in shrubland systems in California. All of this information is easily available and NONE of this information was included in the PEIS.	See Public Concern Statement BA-3	

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68	14	Best available information-baseline data	BA-4	Science indicates that the alleged hydrologic impacts of juniper may be miscalculated. The water resources used by trees may be much more segregated than previously thought from the water resources discharged to streams. Once the root zone is recharged, which happens every winter, the trees have little impact on the annual discharge of water to streams. See Oregon State University (2010, January 23). Water hits and sticks: Findings challenge a century of assumptions about soil hydrology. ScienceDaily. Retrieved March 15, 2010, from http://www.sciencedaily.com/releases/2010/01/100121173452.htm. BROOKS, J., H. Barnard, R. COULOMBE, AND J. McDonnell. Ecohydrologic separation of water between trees and streams in a Mediterranean climate. Nature Geoscience. 3, 100 - 104 (2010).Published online: 20 December 2009 | doi:10.1038/ngeo722. http://www.nature.com/ngeo/journal/v3/n2/abs/ngeo722.html http://oregonstate.edu/ua/ncs/archives/2010/jan/water-hits-and-sticks-findings-challenge-century-assumptions-about-soil-hydrology	The PEIS should include additional scientific references regarding the potential effects of pinyon-juniper on water availability and carbon capture.	As described in Section 3.4, Vegetation, of the Draft PEIS, Miller et al. (2014a) identify the successional phases of pinyon-juniper used to identify encroachment. Appendix F, Section F.2 outlines the datasets used to determine potential treatment areas, including pinyon-juniper. Large scale removal of pinyon-juniper would not occur as a result of this PEIS due to the limitation on the locations and size of fuel breaks. Less than 1 percent of the pinyon-juniper habitat in the project area could be affected. The effects of the alternatives on pinyon-juniper removal are described in Sections 4.6 and 4.7 in the Draft PEIS (e.g., see page 87, Table 4-6, and subheaders for pinyon-juniper species in Section 4.7). Section 4.6.2 of the Final PEIS has been revised to include additional analysis of the impacts of pinyon-juniper removal. The Draft PEIS discusses prevention of nonnative invasive plant introduction and spread in several places. See Sections 2.2.7 (page 6), Table 2-1, Section 4.5.1 (page 69), and design features 23 through 26, which describe precautions that would be taken during fuel break creation and maintenance. The potential for alternatives to increase the spread of invasive, nonnative plants is analyzed in Section 4.6, Vegetation, and this discussion has been expanded in the Final PEIS.
68	16	Best available information-baseline data	N/A	The PEIS failed to consider the trade-offs associated with juniper removal. One of those trade-offs involves the lost opportunity to store carbon that mitigates global climate change. Landscape scale expansion of juniper woodlands is providing an ecosystem service (carbon storage via natural afforestation) and juniper removal erases that benefit. Campbell, J.L., R. Kennedy, W.B. Cohen, and R. Miller. 2012. Regional carbon consequences of Western Juniper encroachment in Oregon. Journal of Rangeland Ecology and Management. 65(3):223-231. http://larse.forestry.oregonstate.edu/sites/larse/files/pub_pdfs/Campbell_etal_2012.pdf ("unlike forest growth which is balanced by natural disturbance, timber harvest, and land conversion, woody encroachment is assumed to be largely one-directional with the potential result of a [significant] North American net carbon sink. … [T]he highest biomass shrubs with which juniper competes in Oregon (namely, Artemisia spp.) have an average biomass per unit crown cover of only 8% that of juniper (derived from juniper allometry of Sabin [2008], and sage allometry of Rittenhouse and Sneva [1977]). This means that even when juniper cover replaces sage cover on a one-to-one basis (as reported by Miller et al. 2005), aboveground biomass lost in shrubs is less than 8% that gained in aboveground juniper biomass. … This study illustrates the capacity of woody removal, over very small areas, to offset encroachment over very large areas …"); See also Barger, N.N., A.R. Archer, J.L. Campbell, C. Huang, J.A. Morton, and A.K. Knapp. 2011. Woody plant proliferation in North American drylands: A synthesis of impacts on ecosystem carbon balance. Journal of Geophysical Research. 116, G00K07, doi:10.1029/2010JG001506. http://fes.forestry.oregonstate.edu/sites/fes.forestry.oregonstate.edu/files/PDFs/Barger_2011_JGR.pdf ("The greatest tree biomass response occurred in Great Basin sagebrush steppe sites encroached upon by western juniper (J. occidentalis), sites strongly dominated by winter precipitation. … Changes in [above ground biomass] pools were greatest in systems experiencing Juniperus and Pinus spp. Encroachment …"]	See Public Concern Statement BA-4	

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68	15	Best available information-baseline data	N/A	The PEIS failed to recognize that best evidence indicates that moderate tree cover might actually benefit hydrology. Deanna Ramsay 2016. Finding water amid the trees More trees in arid areas could lead to more water access-which is good news for hundreds of millions of the world's poorest people. http://blog.cifor.org/40702/finding-water-amid-the-trees?fnl=en ("In arid places where water is scarce, the planting of trees is often discouraged out of the belief that trees always reduce the availability of much-needed water. Yet scientists working in Burkina Faso found that when a certain number of trees are present, the amount of groundwater recharge is actually maximized. The study is a "game changer", according to one of the study's authors, … 'The most important point of our study is to show that a trade-off between water and tree cover doesn't always exist, and that more trees can actually improve groundwater recharge.' Aida Bargués Tobella") citing Ilstedt, U.; Tobella, B.; Bazié, H.R.; Verbeeten, E.; Nyberg, G.; Benegas, S.L.; Murdiyarso, D.; Laudon, H.; Sheil, D.; Malmer, A. 2016. Intermediate tree cover can maximize groundwater recharge in the seasonally dry tropics. Scientific Reports 6: 21930. DOI: 10.1038/srep21930 http://www.cifor.org/publications/pdf_files/articles/AMurdiyarso1601.pdf	See Public Concern Statement BA-4	
131	4	Best available information-baseline data	BA-5	The PEIS does not accurately describe the environmental baseline-particularly the reasons why wildfire frequency is increasing across the Intermountain West. Nor does the PEIS consider the current extent and condition of fuel breaks within the project area.	The PEIS incompletely or inaccurately describes the affected environment, including the conditions that contribute to increasing wildfire frequency and severity and the current extent and effectiveness of fuel breaks already in place.	Information related to the affected environment is presented in Chapter 3 of the Draft PEIS. The affected environment provided in Chapter 3 is sufficient to support the environmental impact analysis resulting from the alternatives presented in the Draft PEIS. The BLM clarified the baseline in Chapter 3, Sections 3.1 and 3.5, added a new section on climate (Section 3.3 in the Final PEIS), and updated the references cited in Appendix B of the Final PEIS. Inclusion of this information does not present a seriously new or different picture of the impacts from what was analyzed in the Draft PEIS and/or that information submitted/used in the Draft PEIS would not result in impacts that were not previously considered and analyzed within the spectrum of the alternatives in the Draft PEIS. Several suggested references were already incorporated into the Draft PEIS, covered by existing BLM policy, or would be more applicable to future project-level analysis. Appendix H and L in the Draft PEIS provide the correlation between windspeed, terrain and height to identify the minimum fuel break width needed. In particular, Appendix L provides the rationale behind the minimum fuel break widths. These minimum fuel break widths would modify fire behavior, allowing wildland fire fighters to safely engage in direct suppression actions. In addition, a new appendix (Appendix K) has been added to the Final PEIS describing examples of how fuel breaks have been used within the project area. Additional text on fuel break siting has been added to Section 2.2.4. Additional analysis would be needed at the site-specific level for fuel breaks greater than the 500 feet analyzed within this PEIS.
131	4	Best available information-baseline data	N/A	The PEIS does not adequately describe baseline conditions within the project area because it ignores the causes of more frequent fire-namely, invasive annual grasses and climate change. Without understanding how these undesirable conditions came about the BLM can't make assumptions about how they can be fixed.	See Public Concern Statement BA-5	
98	24	Best available information-baseline data	N/A	Sec. 3.5: While BLM is claiming it will "consult" with stakeholders on fuel break projects, the PEIS fails to reference or to incorporate the NDOW Wildlife Action Plan and its identification of species of conservation priority in Nevada as part of the PEIS sections on affected environment, disclosure of environmental consequences, nor in required mitigation.	See Public Concern Statement BA-5	

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109	4	Best available information-baseline data	N/A	3) The PEIS failed to incorporate information and GIS datasets on fire probability, fire ignition frequencies that would help determine the best places for fuel breaks (places that are experiencing a lot of fire ignitions). This information would help determine the effective number of miles of fuel breaks needed and best places to put fuel breaks. Instead the PEIS assumes that all areas across the Great Basin are at risk of fire and this is not the case. These datasets are available through the Forest Service Fire Lab and Research Stations and the BLM failed to include it in the PEIS. See Chambers et al. 2017, The Science Framework for Conservation and Restoration of the Sagebrush Biome: Linking the Integrated Rangeland Fire Management Conservation Actions, Part 1. Science Basis and Applications, especially Appendix 10.	See Public Concern Statement BA-5	
131	36	Best available information-baseline data	N/A	Much of the best available science on the effects of fire on sage-grouse populations and habitat is contained in the 2011 Studies in Avian Biology sage-grouse monograph (Baker 2011; Knick et al. 2011). These studies explain that sagebrush fires are nearly all high-severity or stand-replacing, not low- or mixed-severity. In most sagebrush taxa, the plant is killed because most taxa do not re-sprout after fire. Individual sagebrush plants are able to grow from seed to full maturity in a shorter period, but full coverage of mature plants across a burned landscape is the best measure of actual recovery. Mountain big sagebrush recovers faster than Wyoming big sagebrush. Recovery ranges from a "fast track" to full recovery of mountain sagebrush in 25-35 years and a "slow track" to full recovery in 75-100 years. Wyoming big sagebrush requires 50-120 years for full recovery. In areas of depleted understories, restoration to reestablish native plants is needed if sagebrush ecosystems are to effectively recover from future disturbance. These areas need rest and recovery. Again, restoration is likely to be ineffective if the specific causes of degradation or invasion are not identified and remedied. Following wildfire, the reintroduction of grazing before native and reseeded plant communities have developed will result in increased levels of exotic grasses and failed rehabilitation efforts. Research suggests that more than the typical two growing season rest period for grazing is likely to enhance ecological recovery. Miller et al. (2013) explain that the length of time necessary for a plant community or ecological site to adequately recover before implementing grazing depends on a number of interacting variables including resilience to disturbance and resistance to invasives, fire severity, post-disturbance climate, plant composition of the community prior to disturbance, post-fire grazing management, and additional post-fire disturbances. In their field guide, Miller et al. (2015) recommend that deferring grazing during the active growth period for the first two years is probably adequate only for ecological sites where fire severity was low to moderate, resilience and resistance to invasives is high, vegetation was in the reference state and not at-risk prior to treatment, and post-treatment monitoring indicates adequate recovery of perennial grasses and forbs. By contrast, deferring grazing during the active growth period for the first two years is probably inadequate where fire severity was high, resilience to treatment and resistance to invasives are moderate to low, the vegetation phase was at-risk, or post- treatment monitoring indicates low or slow recovery of perennial grasses and forbs. Based on these recommendations, and what we know about ecological conditions in general on grazed areas throughout the project area, it is likely that two-year grazing deferrals in burned areas has been or will be inadequate-and therefore would contribute to undermine any potential benefits of fuel breaks, fuels reduction or other vegetative manipulations. The PEIS does not 24 adequately consider the full range of ecological states and potential fire restoration and recovery strategies.	See Public Concern Statement BA-5	
98	11	Best available information-baseline data	N/A	Inadequate scientific basis for fuel breaks in the PEIS: The PEIS appears to emphasize possible benefits of fuel breaks while understating possible adverse environmental impacts of fuel break construction and maintenance. Even though the BLM has been constructing fuel breaks for many years in Nevada, the PEIS fails to disclose or incorporate this state-specific information. How many miles of fuel breaks have been constructed in Nevada? Which districts? What kinds? At what costs? What have been the environmental impacts of construction and maintenance of the existing fuel breaks in Nevada? How many miles of these existing fuel breaks are maintained annually or more often and at what costs? How many existing fuel breaks have met project objectives and how many have failed?	See Public Concern Statement BA-5	

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131	49	Best available information-baseline data	N/A	The BLM should put more emphasis on the best available science recommending mitigation practices for pollinator protection. The PEIS at 125 says that "BLM will consider additional guidance on habitat planning for beneficial pollinators (See Hopwood et al. 2016) at the sitespecific level and to the extent practicable that the fuel breaks will support maintenance of [missing word]". (This reference is not in the PEIS Appendix B.2 Literature Cited, but we assume Hopwood et al. 2015 is the intended reference.) We suggest that the BLM definitively add the recommendations from this document and others rather than agree to just "consider" it.	N/A	Pollinators are more likely to use areas of intact sagebrush communities where a diversity of plants and, therefore, floral resources exist. Vegetation states with invasive annual grasses would incur the most intervening treatments and are less likely to have pollinator use. More intact vegetation states (Perennial Grasses and Forbs, Perennial Grasses, Forbs, and Shrubs) would have the least amount of intervention from treatments during fuel break construction and would have the greatest amount of pollinators. As such, impacts on pollinators are expected to be limited. An expanded discussion of how vegetation treatments indirectly impact pollinators and their habitat, including additional citations (IM 2016-013 and Xerces 2018), has been incorporated to Section 4.6, Vegetation in the Final PEIS. Further, guidance on how pollinator conservation would be incorporated into management decisions has been added to Section 2.2.8.
98	16	Chemical Treatments	CT-1	Sec. 2.4: Describe the timing and applicability of pre-emergents to manage invasive species, including cheat grass. What pre-emergents would be used? When and how often must they be applied? How often must maintenance be done to strips treated with pre-emergents? What are the impacts of pre-emergents on native plant and animal species? What are the costs of application of reemergents and the annual costs of their reapplications to maintain brown and green strips in Nevada?11. Also, in Sec. 4.2.6, the PEIS states "Implementing pre-emergent chemical treatments would maintain the viability of fuel breaks over time and would prevent subsequent conversion of treated areas (brown strips and green strips) to invasive annual grasses..." The BLM appears to intend to use pre-emergents regularly. Disclosures requested in #10 above are very important to inform the public the uses and impacts of these chemicals.12. Sec. 2.4: How often will chemical and other treatments be repeated in constructing and maintaining fuel breaks in Nevada, what are the criteria for their use, and which fuel break treatments are most subject to multiple applications? How will BLM determine the cause or causes of the failures of initial treatments? How does BLM use this information to evaluate projects and use adaptive management to address the causes of failure, rather than just repeating failed treatments? Who in BLM makes these determinations?	The PEIS should include more details regarding the use of preemergent chemicals, including the types, timing, impacts, and costs associated with them.	The use of herbicides is not specifically analyzed in the Draft PEIS, as the BLM incorporated by reference two previous PEISs that describe the impacts. They are 2007 Final Vegetation Treatment Using Herbicides and 2016 Vegetation Treatments Using Aminopyralid Fluroxypyr and Rimsulfuron on BLM lands in 17 Western States (see Section 2.3.1 of the Draft PEIS). Only active ingredients analyzed in those documents are incorporated into the Draft PEIS - these include preeemergent chemicals and soil sterilants. Further, design features 30, 50, 52, and 53 (Appendix D in the Draft PEIS) have been developed to limit impacts associated with chemical treatments, including herbicides. The PEIS does not authorize any actions; as stated in Section 1.1 of the Draft PEIS, either a Determination of NEPA Adequacy or additional NEPA analysis would be required for any project to ensure compliance with NEPA. As projects are proposed at the site level, BLM field offices will analyze the potential for site-specific impacts before implementing projects, including those impacts associated with the use of herbicides.
84	11	Chemical Treatments	N/A	Section 2.4 Methods - One of the most crucial components of effective fuel breaks is maintaining low cover of annual grasses. There should be a heavy emphasis on treatment of fuel breaks with pre-emergent chemicals applied in the fall prior to cheatgrass or medusahead germination. Reference citations should be included detailing circumstances for treatment(s) selected.	See Public Concern Statement CT-1	
107	2	Chemical Treatments	N/A	Page 14 of the PEIS describes the methods for fuel break creation and maintenance. It incorporates by reference several documents and lists a number of herbicides that may be used to treat fuel breaks. All herbicides listed, and apparently those incorporated by reference, are used for enhancing range, and are therefore short-term in duration, and many are selective herbicides, targeting specific types of vegetation. We recommend that one or more soil sterilants be added to this list, specifically for the creation and/or maintenance of brownstrips only. A good soil sterilant will kill existing vegetation and prohibit new vegetative growth on the treated area for a period of several years, significantly reducing the maintenance costs and allowing resources to be directed toward maintaining other types of fuel breaks. See: https:!/www.unce.unr.edu/publications/liles/ho/2011/fsl159.pdf	See Public Concern Statement CT-1	
121	9	Chemical Treatments	N/A	While there are limits imparted on mechanical brown-stripping in each alternative, there are no such limits for chemical treatment brown-stripping.-This curious distinction is not addressed anywhere. The complexities of chemical treatments i.e. proper type and time depending on the grow cycle of each specific vegetation are not discussed in this PEIS. This is cause for alarm considering its usage has no restrictions.	See Public Concern Statement CT-1	

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131	33	Chemical Treatments	N/A	The use of herbicides should be greatly limited or disallowed. The herbicide Plateau kills a wide range of native plant species and often completely wipes out all native species on a site. Any use of herbicides must be done by ground application spot spraying only. There must be no use of spray planes. Herbicides can harm sage-grouse and their habitats. The PEIS at 14 allows for the use of many toxic chemicals on fuel breaks: 2,4-D, bromacil, chlorsulfuron, clopyralid, dicamba, diuron, glyphosate, hexazinone, imazapyr, metsulfuron methyl, picloram, sulfometuron methyl, tebuthiuron, triclopyr, imazapic, diquat, diflufenzopyr (in formulation with dicamba), fluridone, aminopyralid, fluroxypyr, and rimsulfuron. Chemical treatment application methods can be applied on the ground with vehicles or manual application devices or aerially with helicopters or fixed-wing aircraft. BLM says potentially significant impacts of these herbicide applications have already been analyzed in the Vegetation Treatments 20 Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statements and the Final PEIS. But what has not been analyzed are the impacts of these dangerous chemicals on specific locations mapped in this PEIS, in sensitive habitats in such places as the Eastern Sierra of California, and high-value native plant communities and species at risk in many other states. The application of these herbicides should be analyzed in more detail in site-specific EIS documents.	See Public Concern Statement CT-1	
70	1	Mechanical Treatments	MT-1	However, there is a matter of concern we have in the methods employed that was not addressed within the Impact Analysis. We have seen consequential impacts by the use of large "masticators" for chipping/shredding in pinyon/juniper areas. This type of equipment is particularly hazardous to the use of existing roads. There is a serious problem with the debris left on roads where this equipment shreds the trees. Large branches and sharp wooden spikes are left behind and become an enormous safety hazard to vehicles passing through after a treatment. These roads are important to the counties for public travel and need to be retained and left in navigable condition. We request that any fuel break treatment proposed will identify and mitigate the safe use of all existing roads for public travel.	The PEIS does not fully analyze the impacts associated with proposed mechcanical treatments, including residual debris on roads and geographic-specific impacts.	The BLM adequately analyzed the impacts from mechanical treatments on the resources analyzed in Chapter 4. Specifically, the impacts from mechanical treatments on vegetation are analyzed in Section 4.5.2 (pages 70-72). Section 2.4.2 has been revised to include additional details on where and how masticators would be used. The PEIS does not authorize any actions; as stated in Section 1.1 of the Draft PEIS, either a Determination of NEPA Adequacy or additional NEPA analysis would be required for any project to ensure compliance with NEPA. As projects are proposed at the site level, BLM field offices will analyze the potential for site-specific impacts before implementing projects, including those impacts associated with the use of mechanical treatments.
131	28	Mechanical Treatments	N/A	The methods for manual and mechanical vegetation treatments virtually guarantee that soil disturbance will lead to a vastly increased potential for cheatgrass invasion and spread. Hand tools for cutting trees, chainsaws, bulldozers, blade machinery, machinery for seeding, plows, harrows, trenchers, scalpers, gougers, and other equipment are proposed. In addition, some of the most destructive methods are also proposed to rip out sagebrush and conifers by the roots, which will disturb all native shrubs, trees, grasses, forbs and biological soil crusts. These include dragging chains and rails with dozers. While these drag chains are still used in states like Nevada by local BLM offices, these highly damaging methods have not been used in California in recent times. The PEIS does not analyze the geographic limits to the use of these methods such as chaining, nor their impacts to sensitive plant habitats.	See Public Concern Statement MT-1	
109	3	New alternative proposed	NA-1	2) The PEIS failed to consider strategic placement of fuel breaks based on general directionality of wildfire spread, so the proposed fuel breaks oriented in many different positions may or may not be effective in controlling fire. If the overall goal is to reduce wildfire over a large extent over time, one would need to analyze the landscape position of the fuel breaks and their potential for effectiveness in reducing fire through the evaluation of existing fuel breaks and large-scale fire simulation modeling that incorporates how wildfire general moves across this landscape. The modeling tools are available, so it is disconcerting that the BLM chose not to do these types of analyses for the PEIS. The PEIS failed to implement these type of large-scale analyses and failed to give any science (scientific literature) demonstrating that placement of a fuel break dictates the effectiveness of fuel break in stopping a fire.	The BLM should model the landscape position of fuel breaks to capture their effectiveness in relation to the directionality of wildfire spread.	It is at the project level that details regarding fuel break locations and impacts on fire behavior would be evaluated; however, additional details regarding the fuel break placement hierarchy have been added to Section 2.2.4 of the Final PEIS. Monitoring and adaptive management described in Section 2.2.7 of the Draft PEIS would help to ensure that fuel breaks are modified if they are not meeting objectives.

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106	8	New alternative proposed	NA-2	The BLM should add an alternative that focuses on using community partnerships to identify and protect high-value resources on and near BLM lands in the Great Basin. This would involve leading an effort that involved partners representing the complete range of entities, such as states, other federal agencies, counties, special districts, towns, companies such as mines and oil producers, and individuals such as ranchers. Collectively, the BLM and its partners in each area would identify high-value resources of concern and develop approaches to protect them from wildfire. The BLM would then be responsible for implementing the elements on its land, such as establishing fuel breaks in a mutually agreed-to area near a mine or town, while the company or community provided complementary protective measures on private property. This alternative could include selective use of fuel breaks to protect important BLM and other community resources, such as major roads, high-value natural and cultural areas, and high-voltage powerlines. However, the fuel breaks would be carefully targeted as opposed to the continuous clearing along thousands of miles of roads and rights-of-way in the current action alternatives. At each site, fuel break routes and widths would be adjusted to avoid construction and maintenance disturbances to local natural and cultural resources. "Let it burn" would be an important element of this alternative. Fire suppression would NOT occur on the BLM lands between mapped protection zones. This approach would enhance firefighter safety because firefighters would not be placed in dispersed, unprotected areas. Public safety would be improved because all human use areas would be within BLM, community, company, or other protection zones.	The BLM should consider an alternative that focuses on collaboration with stakeolders to protect high-value resources within the project area.	The BLM did not include an alternative solely focused on collaboration with stakeholders and community partnerships because collaboration with external partners is already a component of project planning and implementation. See revised Section 1.1 in the Final PEIS and Design Features 8, 19, 28, 40, 49, 53, 56, and 60 in the Draft PEIS.
131	14	New alternative proposed	NA-3	Here, BLM should consider an alternative that does not include new fuel breaks or vegetation treatments, but relies instead upon additional firefighting resources. Such an alternative may entail, for example, increasing Incident Attack Centers in fire-prone areas and near human habitations. The PEIS at 21 eliminated this proposed alternative from further analysis because it is claimed this would not slow the spread of wildfires. We counter that alternative requires examination because BLM did not consider extreme wind-driven fires which can cross wide fuel breaks, and which we discuss later in this comment.	The BLM should consider an alternative that incorporates additional firefighting resources, particularly in instances of extreme wind-driven fires.	BLM considered the comment and maintains its current position that this alternative doesn't meet the project purpose and need.
131	15	New alternative proposed	NA-4	The PEIS at 21 also eliminated an alternative that would concentrate fuel breaks around the Wildland-Urban Interface (WUI). The reason given was that this alternative would not meet the purpose and need, and unduly restrict fuel breaks. However, BLM does not explain why restricting fuel breaks to the WUI would not meet the purposes of protecting firefighters, human life, communities, and private property when WUI-specific fuels management has been shown to be one of the most effective means of protecting communities (Calkin et al. 2014).	The PEIS needs to better explain why an alternative that would restrict fuel breaks to the WUI would not meet the purpose and need.	The purpose and need for the PEIS (Section 1.2) describes that fuel breaks would not only aid in protecting human life and property, but also sagebrush communities and habitat restoration investments, which would be located outside of the WUI. Language has been added to Section 1.1 of the Final PEIS to describe the role of fuel breaks in a larger fuels management strategy.
131	17	New alternative proposed	N/A	BLM should analyze a restoration alterative that omits the proposed treatments and instead protects important habitat areas from anthropogenic impacts like motorized recreation and livestock grazing. The restoration alternative must also include strong, measurable recovery criteria for sagebrush, native grasses, native forbs, and riparian vegetation, all of which must be met before grazing resumes at reduced levels. Finally, the restoration alternatives should focus on removal on non-native crested wheatgrass, Siberian wheatgrass, and other rhizomatous seedings, along with restoration of locally native sagebrush, forb, and grass species.	N/A	The BLM is developing a separate but complementary PEIS for Fuels Reduction and Rangeland Restoration in the Great Basin which includes restoration. Alternatives are included in that PEIS to improve the resistance and resilience of sagebrush communities within the Great Basin.
98	17	Prescribed Fire	PF-1	Sec. 2.4.3: What are the criteria which will be used by the BLM to determine that prescribed fire is a necessary treatment in fuel breaks? How many acres of sagebrush would be burned in these treatments? Would the Nevada Department of Wildlife (NDOW) be consulted on this loss of sagebrush habitat? If NDOW objected, how would BLM resolve this conflict?	The PEIS should include additional detail regarding when and how much prescribed fire would be used and consultation requirements associated with its use.	The use of prescribed fire as a method in the creation of the fuel break and acres of sagebrush that will be burned will be determined based on each particular project's objectives and fuel break type needed. Tables 2-1 and 2-2 display fuel break type, functions, consideration and preferred fuel break type by vegetation state. The role of fuel breaks as part of a larger management strategy has been clarified in Sections 2.3, 3.1, and 4.1 of the Final PEIS. This PEIS doesn't affect the coordination and cooperation between local agencies. This has been clarified in Section 1.1, in the Final PEIS.

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68	1	Purpose and Need	PN-1	Fire should not be viewed as an agent of ecological harm when in most cases fire may be far more beneficial or neutral. Fire has played a role in the Great Basin for millennia. Additionally, fuel reduction comes with its' own set of adverse ecological impacts. It may be that "the cure is worse than the disease," especially in light of the following facts: (i) no one can predict where or when fire will occur, so there is a low probability that fuel treatments will interact with fire; (ii) this means that many of our fuel treatments will cause adverse effects without providing any benefits, (iii) therefore, fuel breaks and fuel reduction may cause more harm than fire itself. When there are significant trade-offs involves in a restoration efforts, there is a chance that doing nothing is better. For a useful analysis of an analogous situation please review Heiken, D. 2010. Log it to save it? The search for an ecological rationale for fuel reduction logging in Spotted Owl habitat. Oregon Wild. V 1.0. May 2010. https://www.dropbox.com/s/pi15rap4nvwxhtt/Heiken_Log_it_to_save_it_v.1.0.pdf?dl=0	Creation of fuel breaks does not adequately respond to the purpose and need of the PEIS because fuel breaks do not stop large wildfires, particularly under extreme weather conditions, or improve suppression opportunities. Data supporting fuel break effectiveness are limited or nonexistant and impacts associated with fuel breaks outweigh the benefits achieved.	As stated in Section 1.2 of the Draft PEIS, fuel breaks are not intended to stop wildfires, but to slow the spread of fires, provide anchor points for fire suppression, and to provide opportunities to control catastrophic fires, among other purposes. These effects are further described in Section 4.2. Sections 1.1, 3.1 and 4.1 have been revised to clarify the role of fuel breaks in a larger fuels management strategy and factors that make a fuel break effective. Impacts associated with fuel break construction and maintenance are discussed in Chapter 4 of the Draft PEIS.
117	2	Purpose and Need	N/A	First I question the purpose and need for the project. You cannot predict where fires will occur and fuel breaks might be necessary. Case in point is that only 2% of all areas logged on Forest Service and BLM lands to "prevent" fires have actually experienced fire. It is a waste of tax payer money to create fuel breaks "in case" of fire especially considering the impact of chaining on sage grouse habitat. It is misleading to assert that these fuel breaks will stop fire. Fires spread via flying embers. When the conditions are right for fire expansion (dry, hot and windy) which are predicted to occur more frequently due to climate change, embers can travel over a mile in advance of a fire. One example would be the fire that jumped the Columbia Gorge a few years back.	See Public Concern Statement PN-1	
68	5	Purpose and Need	N/A	Fourth, BLM cannot predict where and when fire will occur and it only affects a small fraction of the landscape each year. So, even if fuel breaks might be considered effective and worthwhile in the event of fire, there is a low probability that fuel breaks will actually interact with fire during the brief period before they need to be retreated (at great expense). So the probability of benefits from fire breaks is low, while the probability of adverse impacts is very high. This trade-off is not justified. The PEIS does not address this probabilistic issue and is therefore arbitrary and capricious.	See Public Concern Statement PN-1	
74	1	Purpose and Need	N/A	I fear that the BLM is embarking on a large-scale effort that is not supported by science. The draft EIS repeatedly states that "A system of strategically placed fuel breaks in the Great Basin region would slow the spread of wildfires; thereby reducing wildfire size…," but the draft EIS provides no data to support or quantify this assertion. I am aware that some fuel breaks have slowed some wildfires, but there are also many cases when wildfires have jumped wide highways and fuel breaks. I think the value of fuel breaks has been oversold and overstated; I don't believe it is the panacea that everyone is seeking. The BLM's proposal would result in an extensive, unprecedented landscape change that could never be reversed. There is very little peer-reviewed science about the ecological e?ects of fuel breaks (Shinneman et al. 2019). However, there is no question that fuel breaks will alter ecosystems by creating edges and edge effects, creating pathways for invasive species, and fragmenting contiguous sagebrush landscapes (Shinneman et al. 2019).	See Public Concern Statement PN-1	
91	3	Purpose and Need	N/A	The effectiveness of fuel breaks in helping to control the spread of wildfire is limited. Fuel breaks also introduce problems for wildlife (habitat fragmentation and disturbance) and introduce other avenues for fire spread along with invasive plant species. (See [3].) Minimal or no working of the land is preferable to activities that disturb the land and make the natural healing process harder. This land has existed for millennia without fuel breaks and the purpose and need presented in this PEIS is inadequate for the disturbance it creates.	See Public Concern Statement PN-1	

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26	3	Purpose and Need	N/A	The goal is to reduce massive wildfires, the kind that burns hundreds of thousands of acres. That is an admirable goal because fires are burning up vast amounts of sagebrush habitat with dire consequences for sagebrush dwellers like sage grouse. But here's the problem. Climate/weather conditions drive large wildfires. Extreme fire weather with low humidity, high temperatures, extended drought, and most importantly, high winds are the primary driver of large blazes. Under such conditions, windblown embers easily cross any "fuel break.	See Public Concern Statement PN-1	
131	87	Purpose and Need	N/A	The purpose and need statement is also inappropriately narrow, based on unproven assumptions, and designed to support the agency's proposal. It strongly implies that fuel breaks will be effective in achieving BLM's stated goals, which include slowing the spread of wildfires, reducing wildfire size, improving firefighter safety, maintaining wildlife habitat, and reducing invasive species.	See Public Concern Statement PN-1	
68	4	Purpose and Need	N/A	Third, fuel break will likely not be effective. Climate and weather conditions primarily drive large wildfires. Extreme fire weather with low humidity, high temperatures, extended drought and most importantly, high winds are the primary driver of large blazes. Under such conditions, windblown embers easily cross any "fuel break."	See Public Concern Statement PN-1	
122	1	Purpose and Need	N/A	TNC understands that fuel breaks are an important tool to (1) create defensible space to support firefighting and facilitate suppression, along with (2) limiting human-caused ignitions along highly travelled routes. We also agree, in principle, that (3) strategically located and properly maintained fuel breaks can limit wildfire extent by changing fire behavior and slowing spread. We do, however, have critical concerns that this PEIS does not weigh those benefits against the costs of installation, perpetual maintenance, and the likelihood of habitat fragmentation. Overall, we believe the PEIS lacks a strategic framework that could assess and prioritize those trade-offs.	See Public Concern Statement PN-1	
122	5	Purpose and Need	N/A	We believe strongly that fuel break implementation and maintenance costs should be weighed against more holistic approaches including proactive restoration. Models developed with TNC science show that strategic habitat restoration and rehabilitation projects applied to invasive annual grasslands can be as or more effective than fuel breaks in achieving landscape-scale reductions in fire size and occurrence3. Restoration and rehabilitation approaches also have important cobenefits including improved wildlife habitat, forage, and potentially carbon and water storage within the landscape3. In addition, restoration and rehabilitation approaches, when successful, need little if any long-term maintenance. Similar to the above suggestion, TNC believes the BLM has done insufficient analysis on the costs and benefits of various approaches to wildfire management, including consideration of restoration as a viable tool to achieve this objective. We hope that the upcoming Fuels Reduction and Rangeland Restoration PEIS provides this type of analysis needed to fully understand and deploy the most cost-effective solutions to changing wildfire behavior.	See Public Concern Statement PN-1	
123	3	Purpose and Need	N/A	All large wildfires burn under "extreme fire weather conditions" characterized by high winds. With high winds, wildfires regularly jump freeways and similar long distances. Chances are high that the fuel breaks proposed by BLM will NOT stop one of these ever more frequent types of fires. A recent Department of Interior report on fuel breaks found that "fire managers acknowledge that, under extreme fire weather conditions, fuel breaks are unlikely to adequately reduce fireline intensity, flame length, or rate of spread (Moriarty and others 2016).	See Public Concern Statement PN-1	
75	1	Purpose and Need	N/A	Fuel breaks do not work to stop large wildfires because they are spread by wind-borne embers. Instead, fuel breaks may actually speed the spread of wildfires because they promote the invasion of invasive annual grasses like cheatgrass. BLM states that cheatgrass is a major factor in more frequent, more severe wildfires. Wouldn't a better way to achieve the purpose and need be to eliminate grazing on these lands? Grazing is the #1 reason why cheatgrass is so prevalent.	See Public Concern Statement PN-1	
31	1	Purpose and Need	N/A	fuel breaks will not stop a wind driven fire. While they can assist with backfires in some cases, but also lead to excessive backfires and watershed damage.	See Public Concern Statement PN-1	
40	1	Purpose and Need	N/A	If I fire bumps up against a road without any firefighters or aircraft to help hold the fire at that road there will be no difference in the success rate of containing fire. Sage fires will spot much further than one, two, or three road widths in distance. This will be a waste of money at best and an ill-conceived non-native vegetation outbreak and threat to these diminished ecosystems at best.	See Public Concern Statement PN-1	

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4	1	Purpose and Need	N/A	The BLM's preferred alternative is misguided and will only damage the Great Basin's habitat and biodiversity in order to implement an experimental technique that isn't proven to accomplish the wildfire mitigation goals it promises. The BLM's own EIS states "Even with fuel breaks, crown fires and extreme surface fires can exhibit high rates of spread and flame lengths." This language clearly signals that severe, extreme surface fires like the ones this plan is meant to address can spread quickly even with fuel breaks. Furthermore, a U.S. Geological Survey report quoted in this article: https://news.bloombergenvironment.com/environment-and-energy/interiors-grand-experiment-an-11-000-mile-wildfire-break-plan calls the BLM's fuel breaks plan a "grand experiment" that is not substantiated by scientific evidence. The article goes on to state that: "Firefighters recognize that fuel breaks are likely to do little to reduce a fire’s intensity, flame length or rate of spread under the extreme fire weather conditions that have caused wildfires to explode and quickly spread through the Great Basin in recent years, the report says. 'That is a limitation of fuel breaks—under severe fire weather conditions they’re not going to be effective because the intensity of those fires is such that they can jump right across fuel breaks and roads,' Douglas J. Shinneman, a USGS supervisory research fire ecologist in Idaho and lead author of the report, said in an interview.	See Public Concern Statement PN-1	
118	1	Purpose and Need	N/A	While the proposed fuel breaks indeed may halt some fires, they will not stop all of them and especially large intensive fires well known to jump distances far greater than any proposed fuel break. As such, the tradeoffs between predicted fire control in the future must be careful weighed and analyzed against immediate ecological losses to fragmentation or unforeseen consequences like enhancing spread of invasive species or facilitating greater predation on wildlife, for example.	See Public Concern Statement PN-1	
10	1	Purpose and Need	PN-2	Suggesting the following inclusion to the document: The primary reason for fuelbreaks, as well as any other type of fuel treatment, is to change the behavior of a fire entering the fuel-altered zone. Fuelbreaks may also be used as points of anchor for indirect attack on wildland and prescribed fires. We can define the way that fire behavior is altered by modification of fuels, and these principles apply to all wildlands where fuel treatments are applied and maintained. (Agee et. al. 1999; The use of shaded fuelbreaks in landscape fire management.)	Commenters suggested specific changes to the purpose and need text.	The BLM considered the suggestions made by commenters. The text in the Draft PEIS adequately captures these concerns. See Draft PEIS Section 1.2 regarding the benefits of fuel breaks; Section 4.2 regarding the potential for crown and surface fires; and revised text in Sections 1.1, 3.1, and 4.1 of the Final PEIS regarding the role of fuel breaks as part of a larger fuels management strategy and factors that make a fuel break effective.
11	2	Purpose and Need	N/A	Language to be added to Chapter 2; Section 2.3 Paragraph 1 Fuelbreak Effectiveness "Fuelbreak construction standards, the behavior of the approaching wildland fire, and the level of suppression contribute to the effectiveness of a fuelbreak. " (Agee et.al 1999) Fuelbreaks are a part of a fuels management strategy and can aid in wildland fire control and help to achieve more broad-based ecosystem management goals. (Agee and Edmonds, 1992; Weatherspoon 1996; Weatherspoon and Agee, 1996). Fuelbreaks can be created as initial fuel treatments with the intent for follow up with more extensive landscape fuel treatments, gradually reducing potential fire damage interior untreated areas as more of the landscape becomes treated.	See Public Concern Statement PN-2	
22	1	Purpose and Need	N/A	Suggest add bullet: A well designed fuelbreak will alter the behavior of wildland fire entering the fuel-altered zone. Both surface and crown fire behavior may be reduced. (Agee et. al. 2000, The use of shaded fuel breaks in landscape fire management)	See Public Concern Statement PN-2	
23	2	Purpose and Need	N/A	Suggest add bullet: A well designed fuelbreak will alter the behavior of wildland fire entering the fuel-altered zone. Both surface and crown fire behavior may be reduced. (Agee et. al. 2000, The use of shaded fuelbraks in landscape fire management)	See Public Concern Statement PN-2	
135	5	Purpose and Need	N/A	Throughout the document there seems to be an implication/assumption that the proposed fuel breaks would reduce fuels resulting in reduced flame heights, slower fire spread, reduced burned acreage and increased fire-fighter safety. However, the only place where these assumptions would occur would be at the site of the fuel breaks themselves. Fire starts beyond the fuel breaks would bum just as hot, spread just as fast, and unless the fire fighters do not attack the fire, there would be no additional firefighter safety and the fire would go unchecked until it reached the fuel break.	N/A	Fuel breaks will be strategically placed adjacent to roads and ROWs and fuel break design will be based on site-specific conditions and fuel break objectives. Text has been added to Sections 1.1, 3.1, and 4.1 to clarify how fuel breaks can be used as part of a larger fuels management and suppression strategy. Suppression efforts will take place outside of fuel breaks, and fuel breaks will be used both directly and indirectly as fire behavior allows. The locations of existing fuel breaks are considered during suppression operations, not only as points for direct attack, but also as locations to enhance suppression operations. For example, fuel breaks ahead of a fire could be used for a burnout to further slow the spread of the fire.

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122	4	Purpose and Need	N/A	The BLM should consider other approaches to changing fire behavior that have cobenefits including proactive restoration.	N/A	The BLM is developing a separate but complementary PEIS for Fuels Reduction and Rangeland Restoration in the Great Basin, which includes proactive restoration. Alternatives are included in that PEIS to improve the resistance and resilience of sagebrush communities within the Great Basin.
121	7	Range of Alternatives	RA-1	6.) This PEIS doesn't narrowly define where fuel breaks may be instituted and would allow for fuel breaks to be instituted along maintenance level 1(two-track) roads not identified in this PEIS without further NEPA analysis. This is an unacceptable outcome and would greatly impact wildlife and human usage in the affected area.	The PEIS needs to more specifically define and display where fuel breaks will be located and distinguish between differences by ecoregion.	This PEIS is inherently broader in scope than a site-specific analysis. The analysis is based on the vegetation states described in Appendix F, which are representative of vegetation throughout the analysis area. Text has been added to Section 2.2.4 of the Final PEIS to describe the fuel break placement hierarchy for project siting. Text has also been added to Appendix A describing that datasets presented in the PEIS may be incomplete and that actual treatment locations and methods would be based on verified site-specific conditions. Any adverse impacts will be addressed through siting, design features, and project objectives. Beneficial impacts could be greater depending on the characteristics of the site.
121	16	Range of Alternatives	N/A	Despite the 11,000 miles of potential fuel break locations identified in 2015 FIAT assessments, these do not coincide entirely with roads identified within this PEIS, which is stated as such.(PEISSec.1.3) The issue we have is with the vague language concerning where fuel breaks will actually be created. It would seem that in the preferred alternative D as stated in Sec. 2.5.4, "Fuel breaks may be created along roads, BLM-administered linear ROWs, and primitive roads (Maintenance Levels 1, 3, and 5)." Map 6 in appendix A by no means shows all roads of these categories, especially in NV, and this language insinuates that 500 ft. fuel breaks may by instituted on any established two-track.	See Public Concern Statement RA-1	
131	58	Range of Alternatives	N/A	Despite this generally agreed upon distinction between the Great Basin and Colorado Plateau, the Draft PEIS fails to mention it or provide any analysis specific to this area. Due to the unique geomorphology of the Colorado Plateau and a corresponding difference in fire regime and behavior, the Colorado Plateau portion of the existing project area either must be removed from the Project and Analysis Areas, or be given its own specific treatment in the EIS.	See Public Concern Statement RA-1	
131	59	Range of Alternatives	N/A	If these ecoregions had similar fire regimes, one would expect the ecoregions to have a similar percentage of land in the various fire return interval categories. Instead, as one can see in Figure 3, this is not the case when comparing these ecoregions, and there are very few fire return interval categories for which the percentage of land area in the ecoregions is similar. Additionally, a significant difference in Percent Replacement-Severity Fire is also seen between the two ecoregions. This corresponds to the concern about high-severity wildfire mentioned in the Purpose and Need of the Draft PEIS. Percent Replacement-Severity Fire is not only much more variable across the Colorado Plateau compared to the Great Basin, it is also generally lower.	See Public Concern Statement RA-1	
95	4	Range of Alternatives	RA-2	Selection of Plant Materials: We urge that maximum consideration be given to the functional role that fuel breaks have in protecting resources. By virtue of the function for protection of adjacent areas, non-native plant communities should be a given element for fuel breaks (fitting with the green stripping system of fuel breaks). The use of non-native plants are more likely to successfully establish and will not only provide the benefit of being more fire-prone, but also will enhance the likelihood of reducing invasive plants taking over installed fuel breaks. The use of non-native plants is described "as a last resort." We believe that it should be ranked as part of an adaptive management essential tool to accomplish the specific objective of reducing wildfires.	Nonnative plants would be more likely than native species in achieving fuel break objectives and thus should be given preference.	The Draft PEIS addressed appropriate use of plant material in Section 2.2.6, Native Plant Material Policy. The policy in BLM Handbook H-1740-2, Integrated Vegetation Management Handbook, requires native plant material be used except under limited circumstances. The determination of plant material use would occur at the site specific level with this policy as guidance. Additionally, while each alternative is guided by the native plant material policy (Section 2.2.6 of the Draft PEIS), Alternatives B and C supplement this policy with specific requirements for native plant material use (Table 2-3 of the Draft PEIS, #9). The effects of the policy and requirements for native plant material use are adequately analyzed in Section 4.5, Vegetation (see, for example, pages 72, 78, 79, and 80 of the Draft PEIS).
94	5	Range of Alternatives	N/A	Fire resistant vegetation for firebreaks should not be limited to native species, but based on the goal of limiting fire.	See Public Concern Statement RA-2	

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89	1	Range of Alternatives	N/A	Alternative D provides that "Fuel breaks would be constructed and maintained in accordance with the BLM Integrated Vegetation Management Handbook (H-1740-2, page 82) and the National Seed Strategy." The Integrated Vegetation Management Handbook focuses mainly on repopulating disturbed areas with native plants. While native plants are an important part of a sustainable landscape, the focus of this project is on reducing the number, duration, and intensity of wildland fires. Therefore, Elko County recommends that the chosen alternative be amended to include, for the short term, species such as Agropyron cristatum, Agropyron desertorum, or Agropyron fragile, known as crested wheatgrass, or any other non-native deep-rooted perennial, which protect soil by being less-likely to transfer the heat of a fire to the root system, keeping the plant alive.1 Crested wheatgrass also resists cheatgrass invasion because it germinates earlier and grows better in colder temperatures.2 Additionally, crested wheatgrass can often survive in conditions where native grasses cannot3, protecting those areas where it is seeded from cheatgrass invasions until native communities can be established.	See Public Concern Statement RA-2	
9	1	Range of Alternatives	RA-3	The County does not support the elimination of fuel breaks in 'Exclusion Areas.' Many fires begin in wilderness, or lands managed like wilderness, that promote wildfires to develop in size and intensity and burn onto other lands. Non-treated streams and other hydrological features create chimneys that allow fires to gain in strength before moving into the uplands. The County suggests that, at the least, 'Exclusion Areas' have fuel breaks implemented at the maximum size possible on the outside of perimeters to reduce the opportunity for uncontrollable fires to get started.	Potential fuel break locations should be expanded to the extent possible in areas that are identified as "Exclusion Areas" in the PEIS.	The Draft PEIS identified Analysis Exclusion Areas in Section 2.2.1; these were identified based on the greater potential for adverse effects in these areas. However, Section 2.2.1 does state that the analysis exclusion areas are not prohibited under the action alternatives and site-specific analysis would be required should Field Offices decide to construct fuel breaks in these areas. Text has been added to Section 2.2.4 of the Final PEIS to describe the hierarchy for fuel break placement.
64	1	Range of Alternatives	N/A	It seems the concept of wet meadow and lotic system restoration in some locations to aggrade incised systems, increase meandering, and enhance or create mesic green strips (where riparian vegetation is currently lacking) that essentially serve as fuelbreaks has not been mentioned in the document. While healthy wet meadows and riparian systems may not always make good anchor points to fight fire from, stream or meadow restoration should be considered where appropriate as an important element in stratifying the landscape for fuelbreaks planning through maximizing natural resistant and resilient green strips. In addition to complementing other stratification efforts to slow or stop wildfire, fortification of these green strips through restoration may reduce the need for other fuelbreaks in some areas. Aspen forests have also been said to slow or halt fires in certain cases and opportunities to restore them should be viewed as similarly complementary to the fuelbreaks efforts. These types of restoration efforts would improve habitat for fish and wildlife as opposed to reducing wildlife habitat in the state as fuelbreaks tend to do in order to reduce their risks of burning. We recommend these types of projects be explored and areas with high potential for improvement wet meadow and riparian vegetation be considered as part of this stratification effort.	See Public Concern Statement RA-3	
47	5	Range of Alternatives	N/A	Riparian areas and meadow systems should be enhanced and used as fire breaks.	See Public Concern Statement RA-3	
74	3	Range of Alternatives	N/A	There is increasing evidence that the purported advantages of non-native species in greenstrips have been overstated. Research has shown that crested wheatgrass does not suppress cheatgrass in high precipitation years (Francis and Pyke 1996). In addition, its taller height and greater total biomass along with its tendency to senesce early in drought years result in higher fuel loading and a higher fire risk, especially in years when fire danger is highest. Some non-native species like forage kochia that are known to spread outside of fuel breaks into intact native vegetation communities (Gray and Muir 2013, Jeff Ott, USFS, unpublished data). Mark Williams' review shows that fuel breaks with native species have an advantage over those with non-natives in fuel height, total fuel loading, the ability to compete with cheatgrass, and the value for native wildlife species. Many natives are more drought-tolerant and have better establishment rates in dry sites than non-natives. Their small stature contributes to reduced fuel loads. Available science suggests that fuel breaks should emphasize native over non-native plantings	Native plants would be more likely than nonnative species in achieving fuel break objectives and thus should be given preference.	The Draft PEIS addressed appropriate use of plant material in Section 2.2.6, Native Plant Material Policy. The policy in BLM Handbook H-1740-2, Integrated Vegetation Management Handbook, requires native plant material be used except under limited circumstances. The determination of plant material use would use this policy as guidance. Additionally, while each alternative is guided by the native plant material policy (Section 2.2.6 of the Draft PEIS), Alternatives B and C supplement this policy with specific requirements for native plant material use (Table 2-3 of the Draft PEIS, #9). The effects of the policy and requirements for native plant material use are adequately analyzed in Section 4.5, Vegetation (see, for example, pages 72, 78, 79, and 80 of the Draft PEIS). Monitoring and adaptive management described in Section 2.2.7 of the Draft PEIS would help to ensure that fuel breaks are modified if they are not meeting objectives.

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106	6	Range of Alternatives	N/A	The BLM's draft EIS alternatives of building fuel breaks along roads versus building more fuel breaks along roads versus using different treatment methods to build fuel breaks along roads do not represent distinct alternatives under NEPA. Therefore, the BLM must develop and analyze at least one reasonable action alternative that provides a distinctly different approach to fulfilling the purpose and need.	All alternatives analyze the creation of fuel breaks along roads and thus represent an inadequate range of alternatives.	
98	38	Required Design Features	RD-1	D-4: On the other hand, we question this ambiguous design feature statement: "Apply restrictions and design features in applicable land use plans and land use plan amendments...If any design features in the PEIS conflict with state or local guidance, defer to state or local guidance." What does this statement mean? Is BLM proposing to abnegate its authority and responsibility for management of the public lands to states or local governments? Is BLM giving veto power over its decisions on fuel breaks on public lands in Nevada to Nevada state or local governments? Also, does this design feature negate Chapter 4 analysis of Environmental Consequences?	Some design features should include additional details to clarify when and how they would be applied.	The BLM has incorporated Design Features into the PEIS (Appendix D) to minimize the likelihood for impacts associated with fuel break construction and maintenance. Several commenters suggested design features that are already included in the Draft PEIS; these are included in Appendix D. The BLM considered the suggestions received to revise the Design Features; several have been revised, including Design Features 4, 13, 14, 21, 25, 26, 44, and 45 in the Final PEIS. In addition, any Design Features in existing resource management plans, including the Approved Resource Management Plan Amendments for the Greater Sage-Grouse, would be adhered to, as applicable (see Section 2.5.5 of the Draft PEIS). Fuel breaks are not included in the anthropogenic disturbance threshold calculations in those documents. Additional details regarding implementation of the PEIS, including how and when design features would be applied, will be included in the Record of Decision and specified during subsequent policy development.
105	4	Required Design Features	N/A	ODFW requests that RDF 44 (Table D-1) be applied to whichever alternative is ultimately selected, and that the sage-grouse breeding season be defined as March 15 - June 30 annually. Currently, Table D-1 indicates that RDF 44 only applies to Alternative B	See Public Concern Statement RD-1	
97	2	Required Design Features	N/A	Page D-3, Prescribed Fire (43 PDF) Add an additional option to read as follows: "Coordinate, collaborate, and communicate with applicable permittees for any proposed adjustments in livestock grazing."	See Public Concern Statement RD-1	
91	4	Required Design Features	N/A	This PEIS does discuss wildlife disturbance. I do not see specific instructions for the timing of fuel break construction and ongoing maintenance work to avoid or reduce this disturbance, or to avoid harm to wildlife during breeding or migratory activities. The addition of requirements and procedures used to avoid wildlife disturbance needs to be added to this PEIS.	See Public Concern Statement RD-1	
100	2	Required Design Features	N/A	We recommend that the PEIS describe the approach the BLM will take to ensure that District and Field staff are adequately trained (online training, workshops etc.) to implement design feature #5's commitment to "use best available science when designing and implementing fuel breaks."	See Public Concern Statement RD-1	
131	42	Required Design Features	N/A	Best management practices should be used to protect burrowing owl nest sites during any fuel break construction and maintenance activities, because the burrowing owl is a protected species under the Migratory Bird Treaty Act. Burrowing owl nest sites should be avoided with a buffer of 250 feet during the breeding season from March to August.	See Public Concern Statement RD-1	
131	91	Required Design Features	N/A	Design Feature 45 states, "[i]n sage-grouse Biologically Significant Units occurring within Priority and Important Habitat Management Areas, ensure that sagebrush treatments do not lead to a soft or hard habitat trigger trip," yet BLM provides no specific information on how it will ensure treatments do not result in habitat triggers being met. Fuel breaks and other treatments should count toward a disturbance cap and should not be permitted in areas that have already reached soft or hard ARMPA habitat triggers, or where the proposed projects could feasibly lead to a habitat trigger trip.	See Public Concern Statement RD-1	
137	6	Required Design Features	N/A	Design Feature #44 in Appendix D identifies a seasonal restriction on treatment activities in greater sage-grouse "breeding habitat" during the "breeding season". However, in recent SF-299 applications with the BLM in Priority Habitat Management Areas and General Habitat Management Areas, MI. Wheeler Power and other Nevada rural electric utilities have been required to observe seasonal restrictions for lek habitat (March I - May 15), early brood-rearing habitat (May 15 - June 15), late brood-rearing habitat (June 15 - September 15), and winter habitat (November 1 - February 28). Please clarify why the BLM's treatment activities are not held to the same standard as MI. Wheeler Power's and other Nevada rural electric utilities in building and maintaining its infrastructure.	See Public Concern Statement RD-1	

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110	6	Required Design Features	N/A	Design Feature #44 in Appendix D identifies a seasonal restriction on treatment activities in greater sage-grouse "breeding habitat" during the "breeding season". This vague definition of habitat cannot be correlated to the Nevada and Northeastern California Greater Sage-Grouse Draft Resource Management Plan Amendment/Environmental Impact Statement (RMPA); which identified Priority Habitat Management Area, General Habitat Management Area, and Other Habitat Management Area. Please edit Design Feature #44 to align with the RMPA.	See Public Concern Statement RD-1	
137	5	Required Design Features	N/A	Design Feature #44 in Appendix D identifies a seasonal restriction on treatment activities in greater sage-grouse "breeding habitat" during the "breeding season". This vague definition of habitat cannot be related to the Nevada and Northeastern California Greater Sage-Grouse Draft Resource Management Plan Amendment/Environmental Impact Statement (RMP A); which identified Priority Habitat Management Areas, General Habitat Management Areas, and Other Habitat Management Areas. Please edit Design Feature #44 to be more in line with the RMPA.	See Public Concern Statement RD-1	
125	20	Required Design Features	N/A	IDFG recommends the following implementation guideline to minimize disturbance to lekking sage-grouse: Fuel break construction and maintenance would not be allowed from 6:00 p.m. to 9:00 a.m. within 1 km of occupied sage-grouse leks during the breeding season in order to minimize disturbance to lekking birds (Idaho Sage-grouse Advisory Committee 2006, pages 4-70). This guideline would be applied from (approximately) March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats.	See Public Concern Statement RD-1	
97	12	Required Design Features	N/A	Page D-5, Targeted Grazing: point #20 (45 PDF) Edit the following sentence to reads as follows: "All new seedings of grasses and forbs should not be grazed until, at least, after the end of the second growing season, or when fuel break objectives are met to allow plants to mature and develop robust root systems." Not all landscapes need to be rested for a full two growing seasons and some landscapes need to be rested for longer. Removing the language requiring the discontinuation of grazing until after at least two growing seasons would provide the BLM with flexibility to monitor the needs of the landscape on a site specific level.	See Public Concern Statement RD-1	
97	6	Required Design Features	N/A	Page D-5, Vegetation and Invasive and Noxious Weeds: Applicable Resources point #23 and #24 (45 PDF) Edit to read as follows: "CULT, FW, SD, SSS, VEG, LG" Livestock grazing is a beneficial management tool when combatting noxious weeds. 6 Livestock grazing can suppress invasive annual grasses and control or even eliminate noxious weeds. 7 The inclusion of livestock grazing as a potential management tool for invasive and noxious weeds in this section will help benefit future projects.	See Public Concern Statement RD-1	
110		Required Design Features	N/A	Design Feature 45 states, "[i]n sage-grouse Biologically Significant Units occurring within Priority and Important Habitat Management Areas, ensure that sagebrush treatments do not lead to a soft or hard habitat trigger trip," yet BLM provides no specific information on how it will ensure treatments do not result in habitat triggers being met. Fuel breaks and other treatments should count toward a disturbance cap and should not be permitted in areas that have already reached soft or hard ARMPA habitat triggers, or where the proposed projects could feasibly lead to a habitat trigger trip.	See Public Concern Statement RD-1	
97	3	Required Design Features	RD-2	Page D-4, Targeted Grazing (44 PDF) 5th Bullet Point The BLM should use the 2018 Utah Bighorn Sheep Statewide Management Plan for any issues related to bighorn sheep and also consult the Utah Division of Wildlife Resources (UDWR), as well as UDAF when handling any issues between bighorn sheep and domestic sheep.	The BLM should use the 2018 Utah Bighorn Sheep Statewide Management Plan when separating bighorn and domestic sheep.	As stated in Section 1.4 of the Final PEIS, the BLM will consider any applicable non-BLM policies, plans and programs. Management of domestic sheep will be in conformance with BLM Manual 1730, Management of Domestic Sheep and Goats to Sustain Wild Sheep (see design feature 47). The manual includes direction to coordinate with state wildlife agencies and use of local management plans to inform decisions.

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97	7	Required Design Features	N/A	Page D-8, Wildlife and Special Status Species (Wildlife and Plants): point #47 (48 PDF) Edit to read as follows: "Manage domestic sheep grazing to continue while minimizing contact between domestic sheep and desert and Rocky Mountain bighorn sheep, using the management tools and strategies described in the 2018 Utah Bighorn Sheep Statewide Management Plan, with BLM Manual 1730, Management of Domestic Sheep and Goats to Sustain Wild Sheep." Detailed management tools and strategies are described in the 2018 Utah Bighorn Sheep Statewide Management Plan and the implementation and adherence to this Management Plan needs to be stated in this section. Physical separation of domestic sheep and bighorn sheep such as fences and topography reduce the risk of contact. The known pathogen from domestic sheep that causes illness to bighorn sheep has also been found among other wildlife species as well. 8 This shows that domestic sheep are not the only species that possess and can spread the harmful pathogen to bighorn sheep. 9 Reductions in livestock AUMs and allotment closures should always be a last resort for management strategies and should be done in coordination with the applicable permittees.	See Public Concern Statement RD-2	
57	19	Required Design Features	RD-3	Removing livestock grazing from an entire unit to allow an extremely small area of that unit to rest and establish will do more harm that can be offset by a successful fuel break. The risk of a return fire in areas with increased fuel loads is too great. If there is a concern that livestock will gather in the newly seeded areas temporary fencing, mineral supplementation, or strategically placed/developed water sources can be implemented to mitigate livestock movement. Continued livestock grazing is critical not only to the economic health of the grazing permittees, but to the health of the ecosystem. Livestock grazing that is properly managed can reduce the fuel loads without damaging plant communities. Dormant season grazing is an effective tool in reducing fuel loads with minimal impact on established plants	Some design features are overly burdensome and would cause new impacts, while others would be inadequate to protect resources.	The BLM has incorporated Design Features into the PEIS (Appendix D) to minimize the likelihood for impacts associated with fuel break construction and maintenance. Several commenters suggested design features that are already included in the Draft PEIS in Appendix D. The BLM considered the suggestions received to revise the Design Features; several have been revised, including Design Features 21 and 44 of the Final PEIS. Additional analysis has been included in the Final PEIS Section 4.7, Wildlife, regarding the potential for habitat fragmentation. In addition, any Design Features in existing resource management plans, including the Approved Resource Management Plan Amendments for the Greater Sage-Grouse, would be adhered to, as applicable (see Section 2.5.5 of the Draft PEIS). These include guidance for fuel breaks, such as strategic placement along roads and near existing restoration investments.
57	16	Required Design Features	N/A	DF 19 is quite comprehensive. However, subpoint 3 states that "rest from regularly permitted grazing may be necessary in order to accomplish targeted grazing objectives". DF 20 states that areas may require at least 2 seasons of rest after seeding. We categorically object to any rest in pastures where fuel breaks are being installed. The entire purpose of creating these fuel breaks is to decrease the amount of vegetation that will become fuel load on the landscape.	See Public Concern Statement RD-3	
57	21	Required Design Features	N/A	The monitoring burden associated with the graduated use plan described in the EIS is significant and is not achievable with current agency workload requirements and budget constraints.	See Public Concern Statement RD-3	
131	38	Required Design Features	N/A	Design feature 44 prohibits fuel break construction and maintenance in sage-grouse breeding habitat during the breeding season. While important, this design feature would only address short-term disturbance in sage-grouse breeding habitat, not the long term impacts of habitat fragmentation.	See Public Concern Statement RD-3	
131	89	Required Design Features	N/A	Design feature 44 prohibits fuel break construction and maintenance in sage-grouse breeding habitat during the breeding season. While important, this design feature would only address short-term disturbance in sage-grouse breeding habitat, not the long term impacts of habitat fragmentation.	See Public Concern Statement RD-3	
57	20	Required Design Features	N/A	The utilization levels described in Section D.1 Graduated Use Plan will make targeted grazing almost impossible to use as a treatment method. In most grazing permits, utilization levels outside of riparian areas are greater than 30% and as high as 70% for non-native seeded communities. While the idea of decreasing utilization outside of the targeted area is understandable when compared to the desired use in the fuel break, utilization levels should never be less than that allowed by the grazing management plan or permit. A utilization standard of 16-30% for perennial grasses is exceptionally low and will not provide the desired fuel load management. It may require that livestock be removed from a pasture or allotment before appropriate utilization has been reached in the management unit which will actually result in increased fuel loads.	N/A	The comment equates permitted grazing with targeted grazing. Utilization levels for a given fuel break will be set as part of the targeted grazing plan and will be site specific and objective driven (see design features 19-22 in Appendix D of the Draft PEIS). Permitted livestock grazing will not be impacted at the allotment level per Section 2.2.4 of the Draft PEIS.

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24	1	Suggestion for specific change to an alternative	SC-1	You describe Shaded Fuelbreaks in footer point 9 "Fuelbreaks in Phase 3, tree removal would be needed and a minimum tree spacing of two times the average tree height. This would reduce opportunities for crown fire initiation on flat to gently rolling slopes. On steeper slopes(>15%) tree spacing requirements would increase. Limbing may also be necessary to reduce ladder fuel components." However, Shaded Fuelbreaks are not defined as a treatment option. Should this be included in chapter 2?	Shaded fuel breaks should be included as another type of fuel break in the PEIS.	Shaded fuel breaks would be most appropriate within Phase III pinyon-juniper. Given that the tools analyzed in the PEIS could be the same tools used to create a shaded fuel break and a shaded fuel break is not specifically prohibited, no additional analysis is necessary.
25	1	Suggestion for specific change to an alternative	N/A	You describe Shaded Fuelbreaks in footer point 9 "Fuelbreaks in Phase 3, tree removal would be needed and a minimum tree spacing of two times the average tree height. This would reduce opportunities for crown fire initiation on flat to gently rolling slopes. On steeper slopes(>15%) tree spacing requirements would increase. Limbing may also be necessary to reduce ladder fuel components." However, Shaded Fuelbreaks are not defined as a treatment option. Should this be included in chapter 2?	See Public Concern Statement SC-1	
20	2	Suggestion for specific change to an alternative	N/A	Was there a reason why shaded fuelbreaks were not included in this document? Utah and the other woodland/forested areas still use them along the highways.	See Public Concern Statement SC-1	
98	1	Suggestion for specific change to an alternative	SC-2	We have many general and specific concerns with the BLM proposals and analysis of environmental impacts in the draft PEIS on Nevada public lands and resources. Total miles of proposed fuel breaks affecting Nevada are not disclosed in the PEIS. From Table 1-2 - Analysis Area Acres, we calculated that 46.05% of the acres of proposed fuel breaks are in Nevada which would be close to 5,065 miles of the proposed additional fuel breaks in Nevada. Our comments are specific to this area.	The PEIS should include state-specific information regarding the proposed acreage of fuel breaks	Acres by state have been added to the state-specific alternatives maps in Appendix A. ROWs have been described in Chapter 2 and analyzed as potential treatment locations in Chapter 4. Construction of a fuel break along a specific ROW would follow the existing decision for that ROW and coordination with the ROW holder would occur during project-specific planning efforts. BLM can only disclose potential miles of mapped roads and ROW that would be available for treatment. There are roads not mapped that are potentially available for treatment for which the number of miles are not available. This has been clarified in Appendix A. Therefore, providing a maximum number of miles would not be accurate or precise at this programmatic level.
98	14	Suggestion for specific change to an alternative	N/A	Very little information is provided in the PEIS about ROWs and who is responsible for vegetation management, including the costs for proposed fuel breaks. How many of these proposed 11,000 miles of fuel breaks are within BLM approved ROWs in Nevada? How many of these ROWs cover Nevada level 1, 3, and 5 roads? Are ROW holders in Nevada responsible for the maintenance of ROWs, including managing invasive weeds and other maintenance costs? How are these requirements enforced by the Nevada BLM? Would BLM have to amend ROW permits to use these ROWs as fuel breaks if this is not currently included in ROW grants in Nevada?	See Public Concern Statement SC-2	
125	11	Suggestion for specific change to an alternative	N/A	The draft PElS encompasses a large area, the Great Basin. The State of Idaho would be able to better analyze this document if there were sections regarding individual state decisions as well as the entire planning area.	See Public Concern Statement SC-2	
98	31	Suggestion for specific change to an alternative	SC-3	Sec. 4.6.4: Table 4-6 lists the acres of habitat types available for potential fuel break construction by alternatives, including acres of sagebrush habitat - Alt. B - 329,000, Alt. C - 509,000, and Alt. D - 710,000 acres. The PEIS states (p. 88) that "Direct effects from the use of manual and mechanical treatments for fuel break establishment on sagebrush-dependent wildlife species be limited because sagebrush would not be treated under this alternative (Alt. B)." Does this statement mean that while thousands of acres of sagebrush habitat are available for fuel break construction under Alt. B, the BLM will not actually build fuel breaks on any of these "available" acres?	The PEIS should clarify the acreage of fuel breaks that could be constructed under Alternative B, given the limitations on sagebrush treatment in that alternative.	Table 2-3 and Section 4.7 of the Final PEIS have been revised to clarify the potential for fuel break construction under Alternative B.
17	1	Suggestion for specific change to an alternative	SC-4	Should be specific in noting that National Trail data will be obtained from the trail Administrator(s). We would also suggest that the exclusion area be defined as within the management corridor (where such corridors have been identified via BLM Manual 6280) or within the viewshed/up to 3 miles (whichever is less).	The PEIS should further delineate the proposed exclusion areas.	The exclusion area for NSHTs at the site level would be established by referencing the trail-wide Comprehensive Plan that was developed by the trail administrator(s). The exclusion area will also be established by referencing the current field office Resource Management Plan and the identified NSHT management corridor. This has been clarified in Section 2.2.1 of the Final PEIS.

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122	7	Suggestion for specific change to an alternative	SC-5	we suggest that the BLM should still analyze the strategic value of highway fuel breaks. The BLM should consider how many fires and of what size have occurred along Maintenance Level 5 roads and assess how successful fire suppression efforts have been. If large and destructive wildfires do not originate from these types of corridors, then the return on investment for implementation and perpetual management would be unacceptably low.	The PEIS should better define which roads and ROWs fuel breaks would be constructed along.	Roads and ROWs along which fuel breaks could be created and maintained under each alternative are summarized in Table 2-3 in the Draft PEIS. These roads are displayed for the entire project area in Map 2 and for each state in Maps 2a through 2f. Appendix A has been revised to acknowledge that some datasets may be incomplete, including those for roads and ROWs. As such, actual treatment locations and methods would be based on site-specific conditions. Definitions of each maintenance level are described in the glossary in Appendix B and additional details have been included in Section 2.2.6 of the Final PEIS. Further details about the road maintenance levels are available in the BLM Manual 1626, Travel and Transportation Management Manual.
94	1	Suggestion for specific change to an alternative	N/A	Need to include firebreaks along County roads as they get the most use of all roads across BLM lands and have the greatest potential of human caused fires.	See Public Concern Statement SC-5	
110	4	Suggestion for specific change to an alternative	N/A	Review of available literature found no consistency and vague distinctions in the descriptions of road maintenance levels. WREC's Geographic Information System specialist, operations manager, government affairs manager and distribution system engineer were unfamiliar with this classification of roads. Conversations with local field office personnel also found that distinctions between road maintenance levels were essentially unknown. As a result, WREC was unable to discern criteria that warranted the exclusion of road maintenance levels 2 and 4. WREC recommends that this deficiency be addressed.	See Public Concern Statement SC-5	
98	15	Suggestion for specific change to an alternative	N/A	Sec. 2.4: Since roads in Nevada are generally in BLM ROWs, clarify the amount of fuel breaks proposed along roads in BLM ROWs, the fiscal responsibilities of ROW holders for vegetation maintenance, and whether ROW grants must be altered to allow ROWs to be used as fuel breaks. See #8 above.	See Public Concern Statement SC-5	
138	4	Suggestion for specific change to an alternative	N/A	It is not clear from the maps provided, or from the narrative, whether BLM's intent is to construct fuel breaks on BLM lands adjacent to roads which are claimed by the County under RS 2477 or on roads which cross private lands. If that is the case, the BLM must analyze the potential impact of using public funds on private land relative to establishment of a public ROW per Idaho Statutes. The EA needs to note that any landowner choosing to participate in the fuel breaks project should seek legal assistance before completing any agreement to allow BLM fuel break road work on private land. At the least, the BLM should clearly state that any BLM road work done on private land would be solely for the purpose of creating fuel breaks and allowing access by firefighting equipment only during an active fire suppression effort. BLM road work would not occur on private land without the express written consent of the landowner specifying the limits of the work, the purpose of the work, the frequency of potential maintenance work and advanced notice to and consent of the land owner as to the date and time of any work to be done on such roads.	See Public Concern Statement SC-5	
93	5	Suggestion for specific change to an alternative	N/A	* Clarify financial and operational long-term maintenance responsibilities for expanded "brown strips" or other firebreak projects adjacent to ROWs.	See Public Concern Statement SC-5	
92	1	Suggestion for specific change to an alternative	N/A	The fuel breaks would be placed along a subset of available linear features, such as roads and rights-of-way (ROWs) on Bureau of Land Management (BLM)-administered lands within sagebrush communities. (Introduction, Section 1.1, (pg. 1, Paragraph 4)oComment: For clarity, please disclose if fuel breaks along roadways would be placed within existing road easements (when present), held by other entities (e.g. state departments of transportation, counties, etc.) or directly outside of them?	See Public Concern Statement SC-5	
110	3	Suggestion for specific change to an alternative	N/A	The preferred alternative identifies BLM owned roads under maintenance levels 1, 3, and 5, and BLM-administered ROW as eligible for fire breaks and to receive treatment activities. However, the PEIS does not describe in detail what kinds of BLM-administered ROW would be considered. Map 2 - Roads and Right-of-Ways identified transmission lines and pipelines in the legend; however distribution power line ROW are not identified in the PEIS. If the intent was to include distribution power line ROW as treatment areas, that inclusion should be clarified. If the intention was to exclude distribution power line ROW, WREC respectfully requests that such a decision be reconsidered.	See Public Concern Statement SC-5	

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102	2	Suggestion for specific change to an alternative	SC-6	After reviewing Alternatives C and D, it appears that most of the level 1 and level 3 miles of fuel breaks are not connected and are close to the Colorado border which is excluded from the PFEIS area. As a result, Utah areas in the Browns Park, Goslin Mountain, Bender Mountain and Sears Creek are entirely disconnected from any fuel breaks in Colorado. Putting in fuel breaks in Utah (e.g. Browns Park, Goslin Mountain, Bender Mountain and Sears Creek) without connecting those fuel breaks is very ineffective. The Coalition would make one recommendation. Each of the proposed fuel breaks need to be compared to vegetation, landscape features, habitat, and livestock grazing allotments in Colorado and Wyoming. To do so, the BLM should coordinate with BLM in Wyoming as well as state and local governments to ensure that fires can be mitigated and defensible space can be created across administrative boundaries.	The PEIS should include coordination across administrative boundaries to improve fuel break connectivity.	The BLM intends to coordinate across administrative boundaries, both with other BLM field offices and other land managers. This has been clarified in Sections 2.2.2 and 2.2.4 of the Final PEIS.
121	2	Suggestion for specific change to an alternative	SC-7	2.) Highest priority should be given to fuel breaks constructed along most heavily traveled routes where human caused fire ignitions are most common, avoiding 2-track routes at all costs.	Commenters recommended fuel breaks be prioritized in high risk or high value locations or in other areas with the highest likelihood to achieve objectives.	Details regarding the hierarchy for fuel break placement have been added to Section 2.2.4 of the Final PEIS.
109	14	Suggestion for specific change to an alternative	N/A	12) Based on the maps provided, it seems that there is not a lot of pinyon/juniper in need of fuel breaks, etc. The BLM could easily drop this part of the assessment for pinyon/juniper opportunities for fuel breaks to save money and time to focus on the invasive annual grass wildfire issues. 13) Based on the maps, the fuel breaks are inappropriately placed. It is odd that the proposed fuel breaks are not located in areas where invasives cover are high and where invasives have a high cover within the shrub community. These are the areas where the fuel breaks should be placed to control or reduce high fire risk. All the science shows that these are the areas where fire risk is the highest. Areas proposed for fuel breaks have low invasives cover and low risk of fire.	See Public Concern Statement SC-7	
68	12	Suggestion for specific change to an alternative	N/A	Focus juniper removal on areas where they are just starting to encroach, and where healthy native grass, shrub, and forb communities are still present. This will help minimize the risk of cheatgrass invasion. Rachel Williams, Bruce Roundy. 2016. Ecological Consequences of Pinyon and Juniper Removal; Six Years Later. SageSTEP News. 1 Issue 30, Spring 2016. http://www.sagestep.org/pdfs/newsletter/SageSTEP_News_Issue_30.pdf	See Public Concern Statement SC-7	
122	8	Suggestion for specific change to an alternative	N/A	TNC's primary concern with Alternative C is that, as elaborated above, the PEIS lacks a strategic framework to inform where the BLM should install fuel breaks with quantitative evidence to justify that locations are beneficial to altering landscape fire dynamics and improving firefighting logistics. Stratifying fuel break locations by maintenance level implies that every road segment within a category is equally strategic, which is an unacceptably broad justification. Given the magnitude of disturbance proposed by this PEIS and the resources required to perpetually maintain a fuel break once established, the BLM should put considerable resources into quantifying the relative benefit of all proposed locations to select the most valuable project locations. There are models currently available for the BLM to incorporate into a fuel break strategic framework, for example Circuitscape modeling6. As the BLM develops such a tool or utilizes existing tools, it should consider prevailing weather patterns, ignition probability, topography, and firefighting response times among its variables. Importantly, TNC could support the tools and terms within Alternative C if a strategic framework directed fuel break locations instead of simple road classifications. We recognize that selections made by predictive modeling need to be verified and prioritized by site-specific considerations. Site-specific conditions can greatly affect the cost-benefit analysis of a location. For example, heavily invaded annual grass sites have a much lower disturbance cost than intact sagebrush sites with perennial understories. In contrast, a strategic location from a landscape perspective might be unacceptable to firefighters an anchor point for suppression efforts. This alternative should be explicit and specific regarding prioritization metrics, including existing vegetation condition, restoration need of the surrounding landscape, and perpetual maintenance costs	See Public Concern Statement SC-7	

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106	7	Suggestion for specific change to an alternative	N/A	In this vein, the BLM might consider an alternative that uses the resource-value-based approach to fire management that is employed by the NPS. In a park, the NPS maps all of the high-value resources of the natural, cultural, and built environments and then develops and implements a tailored strategy for protecting each of those resources at each location. Protective measures can include, but are not be limited to, fuel breaks and other vegetation management. Then, regardless of the ignition source, when a fire occurs, it is allowed to burn until it is predicted to potentially encroach on a high-value resource. At that time, the active measures (if any have been prescribed) for resource protection at that specific site are implemented. Using this strategy, the NPS has an excellent record of protecting high-value resources, ranging from isolated groves of old-growth, unique native vegetation to visitor use areas that contain fire-susceptible, historical wooden buildings in settings ranging from dense to scattered. Although the NPS is perpetually underfunded (like all of our nation's land management agencies), it achieves this level of protection with minimal impact to the overall park settings that make our national parks a world-renown treasure. This approach represents a distinctly different, reasonable alternative that was not considered in the fuel breaks draft EIS.	See Public Concern Statement SC-7	
56	4	Suggestion for specific change to an alternative	N/A	We also completed green strips on both sides of the roads. Especially north-south roads, since fires typically ran from the west to the east. What we found in the rocky desert though was that when a 100,000 acre fire was racing east, we limited our fire suppression tactical plans. If we wanted to use back fires to build wider strips, the heavy engines had to bounce around in the rocks a couple hundred feet west of the road where there was enough fuel to carry a burn. However, that made placing anchor points hard to accomplish, placed fire fighters in an unsafe position to move quickly and we experienced many flat tires in those lava rock circumstances. Again, being a safety issue. Therefore, your fuel breaks on both sides of the road, no matter which method you engage needs to be strategically thought out. Because reducing fire starts from the road is different than reducing fire threats coming at you at potentially great speeds. So what we did is place some breaks only on the east side of the roads so the engines could stay on the road for suppression activities and their safety. Another issue I was never able to get traction with was fire starts off of major roads or highways. You have the data to show historic fire starts from highways, interstates, etc. What I tried to do was use the data you have to prioritize treatment areas. If fires typically start along a 1/2 mile stretch of a road than BLM should work with highway departments, highway districts or FHWA to coordinate fuel reductions in those stretches and they should be a very high priority, since human starts are such a high percentage of fire starts. You need the ability to transfer fuel reduction funds to these agencies to accomplish work for you, to protect public resource values and private property. Your Rural Fire Protection Associations would be another avenue to complete this work, since they have equipment and desire to help.	See Public Concern Statement SC-7	
68	24	Suggestion for specific change to an alternative	N/A	"Develop an alternative that avoids heavy equipment within designated Wilderness, Wilderness Study Areas, ACECs, designated and eligible wild & scenic rivers, potential wilderness areas, and other citizen inventories of special places. ... Fuel breaks could be a bigger problem than fire if it facilitates spread of invasive weeds. This MUST be avoided. This will require minimizing soil disturbance, retaining healthy native plants communities that are resistant and resilient to invasives. Focus treatments on areas where invasive annual grasses are a significant problem. Do not fragment existing high quality sage steppe habitat by criss-crossing it with fuel breaks.	See Public Concern Statement SC-7	
121	11	Suggestion for specific change to an alternative	N/A	Those areas of high resistance and resilience should be prioritized for treatment last. 10.) Wherever possible, disturbed areas should be treated preferentially to intact areas of pristine habitat.	See Public Concern Statement SC-7	
57	17	Suggestion for specific change to an alternative	N/A	Areas in the Wildland Urban Interface (WUI) have increased the need for fuel breaks due to the greater risk to human health and structures. Fuel break installation and management should be focused on areas near human habitation and areas identified as key wildlife habitat.	See Public Concern Statement SC-7	
47	3	Suggestion for specific change to an alternative	N/A	Priority areas should protect critical wildlife habitat with an emphasis on high-use areas by humans where wildfires are more likely to be started.	See Public Concern Statement SC-7	

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91	5	Suggestion for specific change to an alternative	SC-8	Construction and maintenance of fuel breaks along low traffic volume routes should not be considered, for these reasons: 1. As noted on page 83, fuel breaks on low traffic routes, that is, maintenance level 1, 3, or ROW, will likely cause greater wildlife disturbance than such work on maintenance level 5 and other high traffic roads. 2. Low traffic volume routes should continue to be managed as such. Construction of fuel breaks will change the character of such routes and encourage more traffic. 3. Part of the character of low traffic volume routes is the wild and scenic impression they have and provide to travelers and visitors of the landscape. Construction and maintenance of fuel breaks will change the look of the landscape as well as the character of the road.	Fuel breaks should not be constructed in certain areas, such as along low volume roads and in wildlife corridors.	The Draft PEIS identified Analysis Exclusion Areas in Section 2.2.1; these were identified based on the greater potential for adverse effects in these areas. Text has been added to Section 2.2.4 of the Final PEIS describing the hierarchy for fuel break placement. Any adverse impacts will be addressed through siting, design features, and project objectives.
66	1	Suggestion for specific change to an alternative	N/A	Although co-location of fuelbreaks with roads and already established linear right of ways makes the most sense in the vast majority of situations in comparison to new disturbance, these areas are also likely to be made less valuable to sage-grouse, but also in some cases will likely become considerable barriers to movements of sage-grouse through reduced cover and increased predation. We understand the goal of firebreaks also reducing the risk of much larger habitat losses, but do recommend working with ecologists to determine whether in some cases corridors of intact (or more intact habitat than surrounding fuel break areas) should be left to allow ample cover for movements of sage-grouse to occur with less vulnerability to predation. With so much data informing sage-grouse and likely other wildlife movements in certain areas, important corridors would in many cases be relatively easy to determine. Fuel or firebreaks could likely be addressed when a fire is approaching as opposed to potentially many years beforehand in the instance a small corridor of intact habitat was left along a road.	See Public Concern Statement SC-8	
98	19	Suggestion for specific change to an alternative	SC-9	Sec. 2.5.1: The description of Alternative A is missing here - only 2 sentences and 31 words is insufficient. It is also not clear that Alt. A is a no action alternative, since existing fuel breaks in Nevada (from 3 to over 3000 fuel break projects) will still need to be maintained while BLM is proposing that new fuel breaks in Nevada.	The PEIS does not adequately describe the No Action Alternative or the extent of existing fuel breaks in the project area.	The No Action Alternative is described in Section 2.5.1 of the Draft PEIS. The Final PEIS has been updated to show existing fuel breaks for the entire project area in Map 10 and for each state in Maps 10a through 10f. A new appendix, Appendix K, has been included in the Final PEIS, which presents additional information about existing fuel breaks in the Great Basin and their effectiveness. Section 3.1 has been revised to include more information about existing fuel breaks. Further, the analysis of the No Action Alternative in Chapter 4 has been augmented to better capture the impacts of the existing fuel breaks in the project area.
121	6	Suggestion for specific change to an alternative	N/A	5.) This PEIS must document an analysis of the effectiveness of those fuel breaks already implemented within the proposed program area. -PEIS-Sec.-3.1-pg.25 states, "Fuel break treatment history in the project area, shown in Map 8, influences fire behavior and provides direct attack suppression opportunities at a site-specific level," this statement is not expounded upon at all. In fact, if one examines map 8 a clear overlap between the fuel breaks in place and that of last year's Martin fire exists. Surely, some commentary on their effectiveness could be given based on this fact. Furthermore, this PEIS readily admits that crown fires and extreme surface fires such as the Martin fire would likely not have fuel break widths large enough to slow fire movement enough to be attacked directly. (PEIS-Sec.4.2.2-pg.49-50)	See Public Concern Statement SC-9	
57	18	Suggestion for specific change to an alternative	N/A	Even though some fuel breaks exist in the project area, the documentation of existing breaks seems limited. We know of at least one instance where a wildland fire burned through existing mowed fuel breaks, but the fire crews were unaware of their location and therefore unable to use them as part of their suppression strategy. All existing fuel breaks should be mapped with up to date information on their maintenance,and this should be information that is readily available to fire suppression crews.	See Public Concern Statement SC-9	
98	28	Suggestion for specific change to an alternative	N/A	Sec. 4.2.2: Table 4.2 does not disclose any fuel break characteristics and programmatic outcomes of Alternative A, despite the BLM's experience with potentially thousands of miles of existing fuel breaks in Nevada. It would be helpful to be able to use BLM's actual experiences with existing fuel breaks in Nevada to inform and assist the public in understanding and comparing possible outcomes of alternatives A, B, C, and D on Nevada public lands and resources.	See Public Concern Statement SC-9	

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95	3	Suggestion for specific change to an alternative	N/A	We want to stress that whatever provisions are needed for the PEIS decision, Sage Grouse habitat areas should not be included as requiring further analysis before installation of critical fuel breaks. Sage Grouse habitat areas need maximum protection for fuel breaks and strategy consideration should also include the potential on not limiting fuel breaks to link to only linear features (roads and rights of way). Resource protection may require implementation of fuel breaks which provide the functions for areas where available linear features are not available.	N/A	Acres of potentially affected sage-grouse habitat areas and analysis of these effects are presented in Section 3.7 and Section 4.8 of the Final PEIS. Although the PEIS analyzes impacts of fuel breaks along roads and ROWs, the PEIS does not prohibit fuel break projects from being proposed outside of these areas within the project area. The extent to which this analysis could be tiered to or incorporated by reference for such projects would be determined on a project-by-project basis.
57	10	Suggestion for specific change to an alternative	N/A	There is little discussion of the additive value of using methods in combination with each other. For example, it would be advantageous to use targeted grazing to reduce annual grass prior to seeding a green strip. A green strip could be successfully maintained or inter-seeded using livestock to reduce biomass and incorporate seed into the soil. This is especially true in remote areas with limited access (i.e., Maintenance Level 1 roads).	N/A	Chapter 4 of the Draft PEIS analyzes the tools available for fuel break creation and maintenance, including several combinations of treatments that would be likely in certain scenarios. The PEIS need not analyze every combination of treatment types, since the desired outcome for each fuel break type would remain the same and thus the impacts from the treatments were adequately captured and disclosed.
57	22	Suggestion for specific change to an alternative	N/A	Post-fire reclamation practices are also not addressed in the EIS. We would recommend including a policy where fuel breaks are incorporated into fire rehabilitation programs by eliminating flammable species such as sagebrush in specific treatment locations.	N/A	Additional details regarding implementation of the PEIS, including incorporation of post-fire reclamation programs, would be considered during policy development subsequent to the ROD.
131	16	Suggestion for specific change to an alternative	SC-10	If BLM would increase this buffer distance in its analysis based on new criteria derived from research on the Camp Fire in California, the alternative could fulfill the purpose and need of protecting communities much more effectively than cutting fuel breaks into remote wildlands, where fire crews often cannot reach ignitions in time to control and suppress wildfires.	The BLM should change the width of fuel breaks in the PEIS.	The BLM analyzed the breadth of fuel break widths, from 0 feet to 500 feet (for certain fuel break types). The fuel break widths needed were adequated summarized in Table 4-3 and the methodology presented in Appendix L. Additional clarification has been added to Appendix L to explain how the safe separation distance was calculated. Although the PEIS does not analyze impacts of fuel breaks larger than 500 feet, the PEIS does not prohibit larger fuel break projects from being proposed within the project area. The extent to which this analysis could be tiered to or incorporated by reference for such projects would be determined on a project-by-project basis.
57	6	Suggestion for specific change to an alternative	N/A	It is critical to have the correct width of fuel breaks for any fuel management project. All potential treatments have a minimum of '0' feet in the alternative discussions. Table 4-3 identifies the minimum width of fuel break as 96 feet for all vegetation states except recently burned Phase 1 pinyon-juniper stands. The shrub vegetative states were analyzed up to 500 feet. An appropriate minimum fuel break for the Preferred Alternative would be 96 feet based on the provided analysis	See Public Concern Statement SC-10	
93	4	Suggestion for specific change to an alternative	N/A	Provide GIS data sets related to cover type analysis and potential fuel break locations to utilities to help further align utility vegetation management practices with the PEIS objectives	N/A	Maps for the alternatives were made available through an interactive map feature on ePlanning which allowed for review of site-specific areas by the public. Further, GIS data sets were made available to anyone who requested them during this effort.
63	1	Suggestion for specific change to an alternative	N/A	When establishing green strips of native plants to create fuelbreaks alongside roads, these native plants (and potentially nonnative plants offering utility) could serve a further purpose of providing an available seed bank for wildfire restoration. We recommend this purpose be explored and fine-tuned as a potentially effective method to increase available seed in the Great Basin.	N/A	Seed collection is outside the scope of this PEIS and would not aid in meeting the purpose and need. Any potential for seed collection would continue to be managed under related plant conservation programs.

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56	1	Targeted Grazing	TG-1	I see and appreciate your use of targeted grazing when it is not detrimental to other resource values. It is a cheap alternative. To reduce fuels levels to like 400 lbs/acre required intensive work by the animal owner and extra protein to keep the animals healthy. Not everyone can have the luxury to pay for that. Will you compensate the animal owner in any way? I don't see how they all may be able to participate without at least some compensation. You pay for other treatments, this one is no different. If your EIS doesn't allow it some BLM staff and managers will interpret that as not allowed. Going back to the recently released Draft FRFO RMP, they barely talk about targeted grazing and historically I have seen that they do not want to use it. So like every Field Office, it is up to the local manager and their staff to actually implement your final decision. How do you influence that? Another issue you should address is a manageable percentage of use in grazing permits. The 2015 Jarbidge RMP and Draft FRFO RMP don't set desired utilization levels. It's left on a case-by-case basis so any number can be used by BLM, unless a permittee spends extensive funds to challenge it. In the old days it was typically 50%. So what I have seen is a reduction in grazing AUMs, with the FRFO stating they haven't given an increase in 20 years and this reduction will meet RMP levels of 50% as per the current 1987 RMP. This happened twice recently. Then the reduction was eliminated, versus placed in suspension. So those AUMs cannot come back since the Draft RMP limits use to the existing levels. Utilization last year in those two allotments ranged from 0-9.6% and 6.6-16.6%. That is raising your fuel levels dramatically, so the grazing permits numbers and dates are not assisting you in achieving your fuels goals. How is this EIS going to accomplish that flaw? Why is one program working against this and another working towards your overall goal? How do you manage your field offices in implementation of this important issue? Then I read that the Jarbidge RMP allocated up to 50% of annual grass production to livestock use. That tells me that BLM in this case is reducing fuels in their grazing permits. The draft FRFO RMP is not doing that, so they are against your proposed action again. Why are tax payers dollars being wasted by internal philosophy differences that could be resolved by one common goal?	The PEIS should provide additional detail regarding how, where, and when targeted grazing would be used for the creation or maintenance of fuel breaks.	Details regarding how targeted grazing would be used to create or maintain fuel breaks are described in Section 2.4.4 and text has been added to clarify that section. Design criteria to reduce impacts are found in Appendix D (see design features 21 through 24 of the Final PEIS); design feature 21 has been revised in response to comments. Section D.1 in Appendix D provides further details on how the graduated-use plan would be applied. Analysis has been added to Section 4.6 in the Final PEIS regarding the effectiveness of targeted grazing to reduce cheatgrass. As stated in Section 2.2.4, none of the alternatives would change permitted grazing in accordance with 43 CFR 4130.2. This includes, for example, AUMs, season of use, numbers and types of livestock, and temporary non-renewable use. Text has been added to that section to clarify how BLM will work with permittees. Additional details regarding implementation of the PEIS, including targeted grazing and coordination with permittees, will be included in the Record of Decision and specified during subsequent policy development. Potential partners and potentially affected stakeholders would be identified as projects are proposed.
57	13	Targeted Grazing	N/A	There was no indication in the EIS that Temporary Non-Renewable (TNR) use could be authorized in conjunction with fuel break establishment and maintenance. TNR could be used to allow changes in the season of grazing, livestock class and AUMs. Many BLM permits only authorize growing season use, but dormant season grazing could be extremely effective in reducing standing fuels while taking advantage of fall germination cheatgrass. Dormant season grazing significantly decreases cheatgrass seed-bank potential when compared to areas that have not been grazed (Foster et al.2015). Supplementation may also be beneficial and necessary in the fall and winter if cheatgrass is providing the bulk of the forage, in order to meet livestock's nutritional requirements (Foster et al. 2015).	See Public Concern Statement TG-1	
57	11	Targeted Grazing	N/A	The EIS does not adequately address the timing or intensity of grazing for proper fuel strip management, particularly as it applies to the management of annual grasses. A high level of grazing intensity is key to successfully lower annual grass fuel loads. Cheatgrass is very palatable to livestock and has high nutrient values at a vegetative state. Livestock will prefer this and select it over many perennial grasses in early spring throughout the Great Basin (Strand et al. 2014). In many cases unfortunately, grazing permits do not allow grazing at this early stage or at sufficient stocking levels where an impact could be made on annual grass communities.While grazing can be an effective tool, it cannot control annual grasses in a single season; several seasons of intensive grazing are generally needed to have an impact on annual grass communities. The amount of cheatgrass available for grazing varies annually because it is highly dependent on timing and amount of precipitation (Foster et al. 2015). A study in southern Idaho found that cheatgrass biomass varied tenfold depending on the annual precipitation from 452 lbs/acre to 4,344 lbs/acre between a dry and a wet year (Strand et al. 2014). To make grazing an effective management tool, it must be flexible enough to respond to variable annual moisture that affects the seasonality of plant growth and biomass levels.	See Public Concern Statement TG-1	
98	18	Targeted Grazing	N/A	Sec. 2.4.4: The effectiveness of using targeted grazing to meet fuel break objectives is not supported in scientific literature (Shinneman, D.J. et al, 2018), nor is it a practicable method to use on Nevada's portion of the 11,000 miles of fuel breaks. The criteria for its use is not disclosed in the PEIS.When would targeted grazing be prescribed - one or two weeks in the spring or fall to target cheatgrass or longer? How many livestock would be needed per mile of fuel breaks? What is the practical availability of that number of livestock for one or two weeks/year to graze fuel breaks? Will BLM pay permittees for targeted grazing, and, if so, how much? Does BLM have adequate staff to manage targeted grazing when BLM management of its existing grazing program is so underfunded and understaffed in Nevada and other Great Basin states?	See Public Concern Statement TG-1	

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57	14	Targeted Grazing	N/A	There was no clear mention of temporary water hauling capabilities, which will be necessary if the areas to be grazed are fenced. Use of troughs and hauling water to planned locations or the use of supplements such as mineral tubs may be required to achieve the desired use levels in the fuel breaks.	See Public Concern Statement TG-1	
46	2	Targeted Grazing	N/A	I am also extremely skeptical of the "targeted grazing" that is part of the plan to create fuel breaks. assume that cattle ranchers will be paid for the services of their cattle? How much and how effective are cattle as targeted grazers?	See Public Concern Statement TG-1	
57	23	Targeted Grazing	N/A	Additional clarity could be provided with regard to whose animals may be grazing in a fuel break. Will BLM use contract sheep or goats in a cattle allotment? Will existing permittees have an option to use their own livestock for fuel break treatments? Can grazing services be treated as part of an ecosystem services contract? Will permittees be expected to maintain any temporary fences installed for targeted grazing or will that be the responsibility of the grazer?	See Public Concern Statement TG-1	
89	2	Targeted Grazing	TG-2	Table 2.2 lists the preferred fuel break types for different areas. In each of these targeted grazing is one of the lower preferred methods. Elko County recommends reorganizing these charts so targeted grazing is made a higher priority. "Animals are most effective at treating smaller-sized live fuels and 1- and 10-hour fuels…" and can help disrupt the fuel ladder to keep flames lengths down.4 Targeted grazing is a favorable option not only in rural areas, where livestock is plentiful, but also "is often a favorable option in the wildland urban interface where homeowners are particularly concerned about fire risk. In these situations, people have heightened concern over herbicide use, are often intolerant of the noise and disturbance caused by mechanical options, and do not find prescribed fire an acceptable alternative so close to their homes."5 Because of its utility in both rural and more populated areas, and it relatively low cost compared to other treatments, Elko County recommends that targeted grazing be given a higher priority when choosing treatments.	The PEIS should allow for increased use of targeted grazing.	As described in Section 2.2.4, the alternatives would not change permitted grazing. Text has been added to that section for clarity. Table 2-1 (page 8 of the Draft PEIS) describes the function, potential locations, and considerations in implemented a targeted grazing fuel break. Table 2-2 further describes the priorities for the different types of fuel breaks for each vegetation state. These were developed with BLM interdisciplinary team input based on professional experience in the different vegetation states. The prioritizations shown in Table 2-2 are meant as guidelines; the decision whether to implement targeted grazing would be made based on a given project's objectives.
94	4	Targeted Grazing	N/A	Targeted grazing to reduce annual plants in identified fuel break areas is good in theory, however, the BLM would have to be more flexible on timing and intensity of grazing to make a positive impact and discourage annual weeds from producing seed. The BLM should consider incentives for grazers, such as range improvements, that would create more interest in such type of grazing. Restore suspended AUMs for grazing when monitoring shows vegetation objectives have been met and can support increased grazing. Although not directly related to a firebreak, proper grazing practices can help reduce dense stands of vegetation.	See Public Concern Statement TG-2	
138	5	Targeted Grazing	N/A	BLM could, however, make better use of currently available livestock numbers by granting more authority for flexible management to District and Field Managers. Granting authority to change grazing dates, in coordination with livestock operators, would better equip BLM management to anticipate and respond to fuel reduction needs. In addition to flexibility authority in regard to tum-out and movement dates, BLM managers should have authority to graze, without rest/rotation, those pastures which are predominantly cheatgrass. Providing more flexibility to BLM management to adapt/adjust grazing seasons/terms & conditions so as to react more quickly and effectively to changes in fuel loading from grazing season to season, or even within a grazing season would provide for much of the action needed to defeat the current fire cycles and impacts. These actions by BLM Managers need to be authorized under Categorical Exclusion or DNA authority.	See Public Concern Statement TG-2	
131	78	Targeted Grazing	TG-3	BLM should consider, for all action alternatives, extending the customary two-year posttreatment rest period and reducing post-treatment livestock numbers. Introduction of livestock after juniper removal has not received adequate scientific scrutiny, and the two-year rest requirement following treatment has never been tested experimentally. As Miller et al. (2005) note, "[d]ecisions regarding livestock reintroduction should be made based on the response of vegetation following treatment. With slow community recovery, rest may be required beyond the standard 2-year time frame" (see also Miller et al. 2015).	The BLM should extend the two year post-treatment rest period to ensure adequate vegetation recovery	Per Design Feature 20 in the Draft PEIS, new seedings would not be grazed "until, at least, after the end of the second growing season, or when fuel break objectives are met…" This language would require a longer rest period if vegetation did not adequately recover after two growing seasons.

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131	93	Targeted Grazing	TG-4	Another concern of the proposed alternative which focuses on targeted grazing is the apparent lack of constraint of livestock to the 500-foot limit. The PEIS at 16 says: Temporary fencing may be used to limit the grazing to the fuel break footprint. Where temporary fencing is not used, the grazing operator would follow a graduated-use plan to limit grazing impacts outside the fuel break footprint. This implies that livestock may "leak" out of the actual fuel breaks if not carefully managed, and impact native plant communities and species outside of the areas that fuel breaks are proposed.	The PEIS does not adequately analyze the impacts associated with targeted grazing	To achieve the stated purpose and need for the PEIS (see Section 1.2 of the Draft PEIS), the BLM would use targeted grazing treatment in areas that have already been converted to invasive annual grasses. As such, the presence of livestock is not expected increase the cover or seed production of the invasive annual grasses. Targeted grazing is not intended to restore native perennial grasses. See Table 2-1 (page 8), Table 2-2, and Section 2.4.4 for a description of when and how targeted grazing would be used. Section 2.4.4 has been revised to clarify how targeted grazing would be implemented. The BLM used the most appropriate and applicable science to analyze impacts from targeted grazing on potentially affected resources and resource uses (see Chapter 4 of the Draft PEIS). Where appropriate, the effects from targeted grazing are described separately for a given resource under the Nature and Type of Effects. For vegetation, effects from targeted grazing are described in Section 4.6.2 of the Final PEIS; this discussion has been augmented to acknowledge the potential for impacts within the graduated use area. Design features 21-24 (Appendix D of the Final PEIS) would be implemented to reduce the likelihood for impacts associated with targeted grazing. Additional details regarding implementation of the PEIS, including targeted grazing, will be included in the Record of Decision and specified during subsequent policy development.
131	31	Targeted Grazing	N/A	One of the methods to remove undesirable vegetation in fuel breaks briefly discussed in the PEIS is targeted grazing. This is an untested method that has the potential to create its own resource damage, including increasing the very exotic plants it is supposed to reduce (Rinella & Bellows 2016). Its use comes with a number of caveats, many of which require close attention to the livestock (PEIS Appendix D). How will this be accomplished? Ranchers typically don't have the resources to closely attend to livestock and move them when necessary. The BLM also lacks staff to take up this task. Targeted grazing on mowed strips introduces an unpermitted use of public lands, apparently without Annual Operating Instructions or grazing fees, and with vague targeted grazing plans that would be site-specific and apparently outside of the NEPA review process. Livestock will preferentially graze native perennial grasses in these vegetation communities, over cheatgrass, so any use of targeted grazing in these plant communities will lead to degradation of native perennial grasses and trampling of biological soil crusts, reducing resistance to non-native species invasion (Reisner et al. 2013, Condon & Pyke 2018). The BLM needs to explain in more detail how the objectives of the PEIS would be accomplished with this technique. Preliminary indications are that the grazing intensities required to reduce annual grasses, for example, are quite heavy (Young et al. 1983). Young et al. (1983) caution that "using livestock grazing to suppress invasive annual grasses and enhance desirable perennials assumes that desirable perennials will fill the temporary void left by the annual grasses. In many areas, however, desirable perennials maybe outcompeted by species considered even more undesirable than annual grasses." The BLM must show that targeted grazing will not lead to more resource damage from heavy grazing of vegetation, trampling, removal of biological soil crust, soil erosion, increased bare ground, and higher weed infestation. These potential impacts have not been adequately addressed in the PEIS. In fact, no citations at all are cited to support or elucidate this concept in the document.	See Public Concern Statement TG-4	
131	32	Targeted Grazing	N/A	Thus, instead of restoring native perennial grasses, this method would type-convert these shrublands into new livestock grazing areas. Another concern of the proposed alternative which focuses on targeted grazing is the apparent lack of constraint of livestock to the 500-foot limit. The PEIS at 16 says: Temporary fencing may be used to limit the grazing to the fuel break footprint. Where temporary fencing is not used, the grazing operator would follow a graduated-use plan to limit grazing impacts outside the fuel break footprint. This implies that livestock may "leak" out of the actual fuel breaks if not carefully managed, and impact native plant communities and species outside of the areas that fuel breaks are proposed. This is not analyzed in the PEIS.	See Public Concern Statement TG-4	

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123	4	Targeted Grazing	N/A	Targeted grazing" is one of the fuel break measures proposed for use in Alternatives C and D. However, it is important to note that research has demonstrated that livestock grazing exacerbates cheatgrass dominance in one of North America's most endangered ecosystems (the Sagebrush Steppe) by adversely impacting key mechanisms mediating resistance to invasion (Reisner et al. 2013 - Conditions favouring Bromus tectorum dominance of endangered sagebrush steppe ecosystems). If the goal is to conserve and restore resistance of these systems, managers should consider maintaining or restoring 1) high bunchgrass cover and structure with small gaps between them; and 2) a diverse assemblage of bunchgrass species to maximize competitive interactions with cheatgrass in time and space (Reisner et al. 2013). Passive restoration by reducing cumulative cattle grazing may be one of the most effective means of achieving these goals (Reisner et al. 2013). For these reasons, and more (ie. that ranchers are unlikely or might be reluctant to properly manage their livestock within these narrow strips), "targeted grazing" to control cheatgrass and other flammable invasives within fuel breaks will only make the problem worse.	See Public Concern Statement TG-4	
98	27	Targeted Grazing	N/A	The assumption that targeted grazing "...would not cause a substantial increase in invasive annual grasses or noxious weeds because it would be intensively managed to prevent introduction or spread of these species" seems optimistic as grazing has been identified as a substantial cause of the spread of cheatgrass and noxious weeds in sagebrush communities (Shinneman, D.J. et al, 2018). The PEIS should disclose how BLM will ensure that targeted grazing does not exacerbate this problem and promote the cheatgrass-wildfire cycle.	See Public Concern Statement TG-4	
129	2	Targeted Grazing	N/A	Unfortunately, targeted grazing, proposed by the Draft EIS, will only encourage a more degraded plant community, further dominated by the species listed above. This is a short-term plan, not a solution to a growing problem. In most cases, the pastures on public lands are extensive and targeted grazing will not work, especially by using cows without full-time herders. These areas could experience reduced fuels in the short-term, but in subsequent years, they will support higher density fine fuels. Grazing animals will eat the better tasting perennial native grass and sage grouse forbs before they eat cheatgrass and other weeds.	See Public Concern Statement TG-4	
131	6	Targeted Grazing	N/A	The PEIS also overlooks the other major factor in annual grass invasion-livestock grazing. The PEIS fails to acknowledge that permitted livestock grazing occurs on nearly all federal public lands within the proposed project area, where it contributes significantly to the establishment and spread of exotic species.	N/A	The impacts of past livestock grazing are acknowledged in Table 4-1 and have been adequately analyzed in the cumulative impacts analysis for each resource in Chapter 4.
69	6	Cooperating Agency relationships	N/A	* The Service previously provided detailed comments on the draft Fuel Breaks PEIS to the BLM that were not fully incorporated. We are willing to work with the BLM to consider and incorporate the Service's previous and present comments into the Fuel Breaks PEIS.	N/A	Comment noted. The BLM will continue to work with the USFWS and other cooperators to incorporate feedback.
9	2	Cooperating Agency relationships	N/A	Baker County is asserting coordination through 43 CFR section 1610.3-1(a). The County looks forward to working with the BLM to develop site specific plans within our jurisdictional boundaries as well as assure consistency with the Baker County Natural Resources Plan. We are also willing to contact private landowners in project areas so that fuel breaks could be continuous, and therefore, more effective.	N/A	Comment noted. The BLM will continue to work with cooperating agencies during project planning and implementation.
125	10	Cooperating Agency relationships	N/A	Appendix M. Comment: In the list of cooperators, IDL is not mentioned, nor are any of the Idaho RFPAs. At minimum, list IDL as a cooperator in Appendix M and the IDL recommends a high-level of coordination with each local RFPA to ensure on-the-ground knowledge and verification of project proposals during the planning and fuel break development process.	N/A	Appendix M has been revised to include the cooperating agency.
30	2	Cooperating Agency relationships	N/A	In early 2018, Reclamation received an invite from Beth Reinhardt with BLM asking if Reclamation would be interested in participating as Cooperating Agency for the development of the PEIS. Since Reclamation has lands that would be affected by this project we accepted the invitation to become a cooperating agency, but we hadn't heard anything back on this project until our Carson City office received a copy of the newsletter last week. I emailed Beth but got a notification that her email doesn't exist, so I'm guessing she isn't with the BLM anymore. Since we do have lands that would be affected by this project, I want to see if there is still an opportunity to be a cooperator on this effort. We really want to make sure any BOR lands identified in here will be included in the NEPA analysis. Is there still an opportunity for Reclamation to inset ourselves in this effort?	N/A	Appendix M has been revised to include the cooperating agency.

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109	10	Cumulative Impacts	CI-1	Because of the scale of the PEIS, across many states, a landscape approach in the PEIS is needed, especially for analyzing cumulative effects on wildlife species habitats and movement corridors and if the fuel breaks will be effective in reducing fire. This PEIS only provided summaries of basic information on vegetation types at the ground level and did not do a true landscape-level analysis to assess cumulative effects despite the fact the tools and science being available to assess the impact and effectiveness of fuel breaks across the states. Because of this, the PEIS makes assumptions that fuel breaks are effective but fails to provide the evidence and fails to make that determination in Alternatives B, C, and D.	The PEIS project area is too large to adequately analyze cumulative effects on resources and whether the fuel breaks would be effective. It should include a landscape level analysis to support assumptions about the cumulative impacts of fuel breaks.	The BLM thoroughly explained its consideration and analysis of cumulative effects in the Draft PEIS in Chapter 4 and has augmented this analysis for the FEIS. The Draft PEIS considered the present effects of past actions, to the extent that they are relevant, and present and reasonably foreseeable (not highly speculative) Federal and non-Federal actions, taking into account the relationship between the proposed alternatives and these reasonably foreseeable actions. The BLM explicitly described their assumptions regarding proposed projects and other reasonably foreseeable future actions. The BLM has complied fully with the requirements of 40 CFR 1508.7 and prepared a cumulative impact analysis to the extent possible based on the broad nature and scope of the proposed actions under consideration at the programmatic level.
81	1	Cumulative Impacts	CI-2	"....past, present, and reasonably foreseeable future actions outside the project area would also influence the location and intensity of cumulative effects in the project area. Examples are weather and climate patterns..." Please provide an analysis on how increasing global temperatures and drought would affect the efficiency and need proposed action.	The PEIS does not analyze the potential climate-related cumulative impacts on the effectiveness of the proposed fuel breaks.	Section 3.1 of the Draft PEIS acknowledges the influence of weather conditions on fire behavior, and thus annual changes in climate may also affect fire patterns. Section 3.3 has been added to the Final PEIS to further describe how climate affects the current conditions in the project area. However, the BLM cannot change this influence. Instead, the BLM focuses fire and fuels management on changes to biomass and the abundance and continuity of fuels. The BLM is developing a separate but complementary PEIS for Fuels Reduction and Rangeland Restoration in the Great Basin. Section 4.2.8 of the PEIS has been revised to clarify that the Fuel Breaks PEIS and the Fuels Reduction and Rangeland Restoration PEIS would have synergistic effects in slowing the spread of wildfire and improving suppression opportunities as well as in reducing the abundance and continuity of fuels, thereby changing wildfire behavior across the landscape.
56	8	Cumulative Impacts	N/A	But now soot and dust are taking a greater toll, according to a report released this week, causing Greenland's ice sheets to darken-and melt-at a faster rate in spring than before 2009. Wind storms that carry dirt off the deserts of the U.S. Southwest are darkening the snowpacks of the Colorado Rockies with layers of red dust, causing snow to melt up to six weeks earlier than in the 1880s. This early snowmelt causes streams to swell earlier in spring before plants are ready to use the water, and streams run low later in the year when the water is most needed for drinking and irrigation. Of course most people only think of forest fires and even though range fires need to be included. Nowhere did I read anything close to this issue from the wildland fires Idaho and the west are experiencing. These fuel breaks are a start but much more needs to be done. I believe you need to incorporate more environmental consequences for not doing these and then work on another programmatic EIS to address the larger issue, because many RMPs have and will not.	See Public Concern Statement CI-2	
131	85	Cumulative Impacts	CI-3	BLM must also consider the cumulative impact of the current fuel breaks proposal with other fuel breaks projects currently underway in Idaho. These include the Soda Fire Fuel Breaks project, the Bruneau Fuel Breaks Project, and the Tri-State Fuel Breaks Project. The PEIS makes no attempt to gauge the cumulative impact of all of this fuel break construction, but between the three projects, it is likely that most of the maintained roadways in Southern Idaho have been affected. Field observations reveal that the Soda Fire fuel breaks have not been maintained, allowing cheatgrass and medusahead to colonize the disturbed soils. These fuel 56 breaks projects also entail a substantial amount of herbicide use, which could adversely impact native vegetation and wildlife.	The PEIS does not mention or adequately consider the potential cumulative impacts of all ongoing fuel breaks and other fuels treatment projects in the project area.	Following CEQ guidance (CEQ 2005), and given the page limitations imposed by SO 3355 and size of the project area, it would be impractical to list all ongoing fuel breaks and fuels treatments projects in the project area. Table 4-1 has been revised to include additional projects and acreages. Further, a new appendix, Appendix K, has been included in the Final PEIS, which presents additional information about existing fuel breaks and their effectiveness. Section 3.1 has also been updated to summarize this information. The analysis of the No Action Alternative and Cumulative Effects in Chapter 4 has been augmented to better capture the impacts of the existing fuel breaks in the project area. To ensure the fuel breaks are successful in accordance with the purpose and need, monitoring, maintenance, and adaptive management will be conducted as described in Section 2.2.8 of the Final PEIS. This section describes the guidance documents and reference material for monitoring and maintenance of fuel breaks.

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131	86	Cumulative Impacts	N/A	In addition to fuel breaks, BLM must consider the cumulative impacts of ongoing vegetation removal efforts throughout southern Idaho, including pinyon-juniper removal. BLM recently authorized the Bruneau-Owyhee Sage-Grouse Habitat Project, which will cover more than 600,000 acres in the Bruneau and Owyhee Field Offices. BLM plans to remove Stage I and II juniper through such methods as mastication, hand-cutting, and pile burning over the course of 10 to 15 years. Such projects are yet another source of ground disturbance, and field observations show that when juniper is removed, invasive grasses such as cheatgrass often invade. Similar projects in the Jarbidge and Bruneau Field offices have already resulted in cheatgrass invasions and monocultures of non-native forage species such as crested wheatgrass. A robust cumulative impacts analysis with respect to juniper treatments is especially important in light of recent legislation that directs BLM to develop a nationwide categorical exclusion for juniper removal and similar vegetation treatments. See 16 U.S.C. § 6591e.	See Public Concern Statement CI-3	
131	76	Cumulative Impacts	N/A	We are concerned that there are numerous ongoing efforts to propose and analyze fuel breaks, fuels reduction, juniper removal and other vegetative manipulation throughout the project area. Examples such as the Tri-State Fuel Breaks Project, Bruneau-Owyhee Sagebrush Habitat (BOSH) project, Soda Fire Fuel Breaks Project, and "biological thinning" or "targeted grazing" approvals such as those in the BLM Burns District and Owyhee Field Office are just a few of many similar efforts that are already examining or have approved the same types of activities being considered in the PEIS. The PEIS does not consider the cumulative impacts of this large number and wide variety of similar projects at various stages of approval, and it does not consider how projects tiered to the PEIS will enhance efficiency or affect ecological outcomes on any of these projects.	See Public Concern Statement CI-3	
98	21	Cumulative Impacts	N/A	In Sec. 4.5.7, the PEIS states "Numerous fuel breaks, undertaken by the BLM, other federal agencies, local and regional partnerships, and other groups, have created and maintained fuel breaks in the project areas, as described in Table 4-1. The area affected by these projects would continue to expand as new fuel breaks continue to be created as part of already approved projects and as part of reasonably foreseeable fuel break projects over the next several years. In general, fuel break projects have altered vegetation structure by reducing fuel loading and continuity in the breaks. Such projects have also affected vegetation on the landscape scale by improving opportunities for wildfire response; this has helped to reduce wildfire severity and intensity, minimize alterations in vegetation condition, and reduce noxious weed and invasive plant species prevalence." First, there are no "descriptions" of the "numerous fuel breaks" in Table 4-1 - only a small list of projects in some states, including only 3 Nevada projects. The public cannot use Table 4-1 information since we don't know why only these projects were cited and where these cited projects fit into the overall picture of "numerous fuel break projects" and their successes or failures. Is the PEIS referring to 3 Nevada fuel break projects? 30 projects? 300 projects, 3000 projects? or more than 3000 projects? And, where is the data to support the PEIS statements on Nevada fuel break impacts on wildfires and on vegetation? The PEIS should disclose the amounts of existing fuels breaks in Nevada, the locations, their successes or failures, whether re-applications were necessary, their environmental impacts and whether mitigation was successful or not, the status of monitoring fuel breaks and the costs of maintaining existing fuel breaks as part of the description of Alternative A and also assess the effects of existing fuel breaks as part of the cumulative impacts assessment section of the PEIS.	See Public Concern Statement CI-3	
98	29	Cumulative Impacts	N/A	Sec. 4.2.8: The PEIS fails to disclose the environmental consequences of the maintenance of existing BLM fuel breaks and new BLM fuel breaks in Nevada which would not be covered by this PEIS as part of its analysis of cumulative effects. Depending on the amount of existing fuel breaks (which is not disclosed in this PEIS) in Nevada, these effects could be significant.	See Public Concern Statement CI-3	

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131	77	Cumulative Impacts	CI-4	The PEIS does not adequately consider the cumulative impacts of livestock grazing which, as noted, is ubiquitous throughout the project area. In order to effectively address the related threats of wildfire and invasive annual grasses, BLM must acknowledge the role of livestock grazing in altering vegetative structures, changing soil characteristics, spreading non-native grasses, and increasing fire risk. Because grazing is the dominant use of public lands in the Great Basin, BLM cannot address the combined threat of weeds and fire without acknowledging the widespread, significant impacts of grazing on species composition and overall ecosystem resilience.	The PEIS needs to fully analyze the potential cumulative impacts of livestock grazing combined with the proposed fuel breaks under each alternative.	The BLM thoroughly explained its consideration and analysis of cumulative effects in the Draft PEIS in Chapter 4 and has augmented this analysis for the FEIS. The Draft PEIS considered the present effects of past actions, to the extent that they are relevant, and present and reasonably foreseeable (not highly speculative) Federal and non-Federal actions, taking into account the relationship between the proposed alternatives and these reasonably foreseeable actions. Projects included in Table 4-1 have already been analyzed on a site-specific scale, and are incorporated into the cumulative effects analysis. Livestock grazing as a contributor to cumulative effects has been analyzed individually for applicable resources in Chapter 4.
131	84	Cumulative Impacts	N/A	These impacts increase with grazing intensity. Thus, on the heavily grazed BLM lands in Southern Idaho, grazing is a primary factor driving increases in fire frequency and intensity. Because BLM's goal for this project is to reduce fire frequency and intensity, the final EIS must analyze the extent of grazing-related ecological impacts in Idaho. The final EIS must also consider the cumulative impacts of fuel breaks and intensive livestock grazing. Both activities entail substantial disturbance, which facilitates annual grass invasion and increases fire risk. By installing fuel breaks in heavily grazed areas-including significant portions of the Owyhee, Bruneau, and Jarbidge Field Offices-BLM will create corridors though which invasive weeds can propagate and spread into adjacent landscapes.	See Public Concern Statement CI-4	
131	80	Cumulative Impacts	CI-5	Further utility corridors are under review for development with pipelines and transmission projects under the West-wide Energy Corridor planning process.11 In 2019, public reviews were ongoing for the Section 368 energy corridor regional review status for Regions 4, 5, and 6, which covers Oregon, Washington, Idaho, Montana, Wyoming, and portions of Nevada and California. These are all future cumulative impacts that should be considered.	The PEIS should list all relevant past, present, and reasonably foreseeable actions in order to fully analyze the potential cumulative impacts of the alternatives.	ollowing CEQ guidance (CEQ 2005), and given the page limitations imposed by SO 3355 and size of the project area, it would be impractical to list all ongoing fuel breaks and fuels treatments projects in the project area. Table 4-1 has been revised to include additional projects and acreages.
131	79	Cumulative Impacts	N/A	BLM must conduct a cumulative impacts analysis to consider how the blading of 500 foot wide swaths of destruction might compound impacts already existing from oil and gas leasing and drilling in the sagebrush ecosystem.	See Public Concern Statement CI-5	
131	6	Direct/Indirect Impacts	DI-1	The PEIS largely overlooks the impacts of roads and rights-of-way, and thus understates the likely environmental impact of fuel breaks. As the PEIS explains, BLM plans to construct fuel breaks along established routes, including paved highways, maintained gravel roads, and twotracks. This will vastly increase the amount of ground disturbance associated with existing routes and increase both the severity and extent of annual grass invasions. As Shinneman et al. (2018) explain, fuel breaks of all types are prone to weed invasion.	Ground disturbance associated with the construction of fuel breaks along existing roadways will propagate invasive annual grasses.	While ground disturbance is a possibility with fuel break construction, required design features and subsequent monitoring and treatments would minimize the potential for weed propagation following treatments. Chapter 4 has been revised to acknowledge the potential for invasive annual grasses in the short term, but that maintenance and monitoring would reduce this impact in the long term.
131	6	Direct/Indirect Impacts	DI-2	BLM has also suggested that fuel breaks will facilitate greater motorized use of federal public lands. In the scoping notice for this proposal, BLM stated that fuel breaks would "improve western landscapes by offering multiple use opportunities." This implies that the project involves developing a significant road 4 system, which would remain on the landscape for use by firefighters, recreational users, grazing permittees, and agency staff. Although the undersigned groups raised this issue in scoping comments, the PEIS fails to meaningfully address it.	The PEIS does not clarify whether new roads will be created as part of the construction of new fuel breaks.	As stated in Section 2.2.6 of the Final PEIS, the Fuel Break PEIS does not authorize or proposed the construction of any new roads. Text has been added to clarify that maintenance levels also would not change.

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135	4	Direct/Indirect Impacts	DI-3	Chapter 4, Environmental Consequences, addresses these effected environments in a general way by conjecture of unrelated published research and assumptions. However, it does not include the consequences resulting from the existing fuel breaks on the ecological, environmental, economic or fire behavior.	Alternative A in the PEIS does not adequately analyze the direct and indirect impacts of existing fuel breaks.	As required by 40 CFR 1502.16, the Final PEIS provides a discussion of the environmental impacts of the alternatives including the proposed action, any adverse environmental effects that cannot be avoided should the alternatives be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources should the proposal be implemented. The Final PEIS provides an updated and expanded discussion of the environmental consequences of the No Action Alternative, which includes existing fuel breaks. The Final PEIS provides sufficiently detailed information to aid in determining whether to proceed with the proposed plan in a manner such that the public could have an understanding of the environmental consequences associated with the alternatives, in accordance with 40 CFR 1502.1.
98	20	Direct/Indirect Impacts	N/A	However, in Sec. 4.2.3 (p. 52), the PEIS states "Under Alternative A, a regional system of fuel breaks would not be constructed and maintained using this analysis. Fuel breaks would continue to be employed throughout the project area on a site-specific basis." These are BLM actions which have impacts and should be addressed in the PEIS.	See Public Concern Statement DI-3	
76	1	Direct/Indirect Impacts	N/A	The BLM in the last 20 years has installed many fuel breaks across the Great Basin. To my knowledge there has been little if any research on the current effectiveness of these existing fuels breaks on the landscape. As a former BLM employee, I have seen many old fuel breaks full of annual grasses and other weeds. How many of these existing fuel breaks are in "suitable" condition to stop or slow down a fire? This information should be provided. How many fuel breaks have already been installed? Where are they? Are there any examples where existing fuel breaks have been effective in slowing or stopping a fire, where and how? Examples of where they have not been effective? Surely the BLM has some data on these fuel break sites?	See Public Concern Statement DI-3	
135	3	Direct/Indirect Impacts	N/A	There is no data presented anywhere in the PElS on the ecological, environmental, economic, or the effect of fire behavior as the result of fuel breaks that have already been constructed within the treatment area.	See Public Concern Statement DI-3	
135	4	Direct/Indirect Impacts	N/A	Chapter 4, Environmental Consequences, addresses these effected environments in a general way by conjecture of unrelated published research and assumptions. However, it does not include the consequences resulting from the existing fuel breaks on the ecological, environmental, economic or fire behavior.	See Public Concern Statement DI-3	
116	1	Direct/Indirect Impacts	DI-4	A programmatic analysis should help prioritize strategic locations for fuel breaks and compare the pros and cons of different treatments and maintenance methods. The analysis should also assess design features to avoid, minimize and mitigate negative impacts. In addition, the agency must take into account the importance of safeguarding the function of the sagebrush ecosystem through careful design and implementation of projects that could be covered by the PEIS. However, we harbor grave concerns that this PEIS in its current form fails to meaningfully integrate these components, nor does it include the necessary analysis and supporting evidence to make informed decisions. A poorly designed study could accelerate the permitting and construction of poorly-placed and designed fuel breaks that result in accelerating habitat degradation instead of preventing it. Concerns with the expanded use of fuel breaks include, but are not limited to the following issues: (1) increased spread of invasive cheatgrass (Bromus tectorum); (2) whether the BLM has the fiscal capability to maintain and properly manage fuel breaks; and (3) increased habitat fragmentation.	Commenters were concerned that there is insufficient direct and indirect analysis to make informed decisions about the environmental impacts caused by fuel breaks.	In compliance with CEQ guidance on Effective Use of Programmatic NEPA Review (CEQ 2014), in the Draft PEIS, the BLM used vegetation states as the analysis indicator for several resources, allowing for the adequate disclosure of broad impacts relevant to the entire project area. Acres of each road maintenance level and ROW have been added for each vegetation state in Table 2-2. The total acres burned by wildfire and the associated causes are presented in Figure 7 of the Draft PEIS. That figure shows that natural causes started the greatest acreage burned for wildfires. Section 4.7 of the Final PEIS has been revised to include an expanded discussion of habitat fragmentation.
117	4	Direct/Indirect Impacts	N/A	Your fuel breaks will most certainly fragment habitat, destroy precious sagebrush habitat and encourage human visitation via new roads. Humans have caused more than 80 percent of fires nationwide. Adding access will only encourage more fire starts. I don't see anything in the plan to remove this most certain fire risk.	See Public Concern Statement DI-4	
6	5	Direct/Indirect Impacts	N/A	Management treatments have tended to continue or to increase the disturbance, by plowing, grazing or other treatments that reduce the abundance of native perennial grasses and forbs, disrupt biological soil crusts, and increase soil surface disturbance in communities dominated by herbaceous species and shrubs/trees [Belnap 1995]. What is the effect of fuel break disturbance?	See Public Concern Statement DI-4	

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106	9	Direct/Indirect Impacts	N/A	All impact analyses in Chapter 4 should be revised to present the effects of the impacts using the context and intensity factors defined in 40 CFR 1508.27. Although it is better than any other section, even the vegetation section could be substantially (significantly?) improved.	N/A	In accordance with NEPA and FLPMA, the BLM incorporated applicable references and information for analyzing the direct and indirect effects in Chapter 4 of the PEIS and conducted its analysis to explain the potential environmental effects of each alternative.
106	10	Direct/Indirect Impacts	N/A	Firefighter Safety Analysis "Improving firefighter safety" is repeatedly identified as a key goal of the fire breaks proposed action. However, the entire Chapter 4 impact analysis has only six uses of the word "safety" on its 101 pages. Four of those uses occur on page 56 with little explanation of why the purported improvements would occur or the relative magnitude of the benefits resulting from each alternative. Solution: Revise Chapter 3 to include a description of the existing threat to firefighter safety. Revise Chapter 4 to analyze impacts based on the NEPA "significance" factors of intensity and context discussed in my comment 6.	N/A	The PEIS is not anlayzing Wildland Fire Operations policy in regards to safety, as that is outside the scope of this analysis. The PEIS will not change BLM policies. The modeling used in the Draft PEIS analysis takes into consideration the mininum fuel break widths that would contribute to fire behavior characteristics that would allow wildldand firefighters to more safely engage in suppression activities (see Appendix H and L). Additional information has been included in Appendix L regarding how the safe separation distance was calculated.
92	5	Direct/Indirect Impacts	N/A	Suggested Revision: Fuel breaks may be associated with previously disturbed corridors, thus reducing the potential for new adverse impacts. (Environmental Consequences, Section 4.1.1, sixth bullet: Assumptions for Analysis, pg. 42)	N/A	The commenter's suggested language matches the current text in the PEIS (see bullet #4 on page 42 in the Draft PEIS). No change is necessary.
135	7	Direct/Indirect Impacts	DI-5	The size of the project area and diversity of soils, plants, wildlife, and ecological conditions within the area prevents adequate environmental analysis or meaningful public participation at the programmatic level.	The large size of the project area and diversity of resources and ecological conditions prevents adequate environmental analysis at the programmatic level. More data should be provided to understand the impacts.	In compliance with CEQ guidance on Effective Use of Programmatic NEPA Review (CEQ 2014), in the Draft PEIS, the BLM used vegetation states as the analysis indicator for several resources, allowing for the adequate disclosure of broad impacts relevant to the entire project area. Acres of each road maintenance level and ROW have been added for each vegetation state in Table 2-2.
106	13	Direct/Indirect Impacts	N/A	It is recognized that this is a programmatic EIS and that site specific information such as routes have not been established. However, to comply with NEPA, the EIS must be revised to provide decision-makers and the concerned public with approximations of the scale of the impacts. As a good steward, the BLM already has reasonable estimates of the density of archeological sites in the Great Basin. The EIS should multiply that value by the 667,000 acres in the preferred alternative to obtain a ballpark estimate of the number of archeological sites that potentially would be destroyed. Similarly, your soil scientists know how many tons of soil are typically lost per acre per year when Great Basin soils are disturbed (most treatment methods) or permanently denuded (brown strips). Do that multiplication for the decision-makers and concerned public and present the results for each alternative in the EIS. ALL of the impact analyses should include this type of quantification so readers can easily understand the scale of the impacts resulting from the alternatives.[comment end]	See Public Concern Statement DI-5	
68	19	Direct/Indirect Impacts	DI-6	Numerous core issues related to the environmental impacts and trade-offs caused by fuel breaks were not fully considered in the EA, such as impacts to soil, water, wildlife, carbon, fire hazard, etc. These issues were raised by the public but not addressed in the NEPA analysis. Programmatic and site-specific proposals require two different types of NEPA analysis. Many details about the effects of logging are simply unknowable at the time programmatic NEPA is being prepared, such as soil types, current soil conditions based on past management, slope/aspect, special habitats, current vegetation conditions, a description of past vegetation management, existing road conditions, proximity to environmental features that require extra attention (streams, nearby homes, etc), and an analysis of how fuel breaks interact with these features. This EA simply failed to enumerate many of these relevant facts and effects.	The PEIS did not sufficiently analyze the benefits of fuel breaks relative to the crosscutting environmental impacts (trade-offs) on numerous resources from fuel breaks.	In compliance with CEQ guidance on Effective Use of Programmatic NEPA Review (CEQ 2014), in the Draft PEIS, the BLM used vegetation states as the analysis indicator for several resources, allowing for the adequate disclosure of broad impacts relevant to the entire project area. Acres of each road maintenance level and ROW have been added for each vegetation state in Table 2-2. Chapter 4 discloses the environmental impacts associated with each type of fuel break described in Chapter 2. Further, the PEIS includes design features (Appendix D) to minimize the potential for adverse impacts.

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122	1	Direct/Indirect Impacts	N/A	TNC understands that fuel breaks are an important tool to (1) create defensible space to support firefighting and facilitate suppression, along with (2) limiting human-caused ignitions along highly travelled routes. We also agree, in principle, that (3) strategically located and properly maintained fuel breaks can limit wildfire extent by changing fire behavior and slowing spread. We do, however, have critical concerns that this PEIS does not weigh those benefits against the costs of installation, perpetual maintenance, and the likelihood of habitat fragmentation. Overall, we believe the PEIS lacks a strategic framework that could assess and prioritize those trade-offs.	See Public Concern Statement DI-6	
57	1	Editorial Comments (grammar and formatting updates)	N/A	Generally, the maps are at a scale that make it difficult to tell how this will affect individual allotments, and if proposed fuel breaks will directly impact ranch operation. If the maps were at a larger scale, permittees would be better able to assess whether additional analysis or action will be required prior to requesting fuel breaks on individual allotments. Even the addition of grazing allotment boundaries would help in determining management, plans, and impacts on specific permits.	N/A	As described in Section 2.2.5 of the Final PEIS, the alternatives would not change permitted grazing; this text has been revised for clarity. Maps for each alternative were available on ePlanning to allow a closer review of how the alternatives would be applied within any given area.
57	8	Editorial Comments (grammar and formatting updates)	N/A	Maintenance of each type of fuel break is generally not referenced in Table 2-2; perhaps the title could be clarified to include "Installation Method."	N/A	Table 2-2 includes both fuel break installation and maintenance under each type of vegetation state. For example, creation and follow-up treatments of green strip fuel breaks are described under the appropriate vegetation states in Table 2-2. The table is not focused on installation and/or maintenance but about the appropriate fuel breaks for each vegetation state. However, Table 2-2 has been revised in the Final PEIS to include miles of each road maintenance level and ROW that occur in each vegetation state to better present the scale of the project.
92	6	Editorial Comments (grammar and formatting updates)	N/A	Comment: For clarity and to reiterate that firebreaks will not be made "cross country," please replace the phrase "may be" with the word "are" so the statement reads: "Fuel breaks are associated with previously disturbed corridors, thus reducing the potential for new adverse impacts."	N/A	The sentence is phrased as "may be" because even though this PEIS only authorizes the creation of fuel breaks in previously disturbed corridors, new corridors may be created in the future where fuel breaks could be installed.
84	10	Editorial Comments (grammar and formatting updates)	N/A	We recommend inserting underlined language Table 2-1 (Page 8), “Follow-up pre-emergent treatments may be used in low-to-moderate resistance/resilience’s areas…”	N/A	The BLM has considered the comment and the suggested text is not needed to clarify text in Table 2-1. No change has been made to the PEIS in response to this comment.
92	2	Editorial Comments (grammar and formatting updates)	N/A	Alternatives, Section 2.3, Table 2-2, last row Fuel Break Type by Vegetation State, pg. 14 Comment: The first column of table 2-2 on pg. 14 reads "Shrubs with Depleted Understory". For the sake of accuracy, it should be changed to "Sites with Pinyon or Juniper" since the corresponding "Preferred Fuel Break Type" column mentions phase two and phase three PJ communities. *Suggested Revision: Fuel break construction and maintenance would occur intermittently over several decades and short-term effects from construction and maintenance would last from several hours to several days. (Environmental Consequences, Section 4.1.1 last bullet: Assumptions for Analysis, pg. 42)	N/A	BLM has made the suggested change in the first column of Table 2-2. The commenter's suggested language in the last sentence matches the current text in the PEIS. No change is necessary.
125	8	Editorial Comments (grammar and formatting updates)	N/A	Page 57, Section 4.2.8 Cumulative Effects. "The increased footprint of the system of fuel breaks under Alternative D, combined with the Fuels Reduction and Rangeland Restoration PEIS in the Great Basin, would have the greatest potential to improve ecological site conditions, increase the fire return interval, and shift vegetation toward desired conditions, while improving fire suppression opportunities and firefighter safety." Comment: IDL recommends using the terms "shorten/lengthen" instead of "increasing/decreasing" in the context of fire return interval. Lay readers are often confused as to whether "increase fire return interval" means more, or less fires. Consider adding "mean" to the fire return interval. These terms are utilized in several locations within the PEIS, and our comment applies to all instances.	N/A	The PEIS has been revised to change terminology related to fire return intervals, as suggested by the commenter. In this PEIS, the BLM addresses a range in fire return intervals, not a mean or average. The PEIS does not define a particular period of time with regards fire return interval; therefore, there is no need to use a mean or average.
5	2	Editorial Comments (grammar and formatting updates)	N/A	J-30: 3rd to last line. Woven-spore lichen is Texosporium sancti-jacobii, not Teucrium canadense var. occidentale. Texosporium is represented on page J-17, so recommend changing common name on J-30 to western germander for the Teucrium. J-17, also, for the Texosporium, it is documented in Washington at 512 m, 1679 feet elevation. Recommend changing elevation range.	N/A	The BLM has reviewed Appendix J for accuracy and has revised it where applicable.

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2	1	Editorial Comments (grammar and formatting updates)	N/A	Map 6B does not match changes sown on general map Map 6. Looks more like Map 4B.	N/A	The Final PEIS has been revised to correct this error.
92	8	Editorial Comments (grammar and formatting updates)	N/A	Comment: For accuracy Section 4.15 should be changed to Section 4.14	N/A	The Final PEIS has been revised to correct this error.
92	7	Editorial Comments (grammar and formatting updates)	N/A	Clerical Error: Unavoidable adverse effects may also be expected to occur during fuel break construction and maintenance. These effects would resemble those described above in Section 4.15, Irreversible and Irretrievable Commitments of Resources. (Environmental Consequences, Section 4.1.5, Paragraph 2. Unavoidable Adverse Impacts, pg. 141)	N/A	The Final PEIS has been revised to correct this error.
135	1	Funding	FU-1	There is some implication that Regional planning would provide a revenue source for implementation and monitoring not available under alternative A, but no funding sources are identified so this implication has no basis.	Commenters requested that the PEIS explain how the BLM will fund the implementation, maintenance, and monitoring of proposed fuel breaks to ensure they meet the purpose and need.	As a programmatic level NEPA effort, none of the alternatives authorize site-specific activities on public lands. The agency's selection of an alternative does not authorize funding to any specific project or activity nor does it directly tie into the agency's budgets as appropriated annually through the Federal budget process. Instead, funding needs and allocation for planning, implementation, monitoring, and maintenance will follow the budget process outlined in the annual budget requests. Funding mechanisms between cooperators will not be impacted by this PEIS. As a consequence, the BLM's costs and differences in program costs across alternatives have not been quantified. The types of fuel breaks are described in Section 2.3 and the methods that would be used are presented in Section 2.4. These will be determined at the site-specific level. Information has been updated in Section 4.13.2, Table 4-9 to present the estimated costs for treatment activities from 2017. Section 3.12 of the Final PEIS has also been revised to include updated suppression costs. To ensure the fuel breaks are successful in accordance with the purpose and need, monitoring, maintenance, and adaptive management will be conducted at the local level as described in Section 2.2.7 of the Draft PEIS. This section describes the guidance documents and reference material for monitoring and maintenance of fuel breaks. ROWs have been described in Chapter 2 and analyzed as potential treatment locations in Chapter 4. The potential for incomplete datasets has been clarified in Appendix A. Construction of a fuel break along a specific ROW would follow the existing decision for that ROW and coordination with the ROW holder would occur during project-specific planning efforts. Design feature 13 has been added to the Final PEIS, Appendix D, to clarify this. Several commenters requested costs associated with restoration treatments, which are outside the scope of this effort.

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98	13	Funding	N/A	Clarification of responsibilities for fuel breaks in ROWs needed: The PEIS proposes that BLM construct and maintain fuel breaks on up to 11,000 miles of roads and ROWs at a public cost of $55 to $192 million for construction costs and another $18 million to $107 million to maintain fuel breaks each year (https://www.denverpost.com/2019/07/19/trump-western-wildfire-plan/). The wide range of cost estimates indicates to us that the BLM needs to reassess the costs of its existing fuel break projects in Nevada and re-focus its proposals in the PEIS, including considering both the costs of fuel break construction and maintenance and of the fiscal responsibilities for roadside maintenance in BLM ROWs in Nevada and other Western states.	See Public Concern Statement FU-1	
120	1	Funding	N/A	In regards to the cost of installing brown strips, mowing, planting green strips, and repairing ROW's. Once the initial cost has occurred, there is the reoccurring cost of maintenance and re-implementing treatments in areas that were not successful. Our concern lies with long term reoccurring annual costs of implementations to achieve a successful fuel break. If the landscape will not allow the implementation of a fuel break we feel that funds should not be wasted on continuous efforts to achieve a fuel break.	See Public Concern Statement FU-1	
46	1	Funding	N/A	It is my understanding that no information is contained in the PElS on the costs of the various alternatives listed there. However, according to the Washington Post these costs range from 12,000 to over 40,000 per mile of fuel break. If we take the 12,000 figure and mUltiply it by 11,000 miles of fuel breaks, this comes to a minimum of 132 million dollars for the preferred alternative. Couldn't this money be spent more wisely in trying to deal directly with the cheatgrass problem? How much would it cost to apply pre-emergent herbicide to the cheat grass outbreaks?	See Public Concern Statement FU-1	
110	5	Funding	N/A	Similarly, the PEIS does not indicate where funding for treatment activities in BLM-administered ROW would originate. If the federal agencies anticipate funding ROW treatments, then coordination as described in paragraph 3, above, would be very much appreciated. If the PEIS anticipates that funding for treatment activities in BLM-administered ROW will be required from the ROW holders, then WREC requests retention of its ability to establish budgets for ROW vegetation management and to perform the work itself or hire contractors of its own choosing in consultation with federal agency field office personnel. WREC's ability to control external costs is critical to fulfilling its obligation to provide affordable electricity to its members.	See Public Concern Statement FU-1	
137	3	Funding	N/A	The DEIS does not indicate where funding for treatment activities in BLM-administered ROWs would originate. Would necessary funding for treatment activities in BLM-administered ROWs be required from the ROW permit holder. or would funding be provided by BLM? Please clarify this issue.	See Public Concern Statement FU-1	
7	1	Funding	N/A	The overall proposal of fuel breaks is extremely problematic. The question has to be asked if such a massive undertaking has been studied in depth and tested on the ground in a controlled environment before being rolled out at tremendous expense to the taxpayer (and the deficit) and to the detriment of the land being targeted. We must question where the dollars will come from to create and appropriately maintain such fuel breaks. The cost of fuel breaks is likely grossly underestimated on such a massive scale -- 1.1 million acres of land across six western states! Consider the tremendous amount of labor and equipment (likely needing to be purchased) necessary for maintenance and the resulting expense for questionable results. Mowing and disturbing the soil promotes noxious weeds to take over and spread into areas that are currently weed-free. Chemical treatment I own an empty one acre lot (no irrigation) and the vegetation needs to be mowed 3x per year! Mowing potentially more than 11,000 miles of fuel breaks in very remote areas 3x/year year after year after year is an impossible task and expense for our BLM to undertake! My guess and fear is that the program would be abandoned after a year or two because of the expense, lack of manpower, etc and all the acres of disturbed land would be taken over by weeds, creating a much greater fire risk due to the added fuel breaks. And...the millions of taxpayer or deficit dollars spent would be wasted.	See Public Concern Statement FU-1	
121	5	Funding	N/A	4.) Funding for long term monitoring and maintenance (min. Once a year) must be appropriated before any project breaks ground. The PEIS Lacks that specific direction. -If the assumption that regular treatment to maintain a fuel break is needed in order for them to be successful as is intimated in Sec. 4.1.1. This regular and extended period of treatment must be stipulated in whatever funding mechanism there is to ensure that they're regularly maintained. This will deter the spread of invasives such as cheatgrass, which in addition to being poor wildlife forage, shortens and exacerbates the fire cycle.	See Public Concern Statement FU-1	

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122	2	Funding	N/A	As the PEIS does not impose additional expectations for capacity or funding for maintenance (nor can we ascertain a request for such funding in the Administration's budget for the Bureau), we fear the increased maintenance need will not be met and fuel breaks will fall into poor condition, exacerbating the very problem this PEIS is designed to address. The added time and costs spent on planning, implementation, and maintenance of fuel breaks will mean fewer project acres will have restoration, which TNC views as the fundamental solution to the problem.	See Public Concern Statement FU-1	
106	2	Funding	N/A	Solution: Detailed annual cost information for each proposed treatment location is beyond the scope of a programmatic EIS. However, the concerned public should be provided with information regarding the long-term economic costs of maintaining the fuel breaks. For example, for each action alternative, the EIS could state something like this: On a per-mile basis, approximately 15% of the treated area would require annual retreatment, 60% would need to be retreated at approximately 3-year intervals (could range from 2 years to 5 years, depending on rainfall), and 25% could be retreated at approximately 10-year intervals. Because vegetation would be maintained in native grasses, forbs, and young woody plants, the use of expensive techniques such as reseeding, herbicides, or chaining would largely be avoided. The typical annual cost per mile of retreatment using tilling, mowing, grazing, and prescribed burns is estimated to be about $XXX in year 2020 dollars. Therefore, for the 11,000 miles of new fuel breaks created in this alternative, the estimated annual cost of maintenance is approximately $YYY.	See Public Concern Statement FU-1	
98	35	Funding	N/A	Lastly, the BLM should clarify the fiscal and other responsibilities for vegetation management in BLM ROWs (including roads) and enforce applicable ROW grant conditions.	N/A	
130	2	GIS data and analysis	N/A	Additionally, WDFW identified inconsistencies in the alternatives maps that could influence treatment areas and ultimately the effects/impacts to local sagebrush habitats and wildlife species. The maps presented in the ePlanning BlM website (ePlanning) showed roads and right-of-ways that were not included in the PDF maps for Volume II. There were also issues with the project area maps including more inconsistencies between ePlanning and Volume" maps and confusion regarding the status of BlM easements on utility corridors. All of these mapping issues made it difficult to correctly ascertain the impacts of the project. WDFW requests that the BLM review the eplanning and Volume" maps for consistency and re-evaluate the project area maps to ensure they present the correct intended area of influence.	N/A	The maps available on ePlanning maps are slightly different from the maps presented within the Draft PEIS. The GIS layer used to calculate acreage for the document could not be drawn on the ePlanning map efficiently due to file size, preventing interactive map features from working. However, the polygon data shown on the maps within the Draft PEIS was derived from the linear features shown on the ePlanning map (buffer, clip and erase). In ePlanning, the commenter can turn on the BLM ownership and the exclusion areas to portray where fuel breaks could potentially be placed.
105	3	GIS data and analysis	N/A	Finally, during review of the PEIS two errors in the provided maps were noticed. First, it appears that Maps 4D (Oregon Alternative B), and 6D (Oregon Alternative D) incorrectly display the same network of potential fuel breaks. Second, Map 13d incorrectly indicates that no pronghorn habitat occurs in the western portion of the analysis area in Oregon. ODFW can provide accurate big game range maps upon request.	N/A	The Final PEIS has been revised to correct these errors.
125	22	GIS data and analysis	N/A	Map 9. Comment: Maps 9, 9b, and ge: The Logan UT /ID PM2.S non attainment area is not identified in these maps. The Logan UT/ID non attainment area is still designated nonattainment for the 2006 PM2.5 NAAQS, even though a clean data determination has been made by EPA.	N/A	The Final PEIS has been revised to correct these errors.
4	1	GIS data and analysis	N/A	There are large areas on the maps with no data. The blank areas are on Southern Nevada District Office land, Northern California District lands, Forest Service and Department of Defense lands shown as Military Lands on your map legends, The maps show fuel breaks, fuel break treatment history, vegetation status, erodible soils and big game habitat. You need to ask the Forest Service and DoD Installations in the Great Basin for their data. I know these agencies have natural resource management plans for their areas that have all this data. The Navy in NV has withdrawn thousands of acres from BLM but, BLM manages the natural resources and maintains the fire breaks, trails on the withdrawn lands. You can check with the Army & Air Force and see if they have the same land management agreements on the BLM withdrawn lands.	N/A	The maps present data for BLM lands within the project area (Great Basin), as fuel breaks are only analyzed for these areas within the PEIS. A description of areas included is presented in Appendix A. Impacts on lands managed by other entities is described qualitatively in Chapter 4 of the Draft PEIS.
5	1	GIS data and analysis	N/A	Was the Oregon/Washington Sensitive Species Geodatabase, GeoBOB, used to determine potential sensitive species in Oregon/Washington? The GeoBOB geodatabase is an application for botanists, biologists, and other specialists to manage their special status, threatened, and endangered species data. http://teamspace/or/sites/GeoBOB/SitePages/Home.aspx	N/A	Lists of potential special status species were obtained by each BLM State Office, which maintains a list of potentially-occurring special status species by District. The special status species in Appendix J of the PEIS were included based on potential habitat and range and thus is comprehensive. Appendix J does not include all species within the project area boundary, only those that occur in the habitats that may be potentially affected. The species included in Appendix J have been reviewed and revised as necessary.

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98	8	Implementation	IM-1	4. Lack of process for implementing fuel break projects: When we tried to figure out what process the BLM would use to implement a fuel break program on such a huge scale, we were unable to find a discussion of this in the PEIS, except peripherally on p. 3 of the Executive Summary in reference to design features - "...district and/or field office specialists..." would make determinations on design features. The PEIS fails to disclose much information on how BLM decisions would be made, including who makes the decisions, where fuel breaks would be sited, which kind, how they would be maintained and how often, how project goals and objectives and measurable outcomes to evaluate whether the project succeeded or failed would be set, who sets priorities on which project to build first, what criteria to use, how to avoid environmental impacts, to minimize impacts and to require mitigation for unavoidable impacts, and how to monitor and report the results, etc. Nor does there appear to be a way for BLM to coordinate the construction and maintenance of fuel breaks across a state or BLM districts to ensure that fuel breaks would be sited in places to be most effective and least environmentally damaging.	Commenters stated that the PEIS does not adequately describe the process that the BLM will use for implementing fuel breaks proposed in the PEIS.	The BLM would follow requirements of the NEPA in accordance with the BLM NEPA Handbook, which is referenced in the PEIS. It is not necessary to cite sections of the BLM NEPA Handbook verbatim in the PEIS. Further, in Section 1.1, the Draft PEIS describes the process for tiering to the PEIS for a site-specific fuel break. Text has been added to Section 1.1 of the Final PEIS to further describe this process. Additional details regarding implementation of the PEIS will be included in the Record of Decision and specified during subsequent policy development. Coordination and collaboration with both federal and state agencies at all office management levels would occur as it does currently during project planning and implementation.
121	10	Implementation	N/A	8.)Please provide the project prioritization methodology at both large scale & site-specific level.	See Public Concern Statement IM-1	
93	7	Implementation	N/A	Ensure a consistent, but flexible, framework or process for identification and implementation of potential fuel breaks across the Great Basin BLM state offices to develop consistent strategies applicable to multi-state utilities.	See Public Concern Statement IM-1	
137	4	Implementation	N/A	The DEIS does not indicate what entity would be responsible to complete treatment activities in BLM-administered ROWs. Would the ROW permit holder be required to I. complete treatment activities in BLM-administered ROWs, or would the BLM complete treatment activities?	See Public Concern Statement IM-1	
104	1	Implementation	N/A	* In general, the Service supports the programmatic nature of the Fuel Breaks PEIS. The Service encourages the BLM to outline a clear step-down process for site-specific analysis to ensure the proposed actions meet the purpose and need at all scales. The Service worked with the BLM to develop a description of a step-down process that identifies the need for future projects that may affect listed species; however, the current language communicated in the first paragraph in Section 4.2.4 (Effects Common to All Action Alternatives) of the Fuel Breaks PEIS does not align with the step-down language the Service developed for the BLM.	See Public Concern Statement IM-1	
118	5	Implementation	IM-2	3. Locating fuel breaks strategically will be of paramount importance. As such, we strongly suggest assessing tradeoffs and net benefits of potential fuel breaks and their location relative to the likelihood and potential effects of unabated fire and compared across several fuel break scenarios (Coates et al. 2016, Shinneman et al. 2019). As reported by Shinneman et al. (2019), spatially explicit modeling would greatly aid with locating and configuring fuel breaks to minimize costs, maximize effectiveness, and minimize ecological impacts.	Commenters suggested that the BLM should use the best available information when implementing fuel breaks. That information should help determine the locations where fuel breaks would have the greatest net benefits on meeting the purpose and need while minimizing resource impacts and costs.	In accordance with NEPA, the BLM used the most recent and applicable information available that was relevant to the scope and scale of the PEIS. Additionally, the BLM consulted with, collected, and incorporated data from other agencies and sources, as described in Chapter 5 of the Draft PEIS. Scientific literature regarding the effectiveness of fuel breaks is expanding and text has been added to Section 4.1 to address the Shinneman et al. 2018 paper. When implementing fuel breaks analyzed in the PEIS, the BLM will use the most applicable science to determine project locations that meet the purpose and need while minimizing environmental impacts.
131	24	Implementation	N/A	Moreover, the DEIS does not consider the availability of firefighting resources. As Shinneman et al. (2018) explain, fuel breaks are designed to create safe and strategic anchor points and escape routes for firefighting crews. In other words, fuel breaks do not stop fires on their own; they simply facilitate fire suppression efforts. Thus, any environmental analysis of a fuel breaks project must consider whether adequate resources will be available to suppress fires in the project area. Without the presence of firefighters, fuel breaks will simply burn over. The DEIS, however, entirely fails to consider the availability of firefighting resources, and thus omits information that is essential to a legally adequate analysis.	See Public Concern Statement IM-2	

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118	6	Implementation	N/A	Although we realize that time is of the essence, we strongly believe that implementation of a fuel break strategy as part of this PEIS should begin with the aforementioned planning and modeling (pt #3) and established in an experimental framework as much as possible/necessary to answer questions set forth in Panel 1 of Shinneman et al. (2019:285; Panel 1). There is simply no reason the implementation of this PEIS could not be set up experimentally to answer many unknown questions and collect data needed to help guide current and future management in the Great Basin. We suggest that BLM work closely with the USGS and other scientific entities to design experiments and ensure appropriate monitoring occurs to answer needed research and management questions. The BLM must also ensure adequate funding is available to monitor fuels breaks and their efficacy and impacts.	See Public Concern Statement IM-2	
69	1	Implementation	N/A	In general, the U.S. Fish and Wildlife Service (Service) supports actions outlined in the Fuel Breaks PEIS to protect and conserve sagebrush habitats from wildfires and the spread of invasive plant species. We also want to stress that when fuel breaks are implemented that: 1) They need to be properly placed, designed, maintained, and incorporated as part of the fire suppression plan; 2) the local site characteristics, conditions, and settings should determine the goals of the individual projects and dictate their design and the tools to be used; 3) fragmentation and habitat loss from the project should be evaluated and addressed for the appropriate species at the project level; and 4) cumulative impacts across the landscape are determined and understood.	See Public Concern Statement IM-2	
122	6	Implementation	N/A	Invest in additional science to understand the most effective deployment of fuel breaks There is limited science quantifying how and when fuel breaks change fire behavior on a landscape scale2. The action alternatives should include specific adaptive management prescriptions to learn from best available science as it emerges. The BLM should require any new fuel break to be catalogued and analyzed for interactions with wildfires to better understand how these features affect wildfire behavior on a landscape scale.	See Public Concern Statement IM-2	
45	5	Implementation	N/A	A DEQ short-term activity exemption (STAE) from this office is required if the project will involve de-watering of ground water during excavation and discharge back into surface water, including a description of the water treatment from this process to prevent excessive sediment and turbidity from entering surface water.	N/A	As described in Section 1.4 of the Draft PEIS, the BLM will adhere to all applicable laws, rules, regulations, and guidelines, which include state permitting requirements. Permitting for any dewatering needed would be completed during site-specific project planning and implementation.
135	6	Implementation	N/A	Also the inter-mingling of land ownership patterns may reduce/compromise the benefit of the fuel breaks.	N/A	Sections 2.2.2 and 2.2.4 of the Final PEIS have been clarified to describe coordination with other landowners.
92	3	Implementation	N/A	Comment: The County is concerned with the wording "intermittently over several decades." It does not offer a clear time frame of the preferred alternative. The County requests more description regarding goals that detail percentages of project completion with associated timeframes. Structured, time-certain/specific goals will help keep the project moving forward and keep all stakeholders accountable through the course of the project.	N/A	Timeframes for implementation of fuel break projects that would tier to this PEIS would depend on annual funding levels and administrative priorities.
100	3	Implementation	N/A	Consider describing in the PElS, to the extent possible, the key steps and/or references that the BLM expects Field and District staff to use for fuel break specific monitoring and adaptive management. Adequate fuel break monitoring and adaptive management is an important part of ensuring that the environmental impacts of fuel breaks tiered to the PElS fall within the scope of impacts disclosed in the PElS.	N/A	Monitoring, maintenance, and adaptive management are described in Section 2.2.7 of the Draft PEIS. Additional details regarding implementation of the PEIS, including monitoring and adaptive management, will be included in the Record of Decision and specified during subsequent policy development.
137	1	Implementation	N/A	The preferred alternative identifies BLM-owned roads under maintenance level 1.3. and 5. and BLM-administered ROWs as eligible for fire breaks and to receive treatment activities. However, the DEIS does not describe in detail what kinds of BLM-administered ROWs would be considered. Map 2 - Roads and Right-of-Ways identified transmission lines and pipelines in the legend; however, distribution power line ROWs are not identified in the DEIS. Please provide clarification as to whether distribution power line ROWs would be considered for treatment areas.	N/A	ROWs have been described in Chapter 2 and analyzed as potential treatment locations in Chapter 4. The potential for incomplete datasets has been clarified in Appendix A. Design feature 13 has been added to the Final PEIS to clarify that construction of a fuel break along a specific ROW would follow the existing decision for that ROW.

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45	4	Implementation	IM-3	DEQ recommends verifying that there is adequate water to serve this project prior to approval. Please contact the water provider for a capacity statement, declining balance report, and willingness to serve this project. * IDAPA 58.01.08 is the section of Idaho rules regarding public drinking water systems. Please review these rules to determine whether this or future projects will require DEQ approval. All projects for construction or modification of public drinking water systems require preconstruction approval. * DEQ recommends verifying if the current and/or proposed drinking water system is a regulated public drinking water system (refer to the DEQ website at http://www.deq.idaho.gov/water-gualitvldrinking-water.aspxl. For non-regulated systems, DEQ recommends annual testing for total coliform bacteria, nitrate, and nitrite. * If any private wells will be included in this project, we recommend that they be tested for total coliform bacteria, nitrate, and nitrite prior to use and retested annually thereafter. * DEQ recommends using an existing drinking water system whenever possible or construction of a new community drinking water system. Please contact DEQ to discuss this project and to explore options to both best serve the future residents of this development and provide for protection of ground water resources. * DEQ recommends cities and counties develop and use a comprehensive land use management plan which addresses the present and future needs of this area for adequate, safe, and sustainable drinking water. Please schedule a meeting with DEQ for further discussion and recommendations for plan development and implementation.	State agencies request that the BLM adhere to all applicable permitting requirements when implementing fuel break projects.	The BLM will adhere to all applicable federal and state laws, including permitting requirements, when constructing and maintaining fuel breaks.
45	9	Implementation	N/A	If this project is near a source of surface water, DEQ requests that projects incorporate construction best management practices (BMPs) to assist in the protection of Idaho's water resources. Additionally, please contact DEQ to identify BMP alternatives and to determine whether this project is in an area with Total Maximum Daily Load stormwater permit conditions	See Public Concern Statement IM-3	
45	8	Implementation	N/A	Please contact DEQ to determine whether this project will require a National Pollution Discharge Elimination System (NPDES) Permit. If this project disturbs more than one acre, a stormwater permit from EPA may be required.	See Public Concern Statement IM-3	
45	10	Implementation	N/A	The Idaho Stream Channel Protection Act requires a permit for most stream channel alterations, Please contact the Idaho Department of Water Resources (lDWR), Western Regional Office, at 2735 Airport Way, Boise, or call 208-334-2190 for more information.	See Public Concern Statement IM-3	
45	6	Implementation	N/A	The types and number of requirements that must be complied with under the federal Resource Conservations and Recovery Act (RCRA) and the Idaho Rules and Standards for Hazardous Waste (lDAPA 58,01.05) are based on the quantity and type of waste generated. Every business in Idaho is required to track the volume of waste generated, determine whether each type of waste is hazardous, and ensure that all wastes are properly disposed of according to federal, state, and local requirements. No trash or other solid waste shall be buried, burned, or otherwise disposed of at the project site. These disposal methods are regulated by various state regulations including Idaho's Solid Waste Management Regulations and Standards, Rules and Regulations for Hazardous Waste, and Rules and Regulations for the Prevention of Air Pollution. Water Quality Standards. Site activities must comply with the Idaho Water Quality Standards (lDAPA 58.01.02) regarding hazardous and deleterious-materials storage, disposal, or accumulation adjacent to or in the immediate vicinity of state waters (IDAPA 58.01.02.800); and the cleanup and reporting of oil-filled electrical equipment (lDAPA 58.01.02.849); hazardous materials (lDAPA 58.01 .02.850); and used-oil and petroleum releases (lDAPA 58.01.02.851 and 852). Petroleum releases must be reported to DEQ in accordance with IDAPA 58.01.02.851.01 and 04. Hazardous material releases to state waters, or to land such that there is likelihood that it will enter state waters, must be reported to DEQ in accordance with IDAPA 58.01.02.850. Ground Water Contamination. DEQ requests that this project comply with Idaho's Ground Water Quality Rules (lDAPA 58.01.11), which states that "No person shall cause or allow the release, spilling, leaking, emission, discharge, escape, leaching, or disposal of a contaminant into the environment in a manner that causes a ground water quality standard to be exceeded, injures a beneficial use of ground water, or is not in accordance with a permit, consent order or applicable best management practice, best available method or best practical method. "	See Public Concern Statement IM-3	

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84	3	Maintenance	MA-1	We recognize and appreciate the value of fuel breaks as a tool to reduce the risk of large and frequent wildfire events, which typically lead to invasive annual species and habitat degradation. However, improperly designed, implemented, and/or maintained fuel breaks can lead to counterproductive conditions such as where mowing increases fine, flashy fuels like cheatgrass (Bromus tectorum). First-hand experience in Nevada has demonstrated challenges with existing fuel breaks on the landscape including appropriately tracking and maintaining fuel breaks, as well as the actual use of fuel breaks by wildland firefighters for a tactical advantage in fighting wildland fires. Considering the significant investment and impact of fuel breaks on the landscape, we suggest including more detail regarding assurances for the success of these projects, including how fuel breaks will be tracked on a statewide to be most effectively utilized by Type 1,2, and 3 wildland firefighting teams. Additionally:	Commenters requested that the PEIS explain how the BLM will maintain and monitor fuel breaks to ensure they meet the purpose and need.	The types of fuel breaks are described in Section 2.3 of the Draft PEIS, and the descriptions of methods for fuel break creation are presented in Section 2.4, Table 2-1, and Table 2-2. Maintenance will be conducted based on fuel break type and conditions will be monitored at the local level. Maintenance of fuel breaks across agency boundaries would also be conducted. Section 2.2.7 of the Draft PEIS describes the guidance and reference material to be utilized for maintenance of fuel breaks and adaptive management actions to ensure the purpose and need is met and the fuel break continues to function properly over time based on site obejctives. Chapter 4 has been revised to acknowledge the potential for invasive annual grasses in the short term, but that maintenance and monitoring would reduce this impact in the long term. Section 2.2.6 of the Final PEIS has been clarified to state that improvement or maintenance of roads beyond the current definition would require additional site specific analysis. Decommissioning of fuel breaks would be addressed in a given project's objectives. This PEIS does not change or dictate policy and procedures related to funding, Interagency Management Teams, or wildland fire fighting resources. Funding needs for maintenance will be included in the annual budget process and coordination with cooperators will continue to follow procedures in place at the local level.
100	4	Maintenance	N/A	While Chapter 2 of the Draft PElS and Appendix D (Design Features) provide substantial information on methods for fuel break creation and maintenance as well as many design features, we are recommending that the Draft PElS and/or associated appendices include additional information on the education, monitoring, and maintenance required to maximize the effectiveness of fuel breaks	See Public Concern Statement MA-1	
26	9	Maintenance	N/A	A further problem with fuel breaks is that they must be maintained. There are already 6,000 miles of fuel breaks in sagebrush county and adding another 11,000 miles of new weed highways (also known as fuel breaks) and funding for maintenance is not part of the plan. In other words, the BLM will fragment sagebrush habitat, enhance the spread of cheatgrass, and create new challenges for sage grouse and other wildlife, but there is nothing in the plan that suggests they will be able to maintain the breaks or control the spread of cheatgrass.	See Public Concern Statement MA-1	
138	1	Maintenance	N/A	Among our concerns are; A. BLM's long-term ability to maintain the established fuel breaks given the uncertain nature of federal funding from year to year. Without proper and long-term maintenance, the established fuel breaks could ultimately be worse than the problem they are intended to mitigate.	See Public Concern Statement MA-1	
43	1	Maintenance	N/A	Breaks would need to be annually maintained, probably by mowing or employing chemical treatments. The document does not address who would create and maintain the fuel breaks, or how work would be coordinated with transportation agencies.	See Public Concern Statement MA-1	
84	13	Maintenance	N/A	Fuel break planning should incorporate maintenance needs and constraints, so that fuel breaks will not be established that cannot be properly maintained. We suggest including a description of how the BLM will ensure fuels breaks are adequately planned, implemented, monitored and maintained through time.	See Public Concern Statement MA-1	
100	5	Maintenance	N/A	The Draft PElS includes the analytical assumption that "fuel breaks would be maintained with regular treatments in order to meet project objectives." We recommend that the PElS provide evidence to support this assumption. Consider describing in the PElS the results of a study or studies on the recent track record for BLM fuel project and/or fuel break project maintenance. To the extent possible, discuss in the PElS how the BLM expects District and Field staff to account for maintenance needs and resources in the design and planning for fuel break projects that would be tiered to this PElS.	See Public Concern Statement MA-1	

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128	2	Maintenance	N/A	This project encompasses an extremely large landscape, spanning several states. The draft EIS indicates that each fuel break will have an implementation and maintenance plan, but a larger strategic prioritization maintenance plan is needed. This plan should be implemented between states, as well as at the state level, and then tiered to each BLM District Office to ensure that the maintenance of each fuel break can be timely and adequately addressed within and across boundaries. A non-maintained fuel break is ineffective and can become a vector for and lead to the spread of invasive annual grasses as well as increase the risk of wildfire 'along the roadways and right of ways. A larger-scaled maintenance plan among the affected states will help improve the effectiveness of the project and ensure that 13LM has the capacity needed for proper maintenance in the future.	See Public Concern Statement MA-1	
74	4	Maintenance	N/A	Without adequate maintenance, fuel breaks can be a corridor for spreading weeds. Mowing equipment disturbs the soil, creating an ideal opportunity for invasive weeds. History shows that many fuel breaks turn into a reservoir of invasive plants, especially when not maintained. In addition, as BLM acknowledged in their EA on fuel breaks in and near the Soda Fire: “road improvement and maintenance on public lands is likely to promote increased use by the public due to easier access. An increase in traffic volume on these roads would increase the potential spread of noxious weeds and other undesirable vegetation, increase the potential for human-caused wildfire…” Maintenance of fuel breaks will be key to the project’s success. Failure to maintain fuel breaks could create highly-flammable conditions. The BLM should not create more fuel breaks than they can commit to maintaining over the long term. That is another reason I oppose Alternatives C and D: too many acres to maintain.	See Public Concern Statement MA-1	
98	3	Maintenance	N/A	2. Can fuel breaks be adequately maintained?: The PEIS fails to provide information on how often maintenance is needed on existing fuel breaks in Nevada nor on proposed additional fuel breaks in Nevada. No information is provided on current staffing or budget needs to maintain existing fuel breaks in Nevada nor how much additional staff or budget would be needed to effectively maintain these future proposed fuel breaks.	See Public Concern Statement MA-1	
105	2	Maintenance	N/A	Additionally, ODFW urges that BLM develop long-term maintenance and monitoring plans for all fuel breaks developed in Oregon. Without long-term maintenance of fuel breaks their effectiveness will decline over time, resulting in a detriment to wildlife habitat due to the direct loss of desirable vegetation within the fuel break, without the benefit of reduced fire spread. Dedicated funding should be acquired for this long-term maintenance.	See Public Concern Statement MA-1	
92	4	Maintenance	N/A	Also included in a structured time-certain/specific list of goals and objectives should be a target number of fuel breaks to be maintained each year pending justification provided by monitoring results. The County believes that maintenance is important to fire break success since construction of fuel breaks may stimulate annual species invasion if left unchecked.	See Public Concern Statement MA-1	
124	7	Maintenance	N/A	Monitoring for intended outcomes should be an important component of the PEIS. This has been overlooked, and should be included in the PEIS. We recommend BLM commit funding to support rigorous monitoring (e.g. pursuant to section 2.2.7 Monitoring, Maintenance, and Adaptive Management), and also robust data management systems to support decisions. For example, the lack of information and shortcomings of information systems has been identified previously with respect to evaluating the effectiveness of fuel breaks (Shinneman et al. 2018).	See Public Concern Statement MA-1	
76	4	Maintenance	N/A	Monitoring implementation and costs associated with this proposed fuel breaks program must discussed in much greater detail. Monitoring the effectiveness of fuel breaks cannot be done by individual field offices. A monitoring schedule and standardized science-based protocol must be rigorously developed and implemented. Independent teams at the District or State Office level must be assigned to conduct unbiased monitoring assessments of all fuel breaks. The BLM’s track record on effectiveness monitoring is dismal. Why should the public believe that BLM can implement a science-based monitoring program? Please, convince me.	See Public Concern Statement MA-1	

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57	15	Maintenance	N/A	Overall, the importance of maintenance is not properly addressed, almost completely overlooked. As an example, there is an extensive network of mowed green strips located in Elko County, Nevada and unfortunately, the fuel breaks were not sufficiently maintained (by either mowing or grazing). The 2018 Martin Fire blew right through. Hundreds of thousands of acres of important sage-grouse and wildlife habitat was negatively impacted. These consequences could have been drastically lessened if not altogether avoided with a more routine and aggressive maintenance schedule. Another example of poor maintenance and prevention is located north of Winnemucca. A fuel break was put in and never maintained, it now has a well-established cheatgrass population. It is essential that there be regular maintenance plans established and funded if these fuel breaks are to be effective. It is also critical that once installed these fuel breaks are documented, all Incident Commands know their condition and where they are located, then be able to communicate this information to fire fighting teams on the ground. Fire fighters were unaware of and therefore unable to use the fuel breaks during the Martin Fire.	See Public Concern Statement MA-1	
84	6	Maintenance	N/A	Regarding monitoring specifically, we believe implementation of the full AIM protocols will not be practical or affordable along 1,000s of miles of fuel breaks. We recommend strategic deployment of full-AIM sampling locations and limiting them to places where such detail is crucial. A more practical monitoring protocol could focus on photo points that are readily accessible by vehicle. Photo points provide enough information to determine if annual grasses or other invasive species are increasing in cover and abundance and if their spread is indicated.	See Public Concern Statement MA-1	
98	26	Maintenance	N/A	Sec. 4.1.1: The assumption (p. 42) that "Fuel breaks would be maintained with regular treatments in order to meet project objectives" is not supported by direct observations of existing weed infested fuel breaks along roads and BLM ROWs in Nevada. The PEIS should clarify this contradiction and inconsistency of this assumption with the reality of current unmaintained status of a large amount of existing fuel breaks constructed or controlled by the BLM in Nevada and modify the assumption.	See Public Concern Statement MA-1	
80	1	Maintenance	N/A	Successful preservation of the fire breaks is predicated on annual maintenance, particularly to prevent the reversion of the newly reconstructed surfaces to fire susceptible invasive and noxious weed communities. What provisions are in place or proposed to ensure that funding will be available over many decades to perform that maintenance?	See Public Concern Statement MA-1	
125	17	Maintenance	N/A	The State recommends that BLM include Monitoring for intended outcomes as an important component of the PElS. Monitoring as a component of the PElS is not clear or evident. IDFG recommends that BLM commit funding to support rigorous monitoring (pursuant to Section 2.2.7 Monitoring, Maintenance, and Adaptive Management) and robust data management systems to support decisions. For example, BLM identified a lack of information and shortcomings with respect to information systems and evaluating the effectiveness of fuel breaks (Shinneman et al. 2018).	See Public Concern Statement MA-1	
125	3	Maintenance	N/A	This project encompasses an extremely large landscape, spanning several states. The draft PElS indicates that each fuel break will have an implementation and maintenance plan, but a larger strategic prioritization maintenance plan is needed. The State recommends a plan implemented between states, as well as at the state level, and then tiered to each BLM District Office to ensure that the maintenance of each fuel break can be timely and adequately addressed within and across boundaries. A non-maintained fuel break is ineffective and can become a vector for and lead to the spread of invasive annual grasses as well as increase the risk of wildfire along the roadways and right of ways. A larger-scaled maintenance plan among the affected states will help improve the effectiveness of the project and ensure that BLM has the capacity needed for proper maintenance in the future.	See Public Concern Statement MA-1	
118	8	Maintenance	N/A	We strongly recommend that BLM demonstrate before any fuel breaks are created under this PEIS that the agency can reasonably maintain them through time to ensure effectiveness. The BLM should ensure adequate funding remains in place to support not only monitoring, but also maintenance of fuel breaks.	See Public Concern Statement MA-1	

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76	5	Maintenance	N/A	What are the plans and costs of fuel break maintenance? Brown strips will have to be maintained every year. Last fall I saw a recently plowed brown strip along Interstate 84 with Russian thistle in it. This brown strip was plowed up again this year but if it and others like it are not plowed every year we will have Russian thistle and other weed explosions in them. Seriously, how, in the long term, does BLM plan to maintain all these areas and not provide seedbeds across the landscape for weeds? It's not just the plowed areas either. All of the fuel breaks that regularly disturb the soil (e.g. livestock grazing) will create or perpetuate a noxious weed and annual grass infestation every year. These constantly disturbed areas become vectors for distributing weeds and annual grasses. These are not good tools in the long-term – very, very risky.	See Public Concern Statement MA-1	
84	8	Maintenance	N/A	We didn't see within the analysis a rehabilitation plan for the fuel break when maintenance ceased. Are there "rehabilitation release criteria" that the BLM would utilize in making a determination of abandoning maintenance of the fuel break? We seek to understand more about maintenance and rehabilitation aspects of this project before we endorse this project to be beneficial to wildlife and the habitats upon which they rely.	N/A	Section 2.2.7 of the Draft PEIS describes guidance for adaptive management that would be applied to fuel breaks that are not meeting objectives. Decommissioning of fuel breaks would be addressed in a given project's objectives.
56	6	Public Outreach	PO-1	Then there is the Paradigm Project in the Four Rivers Field Office of the Boise District of Idaho BLM. The project made great sense. The project was approved in 2015. Some work occurred in 2017, but without adequate funding, they are still not done with it and from some areas I have observed, they have made it worse; therefore, a failure. That is why funding and commitment to timely accomplish a successful project at all levels is so important. There needs to be consequences for lack of results! One big failure with this project is the lack of coordination with cooperators. The strips end on property lines. Fires do not know property lines. Therefore, BLM never built anchor points to their projects and now fires can race around the ends and the monies spent was wasted. BLM used to give higher priorities to a variety of projects where there were cooperators. BLM needs to do it here also. BLM should require working with potential land owners to make a better product and be part of their submission for funding. That can be private or government owned lands, because we all have much at stake. I have been told cooperators are willing to work on BLM administered lands to finish a project if funds run short to protect their property. Please require offices to work with them.	The BLM should ensure that federal, state, and local stakeholders, including the public, are consulted during the planning and implementation of fuel breaks.	Section 1.1 of the PEIS has been revised to specify cooperation and coordination with other agencies and stakeholders, consistent with applicable laws and regulations. This includes compliance with the NEPA and existing Memoranda of Understanding, among other mechanisms. Outreach and coordination requirements are also included in Design Features 4, 8, 19, 28, 29, 30, 40, 46, 49, 53, 56, 60, and 62 of the Draft PEIS. Additional details regarding implementation of the PEIS, including future public and stakeholder outreach and coordination, will be included in the Record of Decision and specified during subsequent policy development. Potential partners and potentially affected stakeholders would be identified as projects are proposed.
121	1	Public Outreach	N/A	1.)Consultation and coordination with Nevada Dept. of Wildlife(NDOW) must take place at every level of analysis and planning of fuel breaks within Nevada, including, and especially, at the site-specific level.	See Public Concern Statement PO-1	
121	12	Public Outreach	N/A	11.) Every attempt should be made to partner with local Rangeland Fire Protection Associations and others (e.g. ranchers, mining, etc.) to maximize implementation and maintenance actions.	See Public Concern Statement PO-1	
128	1	Public Outreach	N/A	As BLM determines the location and treatment type of each fuel break throughout Idaho, OSC should be included in the process to ensure sensitive species in the project area and the economic vitality of the State are adequately represented. The State of Idaho devotes significant funding and resources each year to wildfire rehabilitation. The Proposed Project's effectiveness could be a factor in the decision the State makes to spend these dollars on rehabilitation after wildfire or on restoration efforts to improve habitat for sagebrush obligate species. OSC, along with the Idaho Department of Fish and Game, the Idaho State Department of Agriculture, the Idaho Department of Lands, local communities, and Rangeland Fire Protection Associations should be consulted and highly involved as locations for the proposed actions are further defined. Collaboration is critical to identifying the most effective methods and locations for fuel breaks.	See Public Concern Statement PO-1	
125	7	Public Outreach	N/A	c) Entire Document. Comment: In project areas with adjacent state endowment trust land holdings, IDL recommends that BLM contact IDL during the planning phase, and prior to finalizing individual treatment project plans, to coordinate any state efforts or treatments. d) Entire Document. Comment: In project areas within local RFPAs, IDL recommends that BLM contact the relevant local RFPA during the planning phase, and prior to finalizing individual treatment project plans, to coordinate any localized efforts or treatments.	See Public Concern Statement PO-1	
118	10	Public Outreach	N/A	Finally, we strongly recommend that the BLM involve state wildlife agencies - and other agencies and fire districts as needed - as cooperating partners from the beginning of the modeling/planning process for fuel break strategies, locations and implementation and monitoring. Fuel breaks should not compromise the ecological integrity of the ecosystem itself or specific habitats like migration corridors, critical winter range, sage grouse leks, or other important habitats identified by the state wildlife agency and the BLM.	See Public Concern Statement PO-1	

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107	6	Public Outreach	N/A	In conclusion, IFBF recommends that wherever Rangeland Fire Protection Associations (RFPAs) exist, they should be full participants in consultation and coordination with BLM as local fuel break projects are planned and implemented. The RFPA members have the knowledge of the geography and weather patterns to know the most effective places to place fuel breaks so that limited resources can be used most effectively. If no RFPA exists in an area, consultation should be initiated with local governments and/or the ranching community to seek their experience and input on project placement.	See Public Concern Statement PO-1	
78	2	Public Outreach	N/A	SCE respectfully requests the BLM coordinate with SCE prior to creating fuel breaks in the vicinity of SCE's facilities. Our employees and contractors are present on BLM-managed lands to support the on-going operation and maintenance of those facilities and their safety and that of the public is of primary concern to SCE. In addition, coordination is important to ensure that potential risks associated with smoke from fires and power lines is properly managed. Too much smoke in power lines can result in hazardous downstrikes underneath those lines, similar to lightning. This can cause a serious safety risk and increased potential for unexpected spot fires.	See Public Concern Statement PO-1	
126	1	Public Outreach	N/A	The BLM's Planning Process for the Great Basin Fuel Breaks should employ a collaborative resource management approach and meaningful coordination with multiple stakeholders, including State agencies, grazing permittees, private landowners, and academia. The ISDA encourages an increased effort by BLM in its consultation, cooperation, and coordination with local stakeholders during the planning of the Great Basin Fuel Breaks project. Stakeholders should be consulted and highly involved as site specific preparation and implementation begins. Local collaboration is critical to identifying the most effective locations for fuel breaks and the site-specific treatment methods best employed to achieve the goals of this project. Choosing the best possible network of strategic fuel breaks that are maintained into the future with input from State and local fire fighters, including RFPA members and other local expertise is crucial to an effective end product. In addition, the connectivity of fuel breaks treatments across various land ownerships is crucial for fuel breaks to be effective. Meaningful planning and coordination with various land owners including state land management agencies is imperative in this effort	See Public Concern Statement PO-1	
124	2	Public Outreach	N/A	The process outlined in the PEIS lacks involvement and commitments to involve both the state wildlife agencies and the various state agencies that manage state threatened and endangered plants. IDFG suggests the BLM increase cooperation in these regards. This should ensure that state agencies are closely involved with the development of the Final PEIS to establish appropriate Best Management Practices and Required Design Features at the programmatic level that meet with the desired outcomes of the projects.	See Public Concern Statement PO-1	
69	2	Public Outreach	N/A	The Service also encourages you to coordinate with state agencies when planning projects to ensure that the treatments will provide the intended benefits to species of conservation concern (e.g., greater sage-grouse) and Federally listed species	See Public Concern Statement PO-1	
103	2	Public Outreach	N/A	To maximize the efficacy of fuel break projects, EEI offers the following specific recommendations for identifying and implementing projects under the PEIS: * Ensure a consistent, but flexible, framework or process for identification and implementation of potential fuel breaks across the five BLM state offices to maximize stakeholder participation; many EEI members have service territories in more than one state in the Great Basin. * Ensure early outreach to electric utilities on potential fuel breaks in their ROWs to maintain an effective partnership for on-the-ground implementation of specific projects. * Clarify financial and operational long-term maintenance responsibilities for expanded "brown strips" or other firebreak projects adjacent to ROWs.	See Public Concern Statement PO-1	
84	7	Public Outreach	N/A	We recommend local BLM Field Offices work with counterpart State wildlife agency partners on site-specific prescriptions. This is especially crucial for wildlife resources such as critical habitat for greater sage-grouse (Centrocercus urophasianus) or mule deer (Odocoileus hemionus). Early coordination can also aid in better understanding of suitable access to the sites, and address concerns regarding invasive species management. We would appreciate a description or outline of how the PEIS will be implemented and rolled out to include partner participation regarding planning. We also recommend partnering with and funding local Rangeland Fire Protection Associations and others (e.g. state agencies, counties, ranchers, NRCS, conservation districts) to maximize implementation and maintenance actions.	See Public Concern Statement PO-1	

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96	3	Public Outreach	N/A	Ensure a consistent, but flexible, framework or process for identification and implementation of potential fuel breaks across the five BLM state offices to maximize stakeholder participation; PacifiCorp has service territories in more than one state in the Great Basin. Consistency on a programmatic level is important, as well as local flexibility to address site-specific conditions. * Early outreach to electric utilities on potential fuel breaks in their ROWs to maintain an effective partnership for on-the-ground implementation of specific projects. PacifiCorp would like to work with BLM to discuss such partnerships.	See Public Concern Statement PO-1	
125	2	Public Outreach	N/A	It is highly desirable that the BLM's planning process for the Great Basin fuel breaks employ a collaborative resource management approach and meaningful coordination with multiple stakeholders, including state agencies, grazing permittees, private landowners, and academia. The State encourages an increased effort by BLM in its consultation, cooperation, and coordination with local stakeholders during the planning of the Great Basin fuel breaks project. The State recommends that stakeholders be consulted and highly involved as site specific preparation and implementation begins. local collaboration is critical to identifying the most effective locations for fuel breaks and the site-specific treatment methods best employed to achieve the goals of this project. Choosing the best possible network of strategic fuel breaks that are maintained into the future with input from State and local firefighters, RFPA members, and other local expertise is crucial to an effective end-product. In addition, the connectivity of fuel break treatments across various land ownerships is crucial for fuel breaks to be effective. Meaningful planning and coordination with various land owners including state land management agencies is imperative in this effort. Strong collaboration would provide opportunities for state agencies to increase the effectiveness of a project by contributing to projects that have intermingled and/or adjacent state owned land. A BLM focus on inclusive collaboration would ensure close involvement in the development of the final PElS to establish appropriate Best Management Practices and Required Design Features at the programmatic level that meet the desired outcomes of fuel break projects.4) As BLM determines the location and treatment type of each fuel break throughout Idaho, include each state agency (OSC, IDFG, ISDA, DEQ, and IDL) in the process to ensure sensitive species in the project area and the economic vitality of the State are adequately represented. The State of Idaho devotes significant funding and resources each year to wildfire rehabilitation. The proposed project's effectiveness could be a factor in the decision the State makes to spend these dollars on rehabilitation after wildfire or on restoration efforts to improve habitat for sagebrush obligate species	See Public Concern Statement PO-1	
105	5	Public Outreach	N/A	Rather, ODFW proposes that the routes analyzed be considered as potential locations for fuel breaks, and requests that ODFW be consulted during any step-down NEPA analysis conducted to actually develop individual fuel breaks or fuel break networks in Oregon	See Public Concern Statement PO-1	
78	1	Public Outreach	N/A	SCE encourages the BLM to engage with affected stakeholders such as right-of-way holders early in the process of considering potential fuel breaks. In reviewing the Great Basin boundary described in the PEIS and the BLM's preferred alternative (Alternative D), it appears that several of the proposed fuel breaks are near or adjacent to SCE's distribution infrastructure and at least one transmission right-of-way and the roads used to access those power lines.	See Public Concern Statement PO-1	
48	7	Public Outreach	N/A	You need a steering committee or review committee or some sort of advisory committee consisting of stakeholders from different interest groups. Otherwise the BLM bureaucracy will swallow this project, stifle the flow of information needed to make changes, divert funds and energy to protect existing jobs and programs, and keep you from rocking the boat. A steering committee containing stakeholder will prevent many of these problems by asking questions and demanding real answers. They will not let you dawdle. A Great Basin wide committee and local committees that can provide local geographic insight would be ideal. The draft has not adequately considered the need for local input on individual fuel breaks.	See Public Concern Statement PO-1	
121	13	Public Outreach	N/A	12.)Further attempts at coordination with Nevada Department of Transportation, Nevada Department of Conservation and Natural Resources and those entities responsible for maintaining the roads must be made.- Their status of "no response" as shown in Table M-3 of Vol. II. is unacceptable.	N/A	The BLM has complied with regulations related to cooperating agencies in 40 CFR 1501.6. The BLM is not required to submit multiple invitations to potential cooperating agencies. If an agency would like to be a cooperator, they are welcome to request this status at any point in the NEPA process.

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130	1	Public Outreach	N/A	Scoping of the project in Washington was inadequate to garner sufficient localized input and ensure necessary resource protections for site-specific projects. The PElS identifies fuel break locations and treatments that will directly affect state or federal sensitive species on BLM lands and adjacent properties. Identification and avoidance of impacts on these species and their habitats should be a priority for the PElS. Given that the PElS does not provide information in Washington that ensures the protection of important species and habitats, I request that the BLM consult with the Department before any fuel breaks are constructed in the State of Washington.	N/A	In accordance with NEPA and CEQ regulations, the BLM solicited input from the public during public scoping. This included publication of the Notice of Intent in the Federal Register on December 22, 2017. In the Notice of Intent, the BLM specified that comments may be submitted until February 20, 2018. The BLM updated the project website, sent notifications to the project mailing list, and held 15 meetings in six states. The BLM will comply with applicable laws and regulations for fuel break construction and maintenance, including compliance with state and local laws. Additional design features for wildlife and special status species would be applied, including Design Features 39 through 68 in Appendix D of the Draft PEIS.
90	1	Public Outreach	N/A	Unfortunately, many of our comments on the Administrative DEIS did not effect any changes where we still strongly believe changes should be made. Attached below is a table that includes our previous comments, BLM's responses to these, and our new (or repeat) comments, clarifications, and requests on the current Draft PEIS.	N/A	In preparing this Draft PEIS, the BLM reviewed and considered comments received from cooperating agencies on the Administrative Draft PEIS. The BLM has sent the response to these comments to cooperating agencies.
131	83	Public Outreach	N/A	Finally, as you are aware, NEPA requires that agencies "present complete and accurate information to decision makers and to the public to allow an informed comparison of the alternatives considered in the EIS." Therefore, we request that all information used in developing the final EIS be posted online in a publicly available manner, preferably on a website that allows open access for all members of the public during all comment and objection periods for this project.	N/A	Sources used to develop the Draft PEIS are listed in Appendix B.2, Literature Cited. Many of these sources are publically available on the internet and for many, websites are provided. Any additional information used to prepare the PEIS will be shared as required by BLM policy. Further information could be obtained through compliance with applicable laws, such as the Freedom of Information Act (FOIA).
2	1	Public Outreach	N/A	1 I was never informed that the scoping comments could be made and that the deadline was 2/20/2019	N/A	In accordance with NEPA and CEQ regulations, the BLM solicited input from the public during public scoping. This included publication of the Notice of Intent in the Federal Register on December 22, 2017. In the Notice of Intent, the BLM specified that comments may be submitted until February 20, 2018. The BLM updated the project website, sent notifications to the project mailing list, and held 15 meetings in six states.
103	1	Public Outreach	N/A	In areas where there are opportunities to modify and expand the width of an existing ROW for use as a new fuel break, utilities and agencies should coordinate efforts.	N/A	Comment noted. Additional details regarding implementation of the PEIS, including future public and stakeholder outreach and coordination, will be included in the Record of Decision and specified during subsequent policy development. Potential partners would be identified as projects are proposed.
91	1	Tiered NEPA Compliance	TN-1	While this PEIS discusses the need for and use of site-specific NEPA analysis under some conditions ([1], p. 2), it is not clear how this will be enforced. Without proper monitoring, projects could be carried out that would violate this guidance for "determination of NEPA adequacy" ([1],p. 2).	Commenters expressed concern that determinations of NEPA adequacy (DNA) could be issued for the implementation of site-specific projects without public involvement or analysis of potential impacts. Commenters stated that issuing DNAs would violate the guidance under NEPA.	The BLM has complied with the CEQ regulations for implementing the procedural provisions of NEPA in 40 CFR 1506.6. In Appendix A, the PEIS provides maps of areas available for fuel break construction and maintenance and Appendix A has been revised to describe limitations in those datasets. The PEIS further describes the types of roads/ROWs available for fuel breaks and the types of fuel breaks in Chapter 2. Table 2-2 has been updated to include miles of each road maintenance level and ROW for each vegetation state in the analysis area. As such, the PEIS has disclosed the potential locations for the 11,000 miles of fuel break construction and maintanence. Further, the PEIS has analyzed the potential direct, indirect, and cumulative impacts in Chapter 4. Based on the information provided, the BLM is providing the public an opportunity to participate in the NEPA process and comment on the PEIS. The BLM will tier to this PEIS in accordance with Chapter 5 (Using Existing Environmental Analysis) of the BLM NEPA Handbook (H-1790-1) and CEQ guidance on the "Effective Use of Programmatic NEPA Reviews" (CEQ 2014).

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98	7	Tiered NEPA Compliance	N/A	While we understand that design elements (Appendix D) are intended to minimize adverse impacts of fuel breaks, the PEIS states that they would only be required "if applicable" (p. ES-3) as determined by district and/or field office resource specialists or from resource management plans. What will BLM do to ensure that the public is involved in site-specific decisions about fuel break projects and what design elements are appropriate for specific decisions? What opportunity will BLM provide for the public to provide input on whether the design elements should be applied? Will BLM use DNAs (Determination of NEPS Adequacy) to circumvent public involvement in the important decisions about what mitigating design elements actually will be applied? As discussed below, this PEIS does not provide a meaningful opportunity for the public to comment on potential impacts because of the broad scale of the area covered: therefore, relying on it to issue a DNA would not comport with NEPA.	See Public Concern Statement TN-1	
131	18	Tiered NEPA Compliance	N/A	BLM is proposing to shortcut NEPA with the proposed action, by avoiding site-specific environmental impacts analysis. The PEIS sets up a framework whereby impacts are evaluated at a programmatic level, and then Determinations of NEPA Adequacy (DNAs) will be issued for individual projects. A DNA is not a NEPA document, and contains none of the disclosure and analysis of environmental impacts which is required by NEPA.	See Public Concern Statement TN-1	
98	10	Tiered NEPA Compliance	N/A	Lack of public input: The PEIS states (p.2) that: "Whenever possible, this PEIS is intended to satisfy NEPA requirements for site-specific projects. As such, field staff could tier directly to this PEIS and complete an administrative determination for a proposed fuel break project, as documented in a determination of EPA adequacy...Additional NEPA analysis may be necessary..." It is impossible for the public to have input on proposed site-specific fuel break projects at the PEIS level, as the scale of maps in Volume 2 cover over a million acres in six states. If a BLM DNA eliminates the requirement for the BLM to do a site-specific Environmental Assessment (EA) on a fuels break proposal in Nevada, then there would be no opportunity for public input into BLM proposed fuel break projects.	See Public Concern Statement TN-1	
69	5	Tiered NEPA Compliance	TN-2	* In general, the Service supports the programmatic nature of the Fuel Breaks PEIS. The Service encourages the BLM to outline a clear step-down process for site-specific analysis to ensure the proposed actions meet the purpose and need at all scales. The Service worked with the BLM to develop a description of a step-down process that identifies the need for future projects that may affect listed species; however, the current language communicated in the first paragraph in Section 4.2.4 (Effects Common to All Action Alternatives) of the Fuel Breaks PEIS does not align with the step-down language the Service developed for the BLM.	Commenters stated that the PEIS should not exempt the BLM from the need to conduct site specific NEPA analysis, including site-specific resource surveys. The BLM should clearly communicate the proposed step-down process from the PEIS to site-specific analyses and implementation.	Per Chapter 5 of the BLM NEPA Handbook (H-1790-1), a Determination of NEPA Adequacy (DNA) can rely on the NEPA analysis in the PEIS. Through the DNA process, the BLM would determine whether site-specific resource surveys would be needed. Section 1.1. has been revised to cite the BLM NEPA Handbook; reiteration of existing policy in the PEIS is not needed (see guidance regarding EIS conciseness in 40 CFR 1502.). The PEIS does not authorize individual projects nor does it act as the policy and guidance for planning and implementing projects. Sources were referenced in the Draft PEIS (for instance, see Section 2.2.7) to assist offices in planning and implementing projects. Additional details regarding implementation of the PEIS, including site-specific analysis, will be included in the Record of Decision and specified during subsequent policy development. As stated in Section 1.1., the BLM would continue coordinating with state, and federal agencies, and Tribes. The PEIS does not change BLM's current processes and policies with regards to the ESA, NEPA, NHPA, other applicable laws, or MOUs and agreements with other agencies and organizations.
124	4	Tiered NEPA Compliance	N/A	Development of a step-down process to be included in the PEIS for future projects that may affect fish and wildlife to: 1) ensure state agencies will be engaged at the local level; and 2) provide the state agencies additional assurances that they will know when/where projects are occurring. IDFG encourages BLM to consider including within the PEIS a mechanism that requires projects be analyzed at the landscape-scale using the BLM sage-grouse Key Habitat Map to better understand the landscape-scale impacts of a project during project specific NEPA.	See Public Concern Statement TN-2	

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124	1	Tiered NEPA Compliance	N/A	Overall, IDFG applauds the programmatic nature of the PEIS but suggest that the BLM outline a clear step-down process for site-specific analysis to ensure the proposed actions meet the purpose and need at all scales. Additionally, we suggest that some level of prioritization mechanism enabling strategic implementation to facilitate the largest benefit at the lowest ecological consequence would produce the most benefit. The current level of flexibility outlined in the Preferred Alternative (D) is too great for our comfort, especially since there are some tools in the PEIS that are untested in areas with high resilience and resistance covered by the project area.	See Public Concern Statement TN-2	
135	2	Tiered NEPA Compliance	N/A	There are numerous project level and site-specific unknowns identified throughout Volume I of the PEIS. These unknowns prevent meaningful analysis and public involvement of alternatives B, C, and D and treatments impacts resulting from them.	See Public Concern Statement TN-2	
131	51	Tiered NEPA Compliance	N/A	While we are glad that BLM does not currently intend to apply this misguided project onto our protected lands, the PEIS leaves the door open for doing so in the future. "Should Field Offices decide to construct fuel breaks in these areas, additional site-specific analysis would be required," (PEIS at 4). It would be inappropriate to exclude these areas from analysis within the PEIS, and then allow individual BLM offices to propose fuel breaks within these areas if such proposals tiered off of this PEIS. Since the areas are excluded from analysis, the PEIS must make it clear that any proposal or development of fuel breaks within protected areas must not be tiered off of this analysis, and must not utilize any approvals of the PEIS in the future as justification for subsequent approvals. Any fuel break projects proposed within exclusion areas needs to be an entirely original proposal and NEPA analysis, and the PEIS should make that explicit and clear.	See Public Concern Statement TN-2	
125	5	Tiered NEPA Compliance	N/A	The State recommends that BLM outline a clear step-down process for site-specific analysis to ensure the proposed actions meet the purpose and need at all scales.	See Public Concern Statement TN-2	
76	3	Tiered NEPA Compliance	N/A	This programmatic EIS is not an adequate environmental assessment for site-scale implementation. Cumulative impacts must be assessed at a finer scale such as a watershed. It would be extremely irresponsible for the BLM, as a steward of our public lands, to implement the proposed action without further mid-scale environmental assessment. There are so many potential cumulative local impacts. This whole paragraph in the DEIS is bureaucratic mumbo-gumbo. You are basically giving the field offices a green-light to totally ignore local environmental impacts that are impossible to address at this programmatic level: “The alternatives evaluated in this PEIS would streamline future site-specific fuel break construction projects; however, site-specific actions may require further National Environmental Policy Act (NEPA) analysis. For instances where no additional analysis would be required, the BLM Field Offices may utilize a Determination of NEPA Adequacy (DNA) for site-specific fuel break projects; however, where needed a resource issue specific Environmental Assessment (issue-based EA) may be required. Examples of where additional analysis would be warranted include projects in areas excluded from analysis in this PEIS, projects outside of the potential treatment area, applying different tools than what were analyzed in this PEIS, and deviations from design features that would result in effects not disclosed in this PEIS.”	See Public Concern Statement TN-2	
131	22	Tiered NEPA Compliance	N/A	A. Monitoring, Maintenance, and Adaptive Management This section (PEIS at 5-6) has too many deferred actions that need to be discussed now in the PEIS, and not later at the site-specific project level, which will be outside of the public review process. Will these future adaptive management actions be categorically excluded from public review under NEPA?	See Public Concern Statement TN-2	
131	19	Tiered NEPA Compliance	N/A	While it is fine for BLM to conduct a project-specific NEPA analysis of fuel breaks construction in areas outside of the PEIS or using techniques not covered in the PEIS, this does not necessarily qualify as a site-specific environmental impacts analysis examining how fuel breaks construction may impact sensitive resources such as those outlined in this comment letter. 10 Additionally, it would be unacceptable for a project-specific EA to examine techniques or geographies outside the confines of the PEIS, and to then be used for tiering future projects off of. If changes need to be made to the BLM fuel breaks program at a programmatic level, a supplemental or revised PEIS needs to be prepared.	N/A	The BLM would comply with existing NEPA guidelines regarding tiering subsequent documents. The BLM concurs with the commenter's assertion that techniques or locations not analyzed within the PEIS would require additional analysis. No change to the PEIS is needed.

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125	6	Tiered NEPA Compliance	N/A	Additionally, the State suggests that some level of prioritization mechanism enabling strategic implementation to facilitate the largest benefit at the lowest ecological consequence would produce the most benefit. The current level of flexibility outlined in the Preferred Alternative (D) is significant, especially since there are some tools in the PEIS that are untested in areas with high resilience and resistance covered by the project area. The State recommends additional analysis and local level collaboration to identify treatment areas and a more constrained level of flexibility.	N/A	Section 2.2.4 of the Final PEIS has been updated to include details regarding the hierarchy of fuel break placement.
107	3	Tiered NEPA Compliance	N/A	On page 36, the PEIS states that only portions of the project area have been inventoried to current standards for cultural or tribal resources. It goes on to state that once specific project locations are determined "required site- and project-specific inventories and analyses are conducted." We recommend that unless the methods for creating and/or maintaining the fuel breaks are more invasive or destructive to potential cultural resources than a mega-range fire, then the project should be able to move forward without waiting for a cultural/archeological survey. Clearly disking a brown strip is more invasive than applying herbicides. Our members have had numerous routine projects held-up waiting for archeological surveys to be completed. There needs to be a way to streamline this process. Therefore, a site-specific survey and analysis should only be required if the methods used to implement or maintain the fuel break will be more destructive than a fire that could be prevented by the project itself.	N/A	The BLM will comply with existing cultural resource regulations including NHPA Section 106, as well as policies and guidelines set forth in the BLM 8100 Manual and Handbook, and agreements with the ACHP and SHPOs. These regulations, guidelines, and agreements do allow for reduced inventory and exempted undertakings under certain conditions where adverse effects to cultural resources would be unlikely.
56	7	Tiered NEPA Compliance	N/A	The recently released Draft Four Rivers Field Office (FRFO) RMP, talks about only accomplishing up to 4,000 acres of fuels reductions acres per year. I believe they will lose ground on the problem with such a low threshold, but looking at the success over the last 23 years of the entire Boise District, that is much more than they can actually accomplish. When their RMP becomes final, how will their RMP maximum numbers be affected by your final decision, since I didn't see your project amending theirs? Why did they not include acres from treatments like targeted grazing into the annual projections, since it will take year to accomplish this important task?	N/A	As stated in Section 1.4 and Design Feature 4 (Appendix D) in the Draft PEIS, the BLM would comply with guidance in applicable resource management plans as projects are proposed.
131	53	Air Quality	AQ-1	The final EIS must fully consider GHG emissions that could reasonably result from BLM's programmatic authorization. As discussed above, climate change is one of the main factors influencing fire frequency and severity within the project area.	The PEIS does not adequately address the potential for greenhouse gas (GHG) emissions and associated climate impacts from fuel breaks.	Some tools used to create or maintain fuel breaks may contribute to greenhouse gas emissions in the short term (e.g., prescribed fire); however, given the scale and duration of these impacts, and lack of long-term changes to fire regimes, the BLM has determined that they would be less than significant. As such, greenhouse gases have not been carried forward for detailed analysis in the PEIS. A brief analysis of climate has been included in Sections 3.3 and 4.4 of the Final PEIS.
131	53	Air Quality	N/A	The PEIS does not analyze greenhouse gas (GHG) emissions from fuel break construction and associated activities. This is a potentially significant impact that requires detailed analysis under NEPA. BLM cannot conclude that GHG emissions will be insignificant without quantifying and analyzing the likely contributions from projects tiered to the PEIS.	See Public Concern Statement AQ-1	
125	21	Air Quality	N/A	Air Resources. Comment: The Environmental Protection Agency (EPA) has not developed national ambient air quality, PM2.5 thresholds for sensitive receptors. All National Ambient Air Quality Standards are applicable, not just PM2.5. Prescribed fire emits pollutants that can impact criteria pollutants other than PM2.5.	N/A	In Sections 3.2 and 4.3.2 of the Draft PEIS, the BLM discloses that while other criteria pollutants are emitted from prescribed fire smoke, particulate matter is the primary pollutant resulting from the combustion of fuels and is typically of greatest concern with respect to health and visibility. Design feature 17 in the Final PEIS has been clarified to ensure compliance with the NAAQS.
98	22	Air Quality	AQ-2	Sec. 3.2: The PEIS fails to analyze, under the Air Resources section, the practical effects of "wind erosion" of fuel breaks. The dust that is created by brown strips and the public safety problems created during frequent high winds is causing brown-outs for drivers on Nevada roads. See video at: https://www.newsflare.com/video/117457/weather-nature/dust-storm-brings-very-low-visibility-to-nevada-highway?a=on&jwsource=clNor is any mitigation being proposed by BLM to reduce adverse brown strip dust effects on driver safety.	The PEIS should analyze the potential for dust-related impacts on air quality and public health and safety from the creation of brown strips.	Dust-related impacts have been adequately disclosed in Sections 4.3 and 4.4 (see pages 57 and 63 of the Draft PEIS). Specifically, the Draft PEIS states in Section 4.5.2 that "Brown strips would directly remove vegetation in the fuel break in the short term, which would prevent fire starts and dissipate flame lengths that facilitate suppression. Indirectly, and in the long term, this would reduce the acres of vegetation loss or conversion in sagebrush communities..." Design features 33 to 38 in the Draft PEIS would be implemented to minimize impacts to soil resources and reduce the likelihood for dust-related impacts.

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98	23	Air Quality	N/A	Sec. 3.4: The PEIS fails to discuss the incompatibility of constructing brown strips in fuel breaks with its responsibilities for resource management, including maintaining plant cover to reduce both wind and water erosion on public lands, using "the end justifies the mean" rationale that removing vegetation on public lands may save sagebrush vegetation from wildfires. The PEIS should discuss this inherent conflict and disclose the rationale for using brown strips despite their inherent adverse environmental effects.	See Public Concern Statement AQ-2	
3	1	Air Quality	N/A	Include all short and long term air pollution and loss of carbon sequestration that would negatively affect the area and the wilderness areas in the vicinity of the project.	N/A	Given the localized scale and short duration of potential change in carbon sequestration due to vegetation removal, the BLM has determined that these impacts would be less than significant. As such, changes in carbon sequestration have not been carried forward for detailed analysis in the PEIS. Design feature 17 in the Final PEIS has been clarified to ensure compliance with the NAAQS.
131	9	Climate and Meterology	N/A	While the PEIS alludes to the fact that increasing wildfire is due to increased exotics and historic fire suppression, it is silent on perhaps the most salient driver of increased wildfire: climate change. Without understanding the causes behind increased wildfire the chances of success of any proposed management is decreased. For example, historic fire frequency in the sagebrush vegetation communities that are the target of this action indicates a general fire return interval of 50 to 125 years in big sagebrush and sagebrush-grassland communities (Welch 2005), and up to 300 years in Wyoming big sagebrush (Baker 2011, Bukowski & Baker 2013). Biological and ecological characteristics of sagebrush suggest it did not evolve with frequent fires, so historical fire suppression may not be a driving factor in the development of wildfires in sagebrush systems as asserted in the PEIS Purpose and Need (ES-1). Similarly, several studies have found that climatological factors are more correlated with wildfire than biomass, especially in forests and pinyon-juniper woodlands (Dennison et al. 2014, Holden et al. 2007, Westerling et al. 2016, Westerling et al. 2006). Models are predicting that wildfire in the Great Basin is poised to increase due to climatological factors (Abatzoglou & Kolden 2011). Keyser and Westerling (2017) used climate data to develop fire severity models and predict where high severity fires are likely to occur. Managers can incorporate this information into pinyon-juniper treatments and conduct more targeted fuels reductions. As noted, the system of fuel breaks the BLM is proposing should be conducted in concert with the fuels treatment programmatic EIS. Areas of highest likelihood of high-severity fire should be identified and every effort made to limit the extent of fuel breaks installed. These two NEPA efforts are interrelated and should be presented to the public together.	N/A	Section 3.1 of the Draft PEIS acknowledges the influence of weather conditions on fire behavior, and thus annual changes in climate may also affect fire patterns. However, the BLM cannot change this influence. Instead, the BLM focuses fire and fuels management on changes to biomass and the abundance and continuity of fuels. The BLM is developing a separate but complementary PEIS for Fuels Reduction and Rangeland Restoration in the Great Basin. Section 4.2.8 of the PEIS has been revised to clarify the combined effects of the Fuel Breaks PEIS and the Fuels Reduction and Rangeland Restoration PEIS.
135	12	Cultural and Tribal Resources	CU-1	There is no discussion of how the preferred alternative would better protect the numerous cultural resources including archaeological sites, historic and architectural buildings and structures, other resources with important public and scientific uses, and sites of traditional cultural or religious importance to specific social or cultural groups. Tribal resources found throughout the project area are a subset of cultural resources and include a wide range of overlapping economic, social, traditional, and religious practices and uses.	Given that the PEIS is not site-specific and that sites of cultural and spiritual significance are not spread uniformly across the project area, the PEIS fails to adequately consider potential impacts to sites of cultural and spiritual significance to tribes.	Potential impacts to cultural and tribal resources from each alternative and proposed treatments are described in Section 4.8 of the Draft PEIS. In that section (pages 112-113), the PEIS describes the BLM's responsibilities, such as compliance with Section 106, tribal consultation, and conducting site-specific surveys. Project-specific Tribal consultation would be conducted to identify potentially affected cultural and tribal resources, such as those described in Section 3.7 of the Draft PEIS.

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131	56	Cultural and Tribal Resources	N/A	The PEIS in no way exempts BLM from needing to conduct site-specific resource surveys and analysis of impacts to cultural resources and site specific consultation pursuant to section 106 of the National Historic Preservation Act. The PEIS is by definition non-site-specific, and the FIAT plans upon which the PEIS is built do not contain analysis of impacts-merely descriptions of project recommendations. Projects such as fuel break creation can cause obvious and significant ground disturbance, threatening any cultural resources located there on the site. Additionally, piñon-juniper woodlands hold significant cultural and spiritual significance to Indian tribes, in particular the Paiute and Western Shoshone. This significance is not spread across the landscape uniformly-rather, certain places are more vital for pine nut collection or spiritual practices than others. Therefore, each project tiered off of the PEIS must contain site-specific impacts analysis and site-specific consultation with local tribes. Failure to do so could result in permanent and irreparable damage to cultural resources, and could constitute a violation of the National Historic Preservation Act.	See Public Concern Statement CU-1	
12	2	Cultural and Tribal Resources	N/A	While specific locations of tribal resources relevant to fuel breaks cannot be determined, tribal resources that have been identified as part of the affected environment of the project area." The above EIS statement proves the bias and inadequacy of the current proposal. The NEPA law requires that all relevant scientific information be provided to the American public and that that information be taken a "hard look" at by the decision makers. The National Environmental Policy Act (NEPA) requires that to ensure that environmental assessment statements reflect a careful consideration of the available science, and that areas of disagreement or uncertainty are flagged rather than being swept under the carpet. Thus, the public and the decision makers must resist the urgings of agencies that low-probability risks of very serious harms be dismissed from consideration or that the risk is evaluated only under the agency's favored theoretical model without taking into account the possibility that other credible models might be correct.	See Public Concern Statement CU-1	
84	4	Fire and Fuels	N/A	Fuel breaks need to be sufficiently large to ensure a tactical advantage for fire fighters to support "anchor, pinch and flank" methodologies. Will the proposed fuels breaks compliment these methodologies? A more robust discussion of how the fuel breaks would tactically support these methods would be beneficial. Once implemented, how will fire-fighting strategies be altered (i.e. direct vs indirect attack) to complement the benefits of these fuel breaks. A discussion of how the BLM will employ indirect attack and direct attack methodologies is needed. How will "back-burns" and retardant drops be utilized to compliment the fuel breaks? Will the BLM support the use of "indirect" fire retardant drops along fuel breaks?	N/A	Table 4-3 identifies minimum fuel break widths needed, based on local fuel and weather conditions. Modified fuels within the fuel breaks will reduce fire behavior, rates of spread and specifically flame lengths to under 4 feet under specific fuel and weather conditions. These minimum fuel break widths were developed from analysis completed and described in Appendix L. Additional detail has been included in that appendix regarding how the safe separation distance was calculated. More information on wildland firefighting strategies and tactics has been added to the Final PEIS in the Executive Summary and Section 4.1.
138	3	Lands and Realty (Not Analyzed)	N/A	Impacts to roads currently claimed under RS 2477. The BLM needs to evaluate the impact or potential impact of the proposed action on the resolution of RS-2477 assertions and the resolution process currently under way in Owyhee County. Owyhee County has asserted a ROW on all of the roads across public land that were in existence in 1976 and is engaged in an ongoing process for validation of those ROWs.	N/A	Fuel break construction, resulting from this analysis, would not interfere with ongoing or future R.S. 2477 assertions or evidence.
131	66	Lands with Wilderness Characteristics	LW-1	BLM states, "this PEIS addresses lands with wilderness characteristics that are managed to emphasize other multiple uses as a priority over protecting wilderness characteristics. Since these areas are not mapped throughout the project area, an accurate acreage of them is not available." PEIS at 37. While BLM may believe that other multiple uses take priority over protection of wilderness characteristics within these LWC units, wilderness is still a multiple use resource that must be analyzed as part of NEPA's "hard look" mandate. Whether LWC units are mapped throughout the entire project area does not excuse BLM from disclosing and analyzing impacts to LWC where it is available. For example, accurate and up-todate geospatial data is available for BLM-identified LWC throughout the entire project area in Utah. In fact, a review of the PEIS geospatial data indicates that 14,414 acres of proposed fuel breaks in Alternative D (7% of the project area) are within Utah BLM-identified LWC units. NEPA requires that, at a minimum, BLM disclose and analyze potential adverse impacts to this wilderness resource within the project area in Utah. Further, given the millions of acres of non- LWC lands throughout Utah that may be better suited for construction of fuel breaks, we request that all proposed fuel breaks be removed from the 14,414 acres of BLM-identified LWC in Utah.	The PEIS does not adequately explain how proposed fuel breaks could impact and potentially fragment areas with wilderness characteristics.	The PEIS does not authorize any actions; as stated in Section 1.1 of the Draft PEIS, either a Determination of NEPA Adequacy or additional NEPA analysis would be required for any project to ensure compliance with NEPA. As projects are proposed at the site level, BLM field offices will consult their updated LWC inventories and applicable land use plans before implementing projects to ensure that wilderness characteristics would not be impacted. In addition, site-specific settlements are not addressed in the Draft PEIS. Local BLM staff would adhere to any site-specific settlements before implementing any fuel break projects. Appendix A, Section A.1 has been revised to describe the accuracy of the maps. Due to missing or incomplete data, the exclusion areas depicted on the maps do not represent all exclusion areas within the project boundary. Instead, the field offices will defer to the exclusion areas described in Section 2.2.1 of the PEIS.

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131	67	Lands with Wilderness Characteristics	N/A	Additionally, LWC units and citizen proposed wilderness units encompass a large portion of southeastern Oregon portion of the project area. LWC and citizen-inventoried areas are the subject of the in-force Settlement Agreement between BLM and ONDA related to the Lakeview and Southeastern Oregon Resource Management Plan amendment processes.9 BLM failed to adequately analyze the impacts of the proposed fuel breaks and other treatments to wilderness character in Oregon LWC units.	See Public Concern Statement LW-1	
131	68	Lands with Wilderness Characteristics	N/A	In the Settlement Agreement, BLM agreed to study impacts of proposed actions to wilderness character on these lands through a NEPA process. ONDA estimates that hundreds, perhaps thousands, of miles of potential fuel breaks in the project PEIS project area may be within or immediately adjacent to LWCs and/or citizen-inventoried areas. Any fuel breaks proposed in the Lakeview and SEORMP planning areas are currently barred under the Settlement Agreement as they would diminish the size of these units and/or cause the units to no longer meet the criteria for wilderness character. These units should be excluded from the PEIS. Moreover, because it is "reasonably foreseeable" that these units may be managed to maintain their wilderness characteristics in the future under the final Lakeview and SEORMP amendments, BLM must take a "hard look" at any proposal that would affect wilderness characteristics. BLM should remove all Oregon LWCs from consideration for fuel breaks and other fuel treatments in the PEIS unless and until BLM has lawfully completed the agreed-to, binding and enforceable, Lakeview and SEORMP plan amendments.	See Public Concern Statement LW-1	
91	2	Lands with Wilderness Characteristics	N/A	Given that the BLM is currently under a legal agreement to complete inventories of lands with wilderness characteristics that fall within the scope of this PEIS ([2]) and not implement projects that would "diminish the size" ([2], Attachment A, p. 3, item 18), such lands may be protected from fuel break projects. Other unique sites and lands may not have such protection. A solution to this would be to assure that all projects require an additional NEPA at the site-specific level that may reference this PEIS but would include additional analysis and the option of public comment.	See Public Concern Statement LW-1	
131	69	Lands with Wilderness Characteristics	LW-2	BLM also should give special consideration to LWC units in the Vale District and Lakeview District that are contiguous with Wilderness Study Areas, where the assumption can be made that they legally must and will be managed to preserve their wilderness character. These areas in particular must be analyzed for the detrimental impact that fuel breaks will have on the wilderness values both to the LWCs and to the WSAs of which they are a part. Analysis must also determine whether the fuel breaks will negate the contiguity of these LWCs.	The PEIS does not describe the unique impacts fuel breaks could cause in LWCs adjacent to Wilderness Study Areas, which are managed to preserve their wilderness character.	As described in Section 4.11 of the Draft PEIS, fuel breaks within lands with wilderness characteristics managed for values other than wilderness character would impact naturalness, solitude, and primitiveness (see page 128). The PEIS does not authorize any actions; as stated in Section 1.1 of the Draft PEIS, either a Determination of NEPA Adequacy or additional NEPA analysis would be required for any project to ensure compliance with NEPA. As projects are proposed at the site level, BLM field offices will consult the applicable land use plans before implementing projects to ensure that specially designated areas, including Wilderness Study Areas would not be impacted. Impacts on adjacent Wilderness Study Areas are not considered, as the BLM does not manage for a buffer around these areas. Fuel breaks near a Wilderness Study Area would not affect the potential for designation as wilderness, as the impacts would not be pervasive and omnipresent.
131	69	Lands with Wilderness Characteristics	N/A	The contiguous LWCs in the Vale District that would be impacted by projects proposed in the PEIS include: OR-034-034 Squaw Creek OR-034-042 Prava Peak OR-036-057 Clarks Butte Contiguous OR-036-050 Oregon Canyon Mountain OR-036-035 Oregon Canyon (Contiguous) OR-036-008 Black Butte OR-036-030 Alcorta Rim OR-036-016 Hanson Canyon BLM should determine and disclose which LWCs in southeast Oregon are contiguous with WSAs and exclude these units from consideration for treatment under the PEIS.	See Public Concern Statement LW-2	

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131	62	Lands with Wilderness Characteristics	LW-3	Appendix G of the PEIS states, "[n]o effects on lands with wilderness characteristics managed to maintain or enhance those characteristics are expected, since no fuel breaks are proposed in these areas within the Fuel Breaks PEIS." PEIS at G-3. This statement is false. Utah BLM resource management plans (RMPs) developed in 2008 include the management of BLM "natural areas." BLM natural areas are LWC units that are managed for the protection of wilderness characteristics over other multiple uses. See, e.g., BLM Vernal Field Office, Record of Decision and Approved RMP (October 2008) at 34 (stating that "BLM natural areas will be managed to protect, preserve, and maintain values of primitive recreation, the appearance of naturalness, and solitude.").8 A review of the PEIS geospatial data indicates that 1,081 acres of proposed fuel breaks in Alternative D are located within BLM-managed natural areas within Utah BLM's Price, Vernal, and Kanab field offices.	PEIS geospatial data appears to have included acres of proposed fuel breaks located within LWCs that are being managed for wilderness character	The PEIS does not authorize any actions; as stated in Section 1.1 of the Draft PEIS, either a Determination of NEPA Adequacy or additional NEPA analysis would be required for any project to ensure compliance with NEPA. As projects are proposed at the site level, BLM field offices will consult the applicable land use plans before implementing projects to ensure that specially designated areas would not be impacted. Data representing the John D. Dingell Jr. Conservation, Management, and Recreation Act (2019) is still being gathered internally. Areas designated through that Act (e.g., natural areas, recreation areas, wilderness areas, national monuments, national conservation areas) would be excluded from this analysis. Section 2.2.1 of the PEIS has been revised to include these areas. The PEIS has also been revised to include NCAs, National Monuments, and natural areas managed to protect their wilderness character in Section 2.2.1.
131	61	Lands with Wilderness Characteristics	N/A	Appendix G of the PEIS states, "[n]o effects on Wilderness area expected because no fuel breaks are proposed in Wilderness in this PEIS." PEIS at G-3. This statement is false. On March 12, 2019, President Donald J. Trump signed the John D. Dingell, Jr. Conservation, Management, and Recreation Act of 2019 (Dingell Act) into law. Section 1231 of the Dingell Act includes conservation designations for public lands throughout Emery County, Utah, including 663,000 acres of designated wilderness. A review of the PEIS geospatial data indicates that 178 acres of proposed fuel breaks in Alternatives B, C, and D are located in the Desolation Canyon, Mexican Mountain, San Rafael Reef, Hondu County, and Muddy Creek Wilderness area, as established in the Dingell Act.	See Public Concern Statement LW-3	
131	60	Lands with Wilderness Characteristics	N/A	Contrary to BLM's statements, Alternative D includes proposed fuel breaks within Utah BLM-managed public lands identified and/or protected for conservation values including designated wilderness, a national monument, a recreation area, BLM-managed natural areas, and lands proposed for wilderness designation in federal legislation. Further, BLM violates NEPA by failing to adequately analyze and disclose potential adverse impacts to LWCs. As discussed below, BLM should remove all proposed fuel breaks on BLM-managed public lands in Utah that are located within designated wilderness, BLM-managed natural areas, the disputed Grand Staircase-Escalante National Monument, the San Rafael Swell Recreation Area, and America's Red Rock Wilderness Act. Furthermore, NEPA requires that BLM fully analyze potential impacts to LWC-regardless if those LWC units are managed for protection of wilderness values-including disclosing both the acres of LWC that may be impacted by proposed fuel breaks and how many acres of LWC will be permanently lost as a result of fuel break development.	See Public Concern Statement LW-3	
131	64	Lands with Wilderness Characteristics	N/A	While the PEIS does not specifically list congressionally designated recreation areas under the section titled "Other Special Designations Areas," this special conservation designation must also be considered as part of the PEIS. A review of the PEIS geospatial data indicates that 1,156 acres of proposed fuel breaks in Alternatives B, C, and D are located within the 216,995-acre San Rafael Swell Recreation Area, as established in Section 1221 of the Dingell Act.	See Public Concern Statement LW-3	

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97	1	Livestock Grazing (Not Analyzed)	LG-1	As part of the environmental training provided for all project personnel, BLM should include information about how such projects will affect livestock grazing. Personnel should understand the affects these projects may have on livestock grazing and the social and economic impacts on surrounding counties. Training should be provided for any adjustments to livestock grazing, such as: possible AUM reductions or any area of permitted allotments being unavailable for grazing during a project. Any changes in management or stocking numbers of livestock should be coordinated and communicated with the affected permittees prior to any adjustments. Temporary and permanent reductions in livestock numbers are harmful not only to producers, who are forced to reduce their herds, but also to local communities. Consequently, local economies are receiving less economic benefits when permitted livestock AUMs do not accurately reflect the sustainable amount of forage that could be used by livestock on public lands.	The PEIS should more clearly describe how proposed fuel breaks projects at the site-specific level will impact livestock grazing, including temporary and permanent changes in AUMs.	As stated in Section 2.2.4, the alternatives would not change permitted grazing in accordance with 43 CFR 4130.2, which includes AUMs, season of use, or numbers of livestock. Section 2.2.5 of the Final PEIS has been revised for clarity. The PEIS is required to analyze the impacts of a federal action that will have a significant effect on the human environment. Those resources determined to have less than significant impacts are described in Appendix G of the Draft PEIS and include livestock grazing. Appendix G has been revised to include additional explanation for why impacts on livestock grazing are less than significant. Design Feature 19 (Appendix D) in the Draft PEIS has been included to address coordination with permittees, and this is further described in the graduated use plan in Section D.1 (Appendix D) of the Draft PEIS. Additional details regarding implementation of the PEIS, including targeted grazing, will be included in the Record of Decision and specified during subsequent policy development.
97	10	Livestock Grazing (Not Analyzed)	N/A	The BLM should consider the effect that these treatments would have on domestic livestock grazing in collaboration with permittees and allow additional AUMs in other grazing areas in the case of temporary AUM reductions. In the likely case that these treatments result in an increase in forage production, the BLM should implement a sustainable increase in AUMs.	See Public Concern Statement LG-1	
97	11	Livestock Grazing (Not Analyzed)	N/A	Page G-6, G.1 Livestock Grazing (82 PDF) BLM should include the following language in this section: "The BLM does not intend to permanently reduce livestock grazing AUMs in the treatment areas. The BLM also recognizes the positive social and economic benefits that livestock grazing has on local communities."	See Public Concern Statement LG-1	
97	8	Livestock Grazing (Not Analyzed)	N/A	Page G-5, Livestock Grazing (81 PDF) To edit and read as follows: "Fuel breaks may require short-term exclusions of livestock grazing from certain areas, but the BLM will coordinate with applicable permittees prior to making any exclusions or reductions to livestock grazing. Voluntary best management practices would reduce…"	See Public Concern Statement LG-1	
58	1	Not Analyzed in the EIS	AN-1	On our allotment our riparian areas are managed with stubble height triggers and/or 10% stream bank alteration. Hitting either trigger results in the removal of cattle from that pasture leaving behind heavy fuel loads surrounding the riparian area and in the uplands. The areas omitted from analysis described in Chapter 2 includes riparian conservation areas and lands with wilderness characteristics. Riparian areas offer the perfect opportunity to create an expansive greenstrip with minimal vegetation disturbance. Because of the presence of water, the systems stay green much longer than surrounding upland areas. Since riparian areas are generally preferred grazing areas for wildlife and livestock, the vegetation (fuel) load is generally reduced a green strip. A green strip could be successfully maintained or interseeded using livestock as the mechanism to reduce biomass and incorporate seed into the soil. This is especially true in remote areas with limited access (i.e., Maintenance Level l roads).	The PEIS should analyze how to enhance the presence of special aquatic features and riparian areas on the landscape through the creation of green strip fuel breaks in these areas.	Riparian Conservation Areas (renamed in the Final PEIS as “Riparian Exclusion Areas”) have been excluded from the analysis area, as described in Section 2.2.1. However, at the site-specific level, the BLM could conduct additional site-specific analysis to use riparian areas as greenstrips, depending on their location, project objectives, and anticipated effectiveness of such an approach.
118	9	Not Analyzed in the EIS	N/A	The influence on riparian and mesic meadows/systems was minimally discussed and analyzed and it is not clear how they will potentially be impacted or enhanced and utilized as natural features to deter fire. This should be further analyzed, supported with literature, and discussed in the PEIS.8. The PEIS does not appear to adequately address fuel breaks that may be planned within proximity to streams or riparian areas. This should be further analyzed and discussed.	See Public Concern Statement AN-1	

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57	4	Not Analyzed in the EIS	N/A	The areas excluded from analysis described in Chapter 2 includes riparian conservation areas and lands with wilderness characteristics. Riparian areas offer a prime opportunity to create an expansive green strip fuel break with minimal disturbance in the vegetation. Because of the presence of water, the systems stay green much longer than surrounding upland areas. Since riparian areas are generally preferred grazing areas for wildlife and livestock, the vegetation (fuel) load is generally reduced when comparing it, again, to adjacent upland areas. We are not proposing additional grazing use of riparian areas but rather taking advantage of the natural system in an effective manner. Not all riparian areas will be appropriate for use as a fuel break, but likely some will be. The removal of sagebrush in drying riparian systems would be a good way to create wider fuel breaks while benefiting the riparian area since this would be removing invading brush as well as eliminating a highly flammable plant. While not all treatments proposed in the EIS would be suitable for managing riparian areas to assist with fire management, it seems shortsighted to not consider the use of these riparian areas in this management strategy.	See Public Concern Statement AN-1	
84	2	Not Analyzed in the EIS	AN-2	Riparian, meadow, and mesic systems were only addressed in so far as not treating them or implementing fuel breaks in these areas. These are highly valuable natural areas serving as very effective fuel breaks. We recommend elevating the importance of enhancing riparian and meadow features that can be utilized on the landscape to discourage wildfire spread.	The PEIS should analyze how fuel break construction will impact riparian areas and wetlands, mesic meadows, and other special aquatic features in the project area.	Buffers around the Riparian Exclusion Areas defined in Section 2.2.1 are intended to prevent impacts on riparian areas, including indirect impacts from dust, sedimentation, or fragmentation. An additional design feature has been included to avoid chemical drift into the riparian exclusion area or other aquatic species-specific buffers (see design feature 45 in Appendix D of the Final PEIS). Fuel breaks could be constructed in riparian areas with additional site-specific analysis, as described in Section 2.2.1.
51	1	Not Analyzed in the EIS	N/A	On this page there is a list of areas that would not be affected by any of the alternatives so they won't be addressed further. A project this large will create dust pollution and habitat fragmentation in nearby riparian resources and wilderness areas.	See Public Concern Statement AN-2	
84	9	Not Analyzed in the EIS	N/A	The PEIS does not address fuel breaks within 300 feet of perennial streams, mesic meadows, or other special aquatic features, or within 150 feet of seasonally flowing streams (intermittent and ephemeral). Although we appreciate this PEIS being conservative, this may also render a fuel break ineffective. Will additional site-specific analysis (e.g. DNA) tiered from this PEIS sufficiently account for these areas, or should these considerations be incorporated into this PEIS?	See Public Concern Statement AN-2	
50	1	Not Analyzed in the EIS	N/A	This section states the fuel break construction will be done up to 300' of Riparian Conservation Areas and wetlands. The construction of thousands of miles of fuel breaks in 6 states will cause dust and particulate matter pollution that will travel over 300'. Table 3-1 on Page 27 shows there are thousands of acres of highly erodible soils in this Project Area.	See Public Concern Statement AN-2	
106	11	Public Health and Safety (Not Analyzed)	N/A	Public health, welfare, and/or safety are key concerns of NEPA, as demonstrated by their citation in Section 2, Section 101(b)2., Section 101(b)3., Section 101(c), Section 204.4., and 42 USC Subsection 4372(d)4. of this foundational legislation. The CEQ regulations also provide extensive guidance on the analysis of public health, welfare, and safety. However, the draft EIS expresses no concern in the purpose and need about enhancing protection of the public, has no description of the current threat to public well-being from wildfires on BLM lands, and presents no analysis of how and by how much this threat would be reduced by the implementation of the action alternatives relative to the no action alternative. Fuel breaks construction activities such as mowing, chaining, harrowing, and tilling involve the use of heavy equipment on rough terrain. As such, construction and maintenance of the fuel breaks would pose threats to worker safety. There is no analysis in the draft EIS of impacts on worker safety. Solution: Add a goal of improving public health, welfare, and safety to the purpose and need. Revise Chapter 3 to include a description of the existing threat to public health, welfare, and safety posed by wildfires. Revise Chapter 4 to analyze impacts on the public and workers based on the NEPA "significance" factors of intensity and context discussed in my comment 6.	N/A	Public health and safety are addressed through compliance with multiple federal regulations and further interpreted through internal policies (e.g., BLM Manuals and Handbooks). To ensure the safety of operators, the BLM requires that operators be certified to operate equipment. That certification implies safe operating procedures are known and will be followed. Threats to the public as a direct result of an active wildfire are addressed in the Draft PEIS in Sections 4.3 (Air Quality), Section 4.10 (Recreation). Sectopm 4.12 (Social and Economic Impacts), and Section 4.12 (Environmental Justice). The risk is reduced as the number and size of fires are reduced.

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106	12	Recreation	N/A	The draft EIS is missing an analysis of impacts on dispersed camping. As indicated in draft EIS Table 3-8, visitors conduct more than 20 million dispersed area visits per year on BLM lands in the affected area. This dispersed use represents more than half of all estimated recreation use on BLM-administered lands in the Great Basin. Many of these visits employ dispersed campsites. Typically, dispersed campsites are pull-offs within a few dozen yards of a primitive road. A key feature is vegetation that is at least as tall as a vehicle. Such vegetation is highly attractive because it shelters campers from the wind, produces some shade late in the day and, most importantly, provides privacy. As a result, pinyon-juniper woodlands are preferred areas for dispersed camping. The action alternatives could eliminate virtually all dispersed camping in the vicinity of the fuel breaks. Prospective campers would not want to camp in the open in low vegetation near a primitive road, and few would drive their vehicles across 250 feet of unroaded terrain to reach the taller pinyon-juniper woodland vegetation remaining beyond the fuel break. This is expected to result in the direct, long-term loss of several million visitor use days annually on BLM lands throughout the Great Basin region. The action alternatives would also produce indirect adverse effects on wildlife and special status plants by moving much of the remaining dispersed camping into high-value riparian corridors where taller vegetation was retained. Solution: Add an analysis of impacts on dispersed camping. I gave you a good start - make it better, and include accurate quantification of impacts.	N/A	As required by 40 CFR 1502.16, the PEIS provides a discussion of the environmental impacts of the alternatives, including the proposed action, on recreation (see Section 4.10 of the Draft PEIS). The BLM provided sufficiently detailed information to allow the public to understand the environmental consequences associated with the alternatives. Section 4.10.2 of the Draft PEIS adequately describes the potential for displacement of recreation opportunities, which includes dispersed campsites, and subsequent increased visitation to other areas (see page 123 of the Draft PEIS). As described in Section 2.2.1, riparian areas are excluded from fuel break construction and are buffered upt to 300 feet. The PEIS does not authorize any actions; as stated in Section 1.1 of the Draft PEIS, either a Determination of NEPA Adequacy or additional NEPA analysis would be required for any project to ensure compliance with NEPA. As projects are proposed at the site level, BLM field offices will apply design features as needed to reduce impacts on recreation.
2	3	Recreation	RE-1	Human entry into national forests is a proven risk factor for forest fires starting, whether by thrown cigarettes, matches, campfires and by sparks from steel. BUT THIS INCREASED RISK from creation of access firebreaks has nowhere been considered. For a project of this extreme size, the standard of worry should be, "Do the data prove that there is NOT a risk?"	The PEIS should include an analysis of how the implementation of fuel break projects might increase human access as a result of fuel break implementation.	As described in Section 2.2.5 of the Final PEIS, no new roads would be created and the BLM would not improve roads beyond their current definition. This text has been revised in the Final PEIS to specify that this includes the maintenance level. Since the maintenance level of the road would remain the same, the same types of vehicles would be able to access the roads. No fuel break is anticipated to provide better driving conditions than the road it is adjacent to, since most fuel breaks would be vegetated. As a result, there would be no increase in the likelihood for fire starts or additional user-created routes.
124	8	Recreation	N/A	The PEIS should include an analysis of how the implementation of fuel break projects might increase human access as a result of fuel break implementation. This should include how fuel break implementation might result in the establishment of additional user-creates travel routes further degrading the habitat quality of adjacent areas for sage grouse.	See Public Concern Statement RE-1	
125	18	Recreation	N/A	The State recommends that BLM include an analysis of how the implementation of fuel break projects might increase human access as a result of fuel break implementation, within the PEIS. For example, consider on how fuel break implementation might result in the establishment of additional user-created travel routes that further degrade the habitat quality of adjacent areas for sage-grouse.	See Public Concern Statement RE-1	
98	6	Recreation	RE-2	Constructing fuel break strips 250 feet on either side of typical two-track (level 1) roads will diminish the primitive character of sagebrush communities enjoyed by recreationalists, as well as its visual integrity.	The PEIS does not fully or accurately analyze how fuel breaks could alter the primitive character or visual integrity of the landscape that contribute to the recreation setting.	Impacts on the primitive character or visual integrity of the landscape are adequately analyzed in the Draft PEIS in Section 4.10, Recreation, and Section 4.11, Lands with Wilderness Characteristics Managed for Values Other Than Wilderness Character (e.g., see Draft PEIS Section 4.10.2, pp. 123-124 and Section 4.11.2, page 128). Further, impacts related to the potential loss of economic contributions associated with displacement of recreation are analyzed in the Draft PEIS in Section 4.12.2 (see page 133). Text has been added to the introduction of Chapter 3 to describe where visual impacts are addressed in the PEIS. Appendix G has been revised to describe the contrast rating form process needed to analyze impacts on visual resources at the site-specfic level.

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109	12	Recreation	N/A	The BLM also failed to incorporate an aesthetic "visual" analysis of fuel breaks and loss of recreation economic opportunities analysis. Implementing 11,000 miles of breaks that are unattractive across undeveloped and natural public lands will reduce public's interest in recreation and conservation of these lands, which in turn will reduce recreation economic opportunities for local communities. Birdwatching is in in the top five of preferred recreation opportunities on public lands and birdwatching economic impacts should be considered in these types of PEISs. Granted, burned sagebrush landscapes are not attractive either. The point here is that with the correct analyses BLM could put in fewer miles of fuel breaks that are more effective at lowering fire risk and controlling fire, preserve natural landscapes and natural habitats that the public enjoys, and save money for other needed projects.	See Public Concern Statement RE-2	
135	11	Social and Economic Impacts	SE-1	The preferred alternative fails to identify how it would better insure revenue generated from livestock grazing, fluid mineral leasing, mining, recreation, ROW development, and production of forest and woodland products than the no action alternative.	The PEIS fails to identify how each of the action alternatives would better ensure revenue generated from livestock grazing, fluid mineral leasing, mining, recreation, ROW development, and production of forest and woodland products than the no action alternative.	The purpose of the PEIS is not to ensure increased revenue generated from uses of BLM lands. However, both beneficial and adverse social and economic impacts, including those on livestock grazing, mining and fluid mineral development, recreation, and woodland product harvest, are described in Section 4.12 of the Draft PEIS.
107	4	Social and Economic Impacts	N/A	On page 38, under the heading of Social and Economic Conditions, the PElS states "Across the project area, the greatest percentage of each state's population is employed in service industries. Farming, agriculture, forestry and fishing and other jobs more directly related to public land use represent a minor portion of the state employment; however, these jobs may represent a higher proportion of employment at the local level." That is a gross understatement of the situation, at least in Idaho. Near BLM lands, the vast majority of jobs in rural Idaho are farming and ranching or jobs directly related to these sectors. Several Idaho counties are very similar to a county in Wyoming detailed in this study: https:!lwyocre.uwagec.org!Publications!ParkGrazFinaIRpt23Aug05.pdf. The direct economic impacts would be expected to be very similar in Idaho counties where large tracts of BLM land exist within the project area. Perhaps this study, or others similar to it could be used to strengthen the Social and Economic Conditions section of the PElS to illustrate the severe loss to local rural economies when vast expanses of rangeland burn and are no longer available for grazing for several years. It is definitely an extreme hardship on local ranchers and many simply cannot continue their ranching business following a catastrophic wildfire event due to a lack of forage at key times of the year. This causes a negative cascading effect throughout the local rural economy.	See Public Concern Statement SE-1	
106	1	Social and Economic Impacts	SE-2	Despite these statutory and regulatory requirements, the economic costs of the alternatives, or any inclusion to a reference or appendix with this information, are totally absent from the draft EIS. The only discussion of costs is in Table 4-9, which provides the rather useless year 2010 range of costs of sagebrush treatments on a per-acre basis. There is no way, from the information in the draft EIS, for members of the concerned public (who are key participants, according to Section 101(a) of NEPA and many parts of its implementing regulations) to determine economic costs of the alternatives. Solution: Provide economic cost data, including enough supporting information so the concerned public can understand how the total cost for each alternative was derived. Include costs for successive treatments that typically would be expected (for example, on X% of the treated area) because, as stated in the EIS, initial treatments may not be not completely effective in some areas. Cost data should consistently be provided in year 2019 or year 2020 dollars.	The BLM should provide costs and a cost-benefit analysis of planning, implementation, and maintenance of fuel breaks in perpetuity under each of the alternatives, particularly in relation to the costs and benefits of fire suppression.	The BLM is not required to conduct a cost-benefit analysis, in accordance with 40 CFR 1502.23. The appropriate level of analysis for a programmatic-level NEPA document has been included in the Draft PEIS in Chapter 4.
122	9	Social and Economic Impacts	N/A	Additional strategic planning, including cost-benefit analysis, should be required in all action alternatives to ensure new fuel breaks are properly located.	See Public Concern Statement SE-2	

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106	3	Social and Economic Impacts	N/A	The EIS team should first develop and include in the EIS accurate cost data for fuel breaks annual maintenance and for average annual fire suppression costs for comparable geographic areas. For example, if fire suppression cost data are only available for Utah, Nevada, and Idaho, then annual fuel breaks maintenance estimates should be developed for the same three states. The BLM should then conduct and include in the EIS a cost-benefit analysis for each alternative, including the no action alternative, for those comparable geographic areas. Section 1502.23 of the CEQ regulations calls for such an analysis if it is "relevant to the choice among environmentally different alternatives being considered for the proposed action." Clearly, that is the case for this proposed fuel breaks action. The cost-benefit analysis should include initial implementation costs amortized over a reasonable period as well as the perpetual annual maintenance costs.	See Public Concern Statement SE-2	
109	11	Social and Economic Impacts	N/A	The BLM failed to provide an economic analysis of the cost of planning, implementation, and maintenance of fuel breaks in perpetuity.	See Public Concern Statement SE-2	
107	5	Social and Economic Impacts	N/A	There appears to be an error on page 39. Under the heading Contributions from Public Lands, the PEIS states "In 2017, BLM lands in the project area supported a total of 6,001,584 active animal unit months of forage allocated to livestock grazing. In fiscal year (FY) 2016, livestock grazing licenses, leases, and permit receipts for the project area was $6,154,503 (BLM 2017)." We recognize that the figures cited are from two different years, but the number of AUMs in the project area should be somewhat similar from one year to the next, yet the receipts reported would indicate a value of just over $1 per AUM. The actual price per AUM in 2016 was $2.11. This means there would have been a more than 100% increase in AUMs from 2016 to 2017 for these two figures to be accurate. This is possible but does not seem likely.	N/A	The disconnect between the total active AUMs reported and the receipts collected noted in the comment was due to two issues. The first of which is the difference between active AUMS (as was reported for AUMs in the DEIS), and authorized/billed AUMs (as used to calculate the receipts collected in the DEIS). While the number of AUM permitted by the BLM generally remains stable from year-to-year, the actual amount of grazing that takes place each year on BLM-managed lands can be affected by such factors as drought, wildfire, and market conditions. The text has been edited to reflect this difference and to include data for authorized AUMs in 2016. The second issue is an error in the reporting of the total receipts collected. This data has been corrected in Section 3.12 of the Final PEIS.
98	5	Soil Resources	SR-1	The massive disturbances due to proposed construction and maintenance of fuel breaks will reduce soil stability and increase soil erosion along Nevada roadsides.	The PEIS should provide additional analysis regarding the potential impacts of fuel break on soil stability and soil erosion in the project area.	The effects of treatments to soil resources have been adequately described in Section 4.4 of the Draft PEIS. In addition, design features 33-38 were included in the Draft PEIS to limit negative impacts to the soil resource associated with treatment methods described in the PEIS.
135	9	Soil Resources	N/A	The preferred alternative fails to identify how it would prevent increased soil erosion caused by the treatments relative to the no action alternative.	See Public Concern Statement SR-1	
131	26	Soil Resources	SR-2	Damage to intact desert soils with biotic crusts and the resulting increased siltation during flooding and dust should be analyzed in the PEIS. Biological crusts protect the soil and hold weeds at bay, including cheatgrass. For example, Ponzetti et al. (2007) found that intact biological soil crust with native perennial bunchgrass-that was not trampled and disturbed by livestock grazing-was resilient to cheatgrass invasion. It also recovered after wildfire. Adding both mechanical and livestock disturbance will break this resilient soil crust where it is present now, and potentially lead to cheatgrass increase.	The PEIS should provide additional analysis regarding the potential impacts of fuel break on desert soils and biotic soil crusts.	The effects of treatments to soil resources have been adequately described in Section 4.4 of the Draft PEIS. An assumption has been added to that section regarding the likelihood for impacts to biological soil crusts (see Section 4.5 of the Final PEIS). In addition, design features 33-38 were included in the Draft PEIS to limit negative impacts to the soil resource associated with treatment methods described in the PEIS.
131	25	Soil Resources	N/A	On the Colorado Plateau, for example, biological soil crusts play a critical role, as delineated in the PEIS. They improve resistance by reducing invasive annual grasses (Chambers et al. 2014). These soils are easily damaged, and the activities associated with fuel break construction will damage soils, increase erosion, and provide greater opportunities for establishment of invasives, especially where such species 16 already occur and can provide a seed source. BLM admits these impacts but asserts, without justification, that they would be temporary and the reduction in wildfire would be beneficial to soils and biological soil crusts in the long term. There is no support for this contention, however, and by putting it forward BLM is proposing to allow a high degree of certain resource damage for a nebulous result that is much less certain than it is admitting. In addition, the PEIS fails to analyze impacts to biological soil crusts. Biological soil crust is a mix of organisms that occupy and protect the surface of the soil in most desert ecosystems. The organisms often include filamentous and non-filamentous cyanobacteria, mosses, lichens, liverworts and fungi.	See Public Concern Statement SR-2	

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6	6	Soil Resources	N/A	Why should land management focus on biocrusts? Because soil biocrusts are the foundation of sage steppe ecosystem. Jeanette Ponzetti summarized the functions of biocrusts: 1. Terricolous lichens and bryophytes reduce soil erosion by providing soil surface cover, trapping and binding soil particles, and creating rough surface microtopographies. [Ponzetti et al. 2007] 2. Soil algae, cyanobacteria and fungal hyphae increase soil aggregate stability by physically binding soil particles with polysaccharide exudates. 3. crusts composed of free-living and lichenized cyanobacteria contribute fixed atmospheric nitrogen to arid and semi-arid ecosystems. 4. Collectively, biotic crusts increase availability of nitrogen and other minerals for vascular plants, and increase soil carbon and organic matter content. "Biotic crust species richness and cover were inversely related to cover of the invasive annual, cheatgrass (Bromus tectorum), and positively related to cover of native bunchgrasses. Integrity of the biotic crust was more strongly related to cheatgrass than to fire. In general, we observed good recovery of crusts following fire, but only in those areas dominated by perennial bunchgrasses" [Ponzetti et al. 2007].By stopping the compaction and breakage of the fragile biocrusts, the soil surface could begin regrowth, and would therefore increase water availability, decrease soil loss by wind and water erosion, increase diversity and abundance of soil biota, and increase nutrients to associated plants. These are crucial benefits to the re-establishment of native bunchgrasses.	See Public Concern Statement SR-2	
48	2	Special Designations (Not Analyzed)	SD-1	A fuel break could be constructed there that would not make the Oregon Trail experience significantly different then that enjoyed today. Any temporary disturbance would be more than offset by a permanent improvement to the security of the trail and surrounding resources. The trail is simply a narrow linear depression filled with cheatgrass, medusa head wild rye and skeleton weed. In most places you need to use binoculars to spot native vegetation. Replacing these plants with forage kosha or crested wheat does not seem to be a significant difference. Using intensive grazing to reduce the fuel loads along this route also does not seem to deviate from the historic nature of the Oregon trail. When the trail was active there was certainly sparse forage and fuel available. It would not be difficult at all to create fuel breaks along the trail that would still permit water infiltration and protect against soil erosion far better than is occurring now with the weeds. A fuel break here would also reduce the likelihood that the physical structure of the trail itself would be damaged by vehicles passing over it in the effort to suppress the fire. Even though fire suppression efforts are stalled initially by the Oregon Trail they eventually occur anyway although too late to be nearly as effective as they could have been if they progressed quickly initially.	The draft PEIS has not sufficiently studied the impact of excluding fuel breaks within National and Historic Trails or left any future opportunity for consideration of possible exceptions to this policy.	The Draft PEIS did not analyze fuel break construction within National and Historic Trail corridors due to the variable conditions in these areas and lack of site-specific information. If a BLM district or field office wanted to construct a fuel break within a National and Historic Trail, additional site-specific NEPA analysis would be required (see Section 2.2.1 of the Draft PEIS). Specific design features would be applied to minimize impacts in these areas.
48	1	Special Designations (Not Analyzed)	N/A	The draft EIS excludes the creation of fuel breaks within National and Historic Trails. Fuel breaks along these trails should be allowed on a case by case basis. Continuing wildfire does not serve the value of the Oregon trail or any of the other resources located near the Oregon Trail. Following a simplistic rule of avoiding disturbance in the area of the trail only results in much greater disturbance to the trail and surrounding resources. This is not a productive management decision. The draft has not sufficiently studied the impact of excluding fire breaks within National and Historic Trails of left any future opportunity for consideration of possible exceptions to this policy.	See Public Concern Statement SD-1	
131	65	Special Designations (Not Analyzed)	SD-2	The PEIS must analyze and disclose the potential impacts of the fuel breaks project on lands subject to proposed federal wilderness legislation in Utah. A review of the PEIS geospatial data indicates that 24,251 acres of proposed fuel breaks in Alternative D (11% of the proposed project area in Utah) are located within lands proposed for wilderness designation in America's Red Rock Wilderness Act. H.R. 2044, S. 948 (115th Congress).	The PEIS must analyze and disclose the potential impacts of the fuel breaks project on lands that are proposed special designations or whose special designation is in contention.	The PEIS does not authorize any actions; as stated in Section 1.1 of the Draft PEIS, either a Determination of NEPA Adequacy or additional NEPA analysis would be required for any project to ensure compliance with NEPA. As projects are proposed, BLM field offices will consult their applicable land use plans before implementing projects to ensure that specially designated areas would not be impacted. In addition, site-specific settlements are not addressed in the Draft PEIS. Local BLM staff would adhere to any site-specific settlements and use the most up-to-date special designations boundaries before implementing any fuel break projects. Appendix A, Section A.1 has been revised to describe the accuracy of the maps. Due to missing or incomplete data, the exclusion areas depicted on the maps do not represent all exclusion areas within the project boundary. Instead, the field offices will defer to the exclusion areas described in Section 2.2.1 of the PEIS.

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131	63	Special Designations (Not Analyzed)	N/A	Appendix G of the PEIS states, "[t]he Fuel Breaks PEIS does not propose treatments in NCAs or National Monuments. It is assumed that most of these areas have management direction regarding treatments and ground disturbance." PEIS at G-4. On September 18, 1996, President William J. Clinton issued Proclamation 6920, establishing the 1.88 million acre Grand Staircase-Escalante National Monument (GSENM) pursuant to his authority under the Antiquities Act of 1906. On December 4, 2017, President Trump issued Proclamation 9682, which reduced the size of GSENM by nearly half-to approximately 1 million acres. The legality of President Trump's rescission of GSENM is the subject of pending federal litigation, and we maintain that Proclamation 9682 is illegal. A review of the PEIS geospatial data indicates that 6,627 acres of proposed fuel breaks in Alternative D are located within the original boundaries of GSENM, as established in 1996. Due to the uncertainty surrounding the legal status of GSENM, we request that all proposed fuel breaks within the original GSENM boundaries be removed from the PEIS.	See Public Concern Statement SD-2	
124	3	Special Status Species	SS-1	IDFG is concerned that the cumulative loss of sagebrush habitat from all impacts (e.g., wildfire, brush treatments, fuel breaks, and infrastructure development) has the potential to impact sage-grouse populations. We recommend that landscape cover of sagebrush be tracked and monitored, and that the additional loss of sagebrush due to fuel breaks should be considered when planning projects at the local level. Furthermore, we have no scientific data to document the indirect effects of fuel breaks on sage-grouse or how indirect effects interact with other sagebrush losses or stressor on the landscape (Heinrichs et al. 2019). Indirect effects could range from additional human activity, faster integration of annual grasses into surrounding areas, increased fire starts from additional human activity in the project area, lack of a comprehensive landscape scale planning that does not account for cumulative effects from other land use / management activities which could result in changes in demographic rates or movements.	The PEIS does not adequately analyze the potential direct and indirect impacts of fuel breaks on Greater Sage Grouse, particularly in relation to fragmentation and loss of sagebrush habitat. Further, design features for sage grouse conservation are inadequate.	BLM adequately analyzed the direct, indirect, and cumulative effects on greater sage-grouse per 40 CFR 1502.16. Impacts on sage-grouse were analyzed within a 6.2-mile buffer, per Aldridge and Boyce (2017); this reference and an explanation has been added to Section 3.7 of the Final PEIS. Additional text has been added to Sections 4.7 and 4.8 of the Final PEIS regarding the impacts from fragmentation on wildlife and special status wildlife, including sage-grouse. Under all alternatives, as projects are proposed the BLM field or district office would ensure conformance with applicable land use plans, including implementing the management and required design features included in the Greater Sage-Grouse Approved Resource Management Plan Amendments. Such management and design features would further reduce impacts on greater-sage grouse.
131	96	Special Status Species	N/A	1. Sage-Grouse The Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report (2013), put out by the US Fish and Wildlife Service, delineates objectives to help stop declines of sage-grouse populations and habitat degradation. The report's objectives were designed to adequately conserve sage-grouse and sage-grouse habitat so that it would no longer be necessary to list the Greater sage-grouse as federally Threatened or Endangered.	See Public Concern Statement SS-1	
131	34	Special Status Species	N/A	The Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report (2013), put out by the US Fish and Wildlife Service, delineates objectives to help stop declines of sage-grouse populations and habitat degradation. The report's objectives were designed to adequately conserve sage-grouse and sage-grouse habitat so that it would no longer be necessary to list the Greater sage-grouse as federally Threatened or Endangered. The report lists conservation options which should be clearly discussed in the fuel break PEIS: Prevention of fires in sage-grouse habitats. 1. Manage for the maintenance and, where necessary, restoration of healthy perennial grass (Blank and Morgan 2012) and sagebrush vegetative communities. 2. Manage land uses (e.g., improper livestock grazing, OHV and recreational use, roads) to minimize the spread of invasive species and or facilitate fire ignition. 3. Address degraded sagebrush systems before fire occurs (e.g., improve grazing systems). 4. Close rangelands that are highly susceptible to fire to OHV use during the fire season. Quickly suppress fires that do occur. 1. Implement policy changes that allow access to more fire suppression resources, such as Air National Guard Mobile Airborne Firefighting Units. 2. Re-allocate fire response resources (crews, equipment, etc.) to important sage-grouse habitats. Identify where resources are lacking and provide those resources to decrease response time to fires in sage-grouse habitats. 3. Establish defensible fire lines in areas where: (i) effectiveness is high, (ii) fire risk is likely, and (iii) negative impacts from these efforts (e.g. fragmentation) 21 are minimized. Avoid use of any vegetative stripping in healthy, unfragmented habitats, unless fire conditions and local ecological conditions so warrant. 4. Carefully consider the use of backfires within PACs to minimize the potential for escape and further damage to sage-grouse and sagebrush habitats. 5. Provide education of fire personnel on the need and value of protecting sagebrush landscapes. 6. Remove pinyon-juniper stands which are highly flammable (stands where trees are the dominant vegetation and the primary plant influencing ecological processes (Phase 3; Miller et al. 2008) in low elevation sagebrush habitats). (Note: we disagree with this particular management prescription except for within the WUI). 7. Reduce risk of human-caused fires by	See Public Concern Statement SS-1	

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				limiting activities that may result in fire (e.g., fire bans for campers, limit OHV use to roads) during high risk fire seasons. 8. Provide incentives for suppressing fires in sagebrush habitats. 9. Federal land management agencies should consider placing additional firefighting resources and establish new Incident Attack Centers in or adjacent to PACs. 10. Firefighters should ensure close coordination with firefighters from other management agencies and local fire departments. Additionally they should seek local expertise to create the best possible strategies for responding to and suppressing wildfire. Improve Restoration Support 1. Consider re-allocation of funding from other habitat work to restoration of sage-grouse habitats affected by fire. 2. Address shortage of locally-adapted seed and storage capabilities. 3. Apply available seed where it is most likely to be effective and to areas of highest need. 4. Ensure sage-grouse habitat needs are considered in restoration efforts including managing for the range of variation, as appropriate for the local area. 22 5. In the case of limited resources, prioritize PACs over habitats outside of PACs for restoration efforts.		
131	90	Special Status Species	N/A	Design feature 40 in the PEIS requires BLM to "[i]mplement restrictions and conservation strategies for special status species, including federally listed, proposed, candidate, and BLM sensitive species, as contained in approved recovery and conservation plans." BLM should develop clear and specific design features that reflect the options and objectives for sage-grouse conservation outlined in the Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report (2013)	See Public Concern Statement SS-1	
131	35	Special Status Species	N/A	Design feature 40 in the PEIS requires BLM to "[i]mplement restrictions and conservation strategies for special status species, including federally listed, proposed, candidate, and BLM sensitive species, as contained in approved recovery and conservation plans." BLM should develop clear and specific design features that reflect the options and objectives for sage-grouse conservation outlined in the Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report (2013)	See Public Concern Statement SS-1	
131	71	Special Status Species	N/A	Finally, BLM must also consider the current condition of greater sage-grouse populations in Idaho, and examine whether the fragmentation effects of fuel breaks will exacerbate downward population trends.	See Public Concern Statement SS-1	
131	94	Special Status Species	N/A	There is no science to support the efficacy of the proposed fuel breaks. There is science showing that sage-grouse are harmed by fragmentation of their sagebrush habitat, including via linear 25 features like roads (the effects of which would be even more pronounced if they are widened through the creation of adjacent fuel breaks).	See Public Concern Statement SS-1	
124	10	Special Status Species	N/A	We recommend the following implementation guideline to minimize disturbance to lekking sage-grouse: Fuel break construction and maintenance would not be allowed from 6:00 pm to 9:00 am within 1 km of occupied sage-grouse leks during the breeding season in order to minimize disturbance to lekking birds (Idaho Sage-grouse Advisory Committee 2006, Page 4-70). This guideline would be applied from (approximately) March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats.	See Public Concern Statement SS-1	
131	95	Special Status Species	N/A	We are concerned about the many likely and potential impacts of the project on greater sage-grouse. Please address in the EIS how many acres of treatments are within four miles of sage-grouse leks, nesting areas, connectivity corridors, winter concentration areas and other essential habitats. Please also determine, disclose, and analyze in the EIS how many and which acres are proposed for treatment where soft and hard triggers in PACs have already been reached.	See Public Concern Statement SS-1	
125	25	Special Status Species	N/A	Appendix 0-7, #44: "Prohibit fuel break construction and maintenance in sage-grouse breeding habitat during breeding season." Comment: Sage-grouse breeding season generally lasts from March to May, occupying large areas within the projects range. Completely excluding maintenance in these areas during this time of year would greatly hinder the fuel breaks' effectiveness. This is an essential time for effective fuel break maintenance because of vegetative characteristics that reduce fire risk during implementation. Ideally the State recommends that BLM work with OSC and IDFG to improve this design feature.	See Public Concern Statement SS-1	
65	1	Special Status Species	N/A	In some cases, fuelbreaks like green strips might be able to provide corridors for sage-grouse movements through pinyon-juniper woodlands. We recommend these opportunities to provide both fuelbreaks and sage-grouse movement corridors be explored where sufficiently-wide corridors through conifer are targeted to improve sage-grouse survivorship during seasonal movements. In some situations these corridors may complement other stratification efforts to slow or stop wildfire and potentially reduce the need for other fuelbreaks in the area	See Public Concern Statement SS-1	

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98	25	Special Status Species	N/A	Sec. 3.5: The PEIS fails to disclose adverse impacts of fuel breaks in Nevada on Greater Sage-grouse habitat, nor any mitigation to avoid, reduce, or minimize adverse impacts, especially the threats of unmaintained fuel breaks in facilitating the spread of cheatgrass and noxious weeds into intact sagebrush communities	See Public Concern Statement SS-1	
98	32	Special Status Species	N/A	Sec. 4.7.4: The PEIS identifies in Table 4.8 maximum potential acres of Greater Sage-Grouse habitat types available for fuel beak construction by alternative. 297,000 acres are listed as "Occupied leks). The PEIS states that under Alt. B, no fuel breaks would be built, but that fuel breaks could be built under Alt. C (438,000 acres) and Alt. D (612,000 acres) in occupied lek areas. Construction of fuel strips in occupied lek areas appears contrary to conservation measures in both BLM Land Use Plans as well as the amended Sagebrush Conservation Plans of 2017. Would fuel break construction and maintenance on hundreds of thousands of "occupied lek" acres meet BLM Greater Sage-Grouse conservation requirements in Nevada or other Western states?	See Public Concern Statement SS-1	
125	26	Special Status Species	N/A	The cumulative loss of sagebrush habitat from all disturbance impacts (e.g., wildfire, brush treatments, fuel breaks, and infrastructure development) has the potential to impact sage-grouse populations. IDFG recommends that landscape cover of sagebrush be tracked and monitored, and that the additional Loss of sagebrush due to implementation of fuel breaks be considered when planning projects at the local level. IDFG has no scientific data to document the indirect effects of fuel breaks on sage-grouse or how indirect effects interact with other sagebrush losses or stressor on the landscape (Heinrichs et al. 2019). Indirect effects could range from additional human activity, faster integration of annual grasses into surrounding areas, increased fire starts from additional human activity in the project area, lack of a comprehensive landscape scale planning that does not account for cumulative effects from other land use / management activities which could result in changes in demographic rates or movements.	See Public Concern Statement SS-1	
131	37	Special Status Species	N/A	There is no science to support the efficacy of the proposed fuel breaks. There is science showing that sage-grouse are harmed by fragmentation of their sagebrush habitat, including via linear 25 features like roads (the effects of which would be even more pronounced if they are widened through the creation of adjacent fuel breaks). As noted earlier in these comments, the PEIS analyzes several types of fuel breaks up to 500 feet in width. Within this area woody vegetation would be removed or drastically shortened and thinned. Annual grasses and other non-native vegetation such as crested wheatgrass or forage kochia is often planted. Repeated herbicide applications remove the forb component, and the area could be grazed by cattle, goats or sheep. All of these actions have direct impacts to Greater sage-grouse habitat which are not adequately analyzed in the PEIS and would not be mitigated by the proposed design features.	See Public Concern Statement SS-1	
131	39	Special Status Species	N/A	We are concerned about the many likely and potential impacts of the project on greater sage-grouse. Please address in the EIS how many acres of treatments are within four miles of sage-grouse leks, nesting areas, connectivity corridors, winter concentration areas and other essential habitats. Please also determine, disclose, and analyze in the EIS how many and which acres are proposed for treatment where soft and hard triggers in PACs have already been reached. Fuel breaks, fuels reduction, and vegetative manipulation each have a variety of potential direct and indirect impacts to sage-grouse habitat and populations. For instance, countless miles of proposed fuel breaks in the PEIS are within one to four miles of sage-grouse leks, leading to potential conflicts with the Greater Sage-grouse Approved Resource Management Plan Amendments (ARMPA, BLM 2019). Indeed the BLM states in the PEIS that "In the project area, approximately 34,556,000 acres are within a 6.2-mile distance of occupied leks." BLM failed to evaluate, disclose, and explain how any proposed actions considered through the PEIS would or would not be consistent with all provisions of the underlying land use plans, including the ARMPA. Among the provisions of the ARMPA that may be applicable to the proposed fuel breaks and require detailed analysis and refinement of the proposed action in the EIS are: MD VEG 3 - Seasonal limitation on sagebrush treatment within 4 miles of leks during brood rearing (analysis of geospatial data indicates that 155,453 acres of Alt D proposed treatments are within 4 miles of leks in Oregon alone) 26 MG VEG 4 - Timing limitation on juniper cutting within 4 miles of leks MD VEG 5 - Timing and operational limitations on vegetation management within 4 miles of leks MD VEG 8, 9, 10 - Limitations and guidance on the use on non-native plant materials for restoration and rehabilitation MD SSS-7 - Requirement for sage-grouse habitat layer verification at the project scale. MD SSS-9 - Application of buffers and seasonal restrictions around leks in PHMA and GHMA consistent with MD VEG 3, 4, 5 MD SSS-11 - Seasonal limitations on disturbances or activities within 4 miles of leks in certain seasonal habitats MD SSS-12 - Requiring consideration of habitat	See Public Concern Statement SS-1	

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				connectivity within 4 miles of leks MD SSS-13 - Requiring avoidance of activities in sage-grouse habitat and prohibits new disturbance within 1 miles of leks in PHMA and GHMA MD TTM-3 - Requiring avoidance of road upgrades or construction that is found to contribute to sage-grouse mortality or lek abandonment MD TTM-8 - Limits upgrading of primitive roads within 4 miles of leks		
125	13	Special Status Species	N/A	Appendix 0-7, #44: "Prohibit fuel break construction and maintenance in sage-grouse breeding habitat during breeding season." Comment: Sage-grouse breeding season generally lasts from March to May, occupying large areas within the projects range. Completely excluding maintenance in these areas during this time of year would greatly hinder the fuel breaks' effectiveness. This is an essential time for effective fuel break maintenance because of vegetative characteristics that reduce fire risk during implementation. Ideally the State recommends that BLM work with OSC and IDFG to improve this design feature.	See Public Concern Statement SS-1	
131	72	Special Status Species	N/A	The degradation and fragmentation of such high value habitat is unacceptable. The PEIS must provide analysis of the impacts to the greater sage-grouse and other sagebrush obligate species in Monitor Valley, or must specify that future projects will use independent analysis through a site-specific Environmental Assessment, rather than a Determination of NEPA Adequacy, a Categorical Exclusion, or other means of avoiding project-specific analysis.	See Public Concern Statement SS-1	
69	4	Special Status Species	SS-2	* The Bureau of Land Management (BLM) needs to address how direct or indirect future actions will affect listed species, including aquatic species, which are not currently being analyzed. Although proposed fuel breaks may not be located in riparian areas that does not automatically preclude them from having potential effects on those areas, which may result in impacts to aquatic species. Indirect effects (e.g., project implementation timing, sedimentation, dust, herbicide runoff, etc.) need to be addressed in the site-specific analysis.	The PEIS does not adequately analyze the potential indirect impacts of fuel breaks on listed aquatic species, and they should be included even though riparian and water resources have been excluded from the analysis.	All waterways within the project area are buffered by Riparian Exclusion Areas included in the Final PEIS (Section 2.2.1). The widths of these buffers are sufficient to protect streams from impacts and provide for riparian function. As such, Riparian Exclusion Areas serve to protect riparian areas, water resources, and listed aquatic species from significant impacts. Design features would further reduce the likelihood for impacts. Appendix G sufficiently describes why the alternatives would not result in significant impacts on water resources. A new design feature has been included in the Final PEIS specifying that aerial herbicide treatments would be designed to avoid chemical drift into the riparian exclusion area or other aquatic species-specific buffers (see design feature 45 in Appendix D of the Final PEIS).
131	47	Special Status Species	N/A	Since there is the distinct potential for impacts to surface water resources, BLM is required to disclose and analyze the potential impacts of the project to fish. Sedimentation is well known to cause significant impacts to fish. As outlined above, there are literally thousands of miles of critical habitat for federally protected trout within four miles of the fuel breaks. The effects of sedimentation on trout are well documented, and it can be the chief factor in the degradation of habitat and population declines (Muck 2010). There are numerous endemic fishes which live in basins with proposed fuel breaks; increased erosion and resulting sedimentation in water sources could have impacts on those fish. An example would be the proposed fuel break through Clover Valley, which lies uphill from the spring harboring the Clover Valley speckled dace, a federally listed endangered fish. Additionally, there are sport fisheries for non-native trout, bass, and other species which lie in water sources down-slope from proposed fuel breaks; sedimentation in these areas could affect these species and must be disclosed and analyzed in the PEIS.	See Public Concern Statement SS-2	
125	14	Special Status Species	N/A	b) Appendix J-1. The gray wolf status is listed as "E" for endangered. Comment: The gray wolf is currently not listed as an endangered species in Idaho. c) Appendix J-3. Slickspot peppergrass is stated to have "critical habitat". Comment: Slickspot peppergrass currently does not have designated critical habitat.	N/A	The PEIS has been revised to correct these errors.

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131	21	Special Status Species	SS-3	Additionally, BLM implies that there will be only programmatic-level Section 7 consultation with the U.S. Fish and Wildlife Service. As outlined elsewhere in this letter, there are literally dozens of federally protected threatened and endangered species within the project area. Since any implementation of the proposed action can reasonably be thought to have the potential for 11 causing take of listed species or adverse modification of critical habitat, project-specific consultation is necessary to comply with the Endangered Species Act.	Given that a number of listed species occur in the project area and that the effects of the proposed action could cause take or adverse modification, BLM's programmatic-level consultation with the FWS per the Endangered Species Act is insufficient.	The BLM is aware of the presence of listed species in the project area and the potential for them to be affected by the construction and maintenance of fuel breaks. Although the exact siting of fuel breaks has not been determined, the BA considers where they might occur and what the effects would be if they are to be constructed within ESA listed species habitats. Programatic consultation with FWS over ESA listed species has resulted in the identification of species-specific conservation measures that would be required by projects to ensure that the potential for adverse effects to ESA listed species is both adequately analyzed and minimized. These conservation measures have been added to the Final PEIS in Appendix D, Section D.2.
131	21	Special Status Species	N/A	It is clear that listed species lie within the action area, and that the effects of the proposed action could cause take or adverse modification. A programmatic-level consultation will by nature avoid site-specific analysis. If there is no project-level consultation, and issuance of incidental take permits as appropriate, the Endangered Species Act will be violated.	See Public Concern Statement SS-3	
131	46	Special Status Species	SS-4	Targeted grazing methods would involve goats, sheep, and/or cattle (PEIS at 15). These fuel breaks could overlap bighorn sheep ranges and connectivity corridors, and have the potential to spread diseases from sheep and goats to bighorn. The map shows occupied bighorn sheep habitat across the planning area (other populations occur in adjacent California but are not mapped). Bighorn sheep cross valleys and basins between core mountain ranges to disperse. The EIS must analyze how disturbing thousands of miles of habitats in fuel breaks, and potentially grazing sheep, goats, and cattle on these fuel breaks will impact bighorn sheep habitat connectivity, as well as the spread of diseases. One of the most significant threats from livestock is the bacterium Mycoplasma ovipneumoniae, which plays a primary role in the etiology of epizootic pneumonia of bighorn sheep. Sheep and goats, and occasionally other livestock, are the carriers, and bighorn sheep that co-mingle with domestic herds that carry the bacteria can develop lethal pneumonia. How will sheep and goats be used in targeted grazing of maintained fuel breaks across landscapes where dispersing or core populations of bighorn sheep may be present? How will contact between livestock and bighorn sheep be prevented?	The PEIS does not analyze how the use of targeted grazing will impact bighorn sheep.	While Section 3.6 of the Draft PEIS does not list all special status species, Appendix J includes potenially affected species that are currently ESA listed or BLM sensitive as of the drafting of the PEIS. Appendix J includes the Sierra Nevada bighorn sheep as a potentially affected species. The Draft PEIS includes an analysis of the potential effects to special status species, including bighorn sheep, and design features are included (DFs 19 and 47 in the Draft PEIS) to minimize the risk of disease transfer. Per design feature 47 in the Draft PEIS, in compliance with the BLM Manual 1730, local BLM offices will coordinate with their local State and Feberal wildlife office prior to implementation. An in-depth description of the potential effects to this species are included in the BA for this PEIS.
125	9	Special Status Species	N/A	Page 91, Section 4.6.5 Effects from Alternative C, Big Game. "For example, use of domestic sheep or goats for targeted grazing would be avoided within 30 miles of bighorn sheep habitat, and the USFWS would be consulted if impacts on listed bighorn species are expected." Comment: There is no mention of ESA listed bighorn sheep in section 3.6 Special Status Species. IDL recommend a brief mention in Section 3.6, unless the reference above is deleted. The only bighorn sheep with an ESA listing are Peninsular bighorn and Sierra Nevada bighorn sheep, both of which are currently limited to California.	See Public Concern Statement SS-4	
135	8	Special Status Species	N/A	Five species of mammals, 2 species of birds, 1 insect species, and 15 plant species are federally listed threatened, endangered, candidate/proposed species occur within the treatment area (Appendix J). Forty three mammal species, 32 bird species, 15 reptile species, 7 amphibian species, 22 insect species, and 502 plant species are listed as sensitive species with a potential to occur within the treatment area (Appendix J). Unfortunately, the population size, distribution and reproductive ability of some of these species is declining as the result of past land management practices. The PEIS fails to identify how the preferred alternative would benefit these species over the no action alternative.	N/A	The effects of the alternatives on special status species are discussed in Section 4.7 of the Draft PEIS. These include effects to species that may be beneficial, such as through habitat and species protection and recovery of natural and seeded plant communities (pp 97-98, 100). While some species that prefer edge or grasslands might benefit directly from treatments, most benefits to special status will depend on the indirect effect of reducing fire size and increasing the fire return interval.
131	43	Special Status Species	N/A	Destruction of pinyon-juniper habitat to create grazing land for cattle has caused the loss of many jays. Given that the proposed project will remove piñon-juniper habitat, its effect on pinyon jays should be analyzed.	N/A	The effects of the alternatives on pinyon jay and other pinyon-juniper-dependent species are described in Sections 4.6 and 4.7 in the Draft PEIS (e.g., see page 87, Table 4-6, and subheaders for pinyon-juniper species in Section 4.7). Less than 1 percent of the pinyon-juniper habitat in the project area could be affected.

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131	40	Special Status Species	SS-5	There are numerous species protected by the Endangered Species Act that occur within the project boundaries. According to our GIS analysis, the following species have federally designated critical habitat within four miles of the proposed fuel breaks. Additionally there is a column to indicate those critical habitats which occur within one mile of proposed fuel breaks. Common Name, Scientific Name, CH Status, Acres of Critical Habitat, within 1 mile of proposed fuel break? Big Spring spinedace Lepidomeda mollispinis pratensis Final 51 Bonytail chub Gila elegans Final 1,637 Yes Borax Lake chub Gila boraxobius Final 641 Yes Bull Trout Salvelinus confluentus Final 2,696 Yes California bighorn sheep (Sierra Nevada DPS) Ovis canadensis sierrae Final 13,285 Yes Canada lynx (Lower 48 DPS) Lynx canadensis (Lower 48 DPS) Final 10,136 Yes Colorado pikeminnow (=squawfish) Ptychocheilus lucius Final 6,406 Yes Desert tortoise Gopherus agassizii Final 2 Graham beardtongue Penstemon grahamii Proposed 65,447 Yes Greater sage-grouse (Bi-state DPS) Centrocercus urophasianus Proposed 897,446 Yes Humpback chub Gila cypha Final 1,636 Yes Large-flowered woolly Meadowfoam Limnanthes pumila ssp. grandiflora Final 1,330 Malheur wire-lettuce Stephanomeria malheurensis Final 103 Yes Mexican spotted owl Strix occidentalis lucida Final 508,942 Yes Northern spotted owl Strix occidentalis caurina Final 22,334 Yes Oregon spotted frog Rana pretiosa Final 1,396 Yes Owens tui chub Gila bicolor ssp. snyderi Final 70 Razorback sucker Xyrauchen texanus Final 5,497 Yes Shortnose Sucker Chasmistes brevirostris Final 5,058 Yes Slickspot peppergrass Lepidium papilliferum Proposed 48,816 Yes Southwestern willow flycatcher Empidonax traillii extimus Final 1,246 Vernal pool fairy shrimp Branchinecta lynchi Final 1,512 Warner sucker Catostomus warnerensis Final 913 Yes Webber Ivesia Ivesia webberi Final 870 Yes Welsh's milkweed Asclepias welshii Final 3,089 Yes White River beardtongue Penstemon scariosus albifluvis Proposed 14,310 Yes White River spinedace Lepidomeda albivallis Final 30 Yes Yellow-billed cuckoo (Western DPS) Coccyzus americanus (Western DPS) Proposed 11,210 Yes Yosemite toad Anaxyrus canorus Final 3 And the following species have federally designated critical habitat along rivers within four miles of the proposed fuel breaks. Common Name, Scientific Name, CH Status, Miles of Critical Habitat, within 1 mile of proposed fuel break? Bull Trout Salvelinus confluentus Final 1,315 Yes Chinook salmon (Upper Coumbia River spring run DPS) Oncorhynchus (=Salmo) tshawytscha Final 185 Yes June sucker Chasmistes liorus Final 5 Lost River sucker Deltistes luxatus Final 1 Shortnose sucker Chasmistes brevirostris Final 20 Yes Steelhead (Middle Columbia River DPS) Oncorhynchus (=Salmo) mykiss Final 658 Yes Steelhead (Snake River Basin DPS) Oncorhynchus (=Salmo) mykiss Final 508 Yes Steelhead (Upper Columbia River DPS) Oncorhynchus (=Salmo) mykiss Final 248 Yes Warner sucker Catostomus warnerensis Final 56 Yes The PEIS does not disclose or analyze the impacts of the proposed action on these species. While there is a list of potentially affected threatened and endangered species in Appendix J of the PEIS, it is a woefully inadequate list, likely capturing only those listed species which occur directly in the path of the fuel breaks. We have used a four mile buffer for our analysis because it should be obvious that the effects of the proposed action will be felt in a wider area than just the immediate confines of the fuel breaks themselves. For instance, there will be tremendous disturbance caused by the construction effort itself, increased vehicular traffic, noise, dust, and potentially an increase in human-associated impact vectors such as ravens and trash. These impacts will reoccur every time the fuel break is maintained, meaning these are ongoing impacts. Also, as discussed elsewhere, the fuel breaks may increase both water and wind erosion, potentially causing sedimentation which could impact listed species, or increasing aerial dust which could impact listed species.	A number of commenters recommended that the PEIS include an analysis of a certain listed species that could be found in the project area, like the yellow-billed cuckoo.	The tables of special status species in Appendix J have been updated to reflect several commenter suggestions and to clarify that these are potentially affected special status species, not all special status species in the project area. The BLM has worked with the USFWS to determine which ESA-listed species could be affected by the proposed action. Impacts on special status species were adequately analyzed in Section 4.7 of the Draft PEIS; design features in Appendix D would be implemented to reduce the likelihood for impacts.
131	44	Special Status Species	N/A	Constructing large fuel breaks in sagebrush habitats could impact such native rodents as dark kangaroo mouse (Microdipodops megacephalus), pale kangaroo mouse (M. pallidus), chiseltooth kangaroo rat (Dipodomys microps), Ord's kangaroo rat (D. ordii), desert kangaroo rat (D. deserti), Merriam's kangaroo rat (D. merriami), Western jumping mouse (Zapus princeps), bushy-tailed woodrat (Neotoma cinerea), Northern grasshopper mouse (Onychomys leucogaster), Southern grasshopper mouse (O. torridus), Canyon deermouse (Peromyscus crinitus), pinyon deermouse (P. truei), montane vole (Microtus montanus), long-tailed vole (M. longicaudus), and sagebrush vole (Lemniscus curtatus). Some populations of these species may be rare or at the edges of their range, within the fuel breaks mapped area. How will agencies mitigate loss of populations of these species?	See Public Concern Statement SS-5	
53	1	Special Status Species	N/A	List Special Status fish such as Cui-ui, Lahontan cutthroat trout and Desert dace. Add Yellow billed cuckoo. Fish and other wildlife are listed in Appendix D.	See Public Concern Statement SS-5	

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52	1	Special Status Species	N/A	This section refers to Appendix J for a list of all Special Status Species in the Project Area. There aren't any fish listed. The yellow billed cuckoo in the Carson City District is also not listed. . In Appendix D Page D 7 the fish are mentioned and on Page D 9 the yellow billed cuckoo. I am not familiar with species in the 5 other states that may be missing	See Public Concern Statement SS-5	
43	2	Travel Management (Not Analyzed)	N/A	Potential impacts on roadway networks beyond a very brief mention of visual effects and reduced visibility from blowing dust were not addressed. This proposed undertaking could have the following impacts on NDOT administered rights-of-way: -Impacts to highway infrastructure due to the inability of hydraulic facilities to adequately pass the designed stormwater flow volume -Effects on stormwater management and water quality due to increased runoff, erosion (water and wind), and use of chemicals -Effects on shoulder and slope stability -Potential conflicts with NDOT maintenance activities -Visual impacts, particularly along scenic byways -Driver safety issues due to blowing dust from bare soils or smoke from prescribed burns -Permitting required from NDOT for personnel and equipment to work within the highway right-of-wayAdditionally, the increased sediment discharges from the highway right-of-way may be conflicting with the requirements of NDOT's statewide National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permit, placing greater risk on NDOT for potential Permit non-compliance.	N/A	BLM anticipates that the fuel breaks will be constructed outside of ROW's maintained by a Department of Transportation. Further, the BLM will coordinate with transportation departments to avoid road degradation as a result of brown strips. Given the scale of the fuel breaks impacts from dust and sedimentation would not likely warrant a design feature to reduce impacts.
131	50	Vegetation	VE-1	Hopgood et al. (2016) recommend avoiding using heavy equipment and trampling pollinator habitat. Carbone and Aguilar (2017) caution that burning wood and slash piles might change soil chemistry and alter plant community structure, which has implications for pollinator resources. Extremely high localized temperatures like those generated by burning brush can potentially kill ground nesting bees. This practice should be avoided in areas with sensitive pollinators, and it should occur outside the active period of pollinators (October - March). Neither should piles be placed near areas of high plant diversity that might be damaged by fire. The effects of fire can be reduced by setting aside unburned refugia, which is another reason to establish a system of exclosures for intact areas of ROW along the fuel break line. The Final EIS should develop a stronger section on how direction like this will be applied to pollinator protection. In addition, all of these recommendations speak to closer, more site-specific NEPA analyses.	The PEIS does not adequately disclose how vegetation treatments will impact pollinators and pollinator habitat.	Pollinators are more likely to use areas of intact sagebrush communities where a diversity of plants and, therefore, floral resources exist. Vegetation states with invasive annual grass would incur the most intervening treatments and are less likely to have pollinator use. More intact vegetation states (Perennial Grass and Forb, Perennial Grass and Forb with Shrubs) would have the least amount of intervention from treatments during fuel break construction and would have the greatest amount of pollinators. As such, impacts on pollinators are expected to be limited. An expanded discussion of how vegetation treatments indirectly impact pollinators and their habitat, including additional citations (IM 2016-013 and Xerces 2018), has been incorporated to Section 4.6, Vegetation, in the Final PEIS. Further, guidance on how pollinator conservation would be incorporated into management decisions has been added to Section 2.2.8 of the Final PEIS. The recent Executive Order 3355 directs the DOI to increase efficiencies in the NEPA process. Two ways this is accomplished is by limiting the number of pages for an EIS and to focus efforts on tiering or incorporation by reference to ensure page limitations are met. Therefore, several documents have been incorporated by reference, such as the 2007 Final Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States PEIS.
131	48	Vegetation	N/A	Given that one of the main reasons for pollinator decline is habitat fragmentation, the PEIS analysis of project effects on this suite of species is incomplete. It relies too much on unsupported assertions and on tiering to the BLM's 2007 Final Vegetation Treatments Using Herbicides on the Bureau of Land Management Lands in 17 Western States PEIS. This is illustrated by overgeneralizations such as "[c]hemical treatment can have beneficial or adverse effects on pollinators" but "[f]ollowing standard operating procedures and mitigation measures described in the PEISs would prevent negative impacts or reduce impact intensity." PEIS at 75. Also, the PEIS states that some of the chemicals proposed for use in the fuel breaks project "can be toxic to pollinators " [and] "acute or chronic exposure to these formulations could result in mortality and reduced population sizes, indirectly negatively affecting ecosystem function" (PEIS at 75), indicating that a more thorough analysis is indicated. Which species would be affected under which conditions? How would that affect surrounding vegetation, including any 34 rare plants? Asking the public to rely on vague possibilities of future site-specific DNAs or EAs is not reassuring.	See Public Concern Statement VE-1	

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2	1	Vegetation	VE-2	Non-native vegetation on our Western landscapes has had unintended, unanticipated, and deleterious consequences to one degree or another in every instance of introduction. For this reason, I do not support any plan that proposes spending tax payer money to spread non-native vegetation across the West in the name of fire breaks. If I fire bumps up against a road without any firefighters or aircraft to help hold the fire at that road there will be no difference in the success rate of containing fire. Sage fires will spot much further than one, two, or three road widths in distance. This will be a waste of money at best and an ill-conceived non-native vegetation outbreak and threat to these diminished ecosystems at best.	The PEIS has not adequately disclosed the potential direct and indirect impacts of using nonnative grasses v. native grasses in the construction of fuel breaks.	The Draft PEIS addressed appropriate use of plant material in Section 2.2.6, Native Plant Material Policy. The policy in BLM Handbook H-1740-2, Integrated Vegetation Management Handbook, requires native plant material be used except under limited circumstances. Additionally, while each alternative is guided by the native plant material policy (Section 2.2.6 of the Draft PEIS), Alternatives B and C supplement this policy with specific requirements for native plant material use (Table 2-3 in the Draft PEIS, #9). The effects of the policy and requirements for native plant material use are adequately analyzed in the Draft PEIS in Section 4.5, Vegetation (see, for example, pages 72, 78, 79, and 80 of the Draft PEIS). Additional text has been included in Appendix F describing how the datasets used for the vegetation states do not separate native and nonnative perennial grasses. However, Table 2-2 does provide a preferred fuel break type for both native and nonnative perennial grasses separately. Therefore, treatments could be applied by vegetation state and would take the relative components of that vegetation state under consideration.
125	19	Vegetation	N/A	Comment: Perennial grasses are currently lumped to include nonnative species in this classification (crested wheatgrass). The State recommends that BLM analyze the perennial grass component as 1) native and 2) non-native. This would provide a more accurate representation of the areas ecological function to be included in the PElS analysis	See Public Concern Statement VE-2	
124	9	Vegetation	N/A	Perennial grasses are currently lumped to include non-native species in this classification (crested wheatgrass). The perennial grass component should be analyzed as 1) native and 2) non-native. This would provide a more accurate representation of the areas ecological function to be included in the PEIS analysis.	See Public Concern Statement VE-2	
131	30	Vegetation	N/A	We suggest that in any seeding of plants following treatment, BLM must use only local native ecotype seeds/seedlings. No crested wheatgrass. Do not use of the exotic and weedy forage kochia that suppresses and out-competes native sagebrush vegetation. We do not agree with using genetically altered native grasses that are bred for livestock forage more than they are for restoring sage-steppe habitat. Seeds should be collected locally from native grasses, forbs, and shrubs, and reseeded into wildfire burns or fuel breaks.	See Public Concern Statement VE-2	
124	6	Vegetation	VE-3	The current analysis does not quantify nor compare the loss of sagebrush habitat expected as a result of various treatments (i.e. sagebrush removal) to the losses expected from fire if the fuel breaks were not in place. BLM should model and include estimates of the sagebrush protections expected with fuel breaks, and compare that to the losses created by fuel breaks themselves. This would provide a stronger analytical basis for the No Action alternative vs. Action alternatives.	The current analysis does not quantify nor compare the loss of sagebrush habitat expected as a result of various treatments (i.e. sagebrush removal) to the losses expected from fire if the fuel breaks were not in place. BLM should model and include estimates of the sagebrush protections expected with fuel breaks and compare that to the losses created by fuel breaks themselves.	The Draft PEIS evaluates program-level actions, not site-specific actions, and therefore the level of analysis should be equally broad (CEQ 2014). For this reason, quantifying the treatment of sagebrush as a result of various treatments is not possible. Additionally, it is impossible to forecast when and where wildfires will occur so quantifying the losses of sagebrush communities expected from wildfire, whether fuel breaks were in place or not, would be speculative. The Draft PEIS does, however, contain variability between alternatives relative to sagebrush treatment (see Table 2-3). The various associated constraints, potential benefits, and potentially significant adverse impacts that could result to sagebrush communities from implementing each alternative are analyzed in the Draft PEIS in Section 4.5, Vegetation. In addition, the Draft PEIS addresses impacts to high resistance and resilience areas in Sections 4.5.5 and 4.5.6. Text has been added to Section 2.2.8 of the Final PEIS describing how a site's resistance and resilience will be considered prior to fuel break siting.

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125	16	Vegetation	N/A	One component of the analysis is not clear or evident, and that component is an attempt to quantify the amount of sagebrush habitat that would be lost to treatments including the long-term impacts, relative to the projected amount of habitat that would potentially benefit. Uncertainty about the effectiveness of a fuelbreak network for reducing the rate of loss of sagebrush habitat is not addressed. It would be important for BLM to analyze and consider the potential for detrimental impacts from implementing fuel breaks in highly resistant and resilient areas, as well as areas of intact native vegetative communities, within the PElS. The current analysis does not quantify nor compare the loss of sagebrush habitat expected as a result of various treatments (e.g. sagebrush removal) to the losses expected from fire if the fuel breaks were not in place. The State recommends that BLM model and include estimates of the sagebrush protections expected with fuel breaks and compare that to the losses created by fuel breaks themselves. This would provide a stronger analytical basis for the No Action alternative vs. Action alternatives.	See Public Concern Statement VE-3	
124	5	Vegetation	N/A	A foundational component of the analysis which is missing is an attempt to quantify the amount of sage-brush habitat that would be lost to treatments (long-term impacts) relative to the projected amount of habitat that would potentially benefit. Uncertainty about the effectiveness of a fuel-break network for reducing the rate of loss of sagebrush habitat is not addressed. This is especially concerning because the potential for detrimental impacts from implementing fuel breaks in highly resistant and resilient areas as well as areas of intact native vegetative communities are given no consideration in the PEIS.	See Public Concern Statement VE-3	
131	5	Vegetation	VE-4	Although experts agree that invasions of non-native annual grasses like cheatgrass and medusahead wildrye are among the leading threats to sage-steppe and desert ecosystems-and one of the leading causes of more frequent wildfires-the PEIS contains only the most superficial discussion of this issue. And, importantly, the PEIS entirely fails to acknowledge and discuss the anthropogenic activities currently driving annual grass invasion across the West. Because of this, the PEIS overlooks the ways in which creating a regional network of fuel breaks could make matters worse	The PEIS must include in its analysis anthropogenic contributions to the spread of invasive annual grass and decreased resistance and resilience in the project area.	Additional discussion regarding anthropogenic contributions to the spread of invasive annual grasses have been added to Section 3.5, Vegetation, in the Final PEIS. Anthropogenic impacts on resistance and resilience have been added to Section 4.6.7, Cumulative Effects on Vegetation in the Final PEIS. Further, the consideration of resistance and resilience of an area during fuel break siting has been added to Section 2.2.8 of the Final PEIS. Impacts on biological soil crust are analyzed in Section 4.4, Soil Resources of the Draft PEIS. Page 62 of the Draft PEIS includes an assumption about the likelihood for biological soil crust occurrence and the low likelihood for impacts on these organisms.
131	98	Vegetation	N/A	Because grazing, road construction, fuel breaks, vegetation treatments and other human factors can have more of an impact on invasive species and wildfire than environmental conditions alone, the final EIS must incorporate a robust resistance and resilience analysis that take into account the influence of human activities, especially those currently authorized or conducted by BLM.	See Public Concern Statement VE-4	
131	13	Vegetation	N/A	Because grazing, road construction, fuel breaks, vegetation treatments and other human factors can have more of an impact on invasive species and wildfire than environmental conditions alone, the final EIS must incorporate a robust resistance and resilience analysis that take into account the influence of human activities, especially those currently authorized or conducted by BLM.	See Public Concern Statement VE-4	
77	2	Vegetation	N/A	Speaking of soil disturbance, I believe that cryptobiotic soil crusts play an important role in the cheatgrass equation. I have observed that where these crusts still exist, it is more difficult for cheatgrass to become established and to spread. For example, I lived for many years in a rural community in southern Utah where I frequently hiked and saw the environmental effects from different BLM land uses. The invasive cheatgrass and mustard species tended to move into areas along roads, utility ROWs, off-road vehicle trails, and livestock concentration areas. However, in more remote areas with less soil disturbance and more crusts, there was almost no cheatgrass or mustard. So we have "met the enemy and it is us". Our collective land uses that cause some level of unnatural soil disturbance are creating the conditions under which invasive exotic grasses can establish, flourish, and fundamentally alter the fire ecology. Therefore, as we properly keep these fuel breaks to areas of existing linear disturbance like Levels 3 and 5 roads and BLM ROWs, we must also address how other authorized land uses, such as OHV route designations and livestock grazing permit conditions, affect cheatgrass colonization, maintenance, and spread.	See Public Concern Statement VE-4	

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109	8	Vegetation	VE-5	The BLM failed to analyze the risk of spread of invasives due to implementation and long-term maintenance of fuel breaks. Much science has demonstrated that invasive nonnative grasses dominate in disturbed areas and that these invasives are what have changed the fire regime in this area. Disturbing roadsides will provide environmental conditions for invasive annual grass dominance, even if planted with natives and nonnatives. More of these nonnative annual grasses alongside roads (where many fire ignitions are prevalent) will only result in the potential for more fires to start. The BLM failed to determine this risk. Currently intact areas that are low, moderate and high resiliency should be avoided in fuel break implementation.	The BLM did not adequately analyze how construction of fuel breaks could affect the spread of invasive annual grasses, particularly in sites already characterized as highly resistant and resilient.	Impacts on the spread of invasive annual grasses are adequately analyzed in Section 4.5, Vegetation, in the Draft PEIS. Additional discussion regarding anthropogenic contributions to the spread of invasive annual grasses have been added to Section 3.5, Vegetation, in the Final PEIS. Further, the consideration of resistance and resilience of an area during fuel break siting has been added to Section 2.2.8 of the Final PEIS.
131	10	Vegetation	N/A	Finally, the PEIS does not analyze the resistance and resilience of ecosystems within the project area. Although the project design under all action alternatives incorporates resistance and resilience concepts, BLM fails to analyze whether landscapes within the project area are resistant to weed invasion and resilient to disturbance. Without a robust, site-specific resistance and 6 resilience analysis, BLM risks exacerbating the "cheatgrass-fire cycle" by introducing new sources of disturbance to fragile and vulnerable habitats. BLM's current approach to resistance and resilience violates NEPA. To adequately consider the cumulative impacts of a project, "some quantified or detailed information is required." Neighbors of Cuddy Mountain v. U.S. Forest Serv., 137 F.3d 1372, 1379 (9th Cir. 1998). "[G]eneral statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided." Blue Mountains Biodiversity Project v. Blackwood, 121 F.3d 1208, 1214 (9th Cir. 1998) (quoting Neighbors of Cuddy Mountain, 137 F.3d at 1380). Without such information, neither the courts nor the public, ... can be assured that [BLM] provided the hard look that it is required to provide." Neighbors of Cuddy Mountain, 137 F.3d at 1379. The final EIS must therefore disclose and analyze "quantified or detailed information" about the resistance and resilience of the affected areas. As discussed below, such an analysis must include human land uses such as motorized travel, infrastructure development, and livestock grazing.	See Public Concern Statement VE-5	
109	5	Vegetation	N/A	The PEIS does little to focus fuel breaks in areas to address the invasive grass wildfire problem, especially where areas are experiencing high fire frequency rates. Areas with low and moderate resiliency to fire may not need fuel breaks if the probability for fire ignition is low and invasive state is low. It is a waste of money and time as well as risk to further spread of invasives and damage to natural resources to implement fuel breaks in these areas where fire risk is low. Again, this information is available through the Forest Service Fire Lab and Research Stations and the BLM failed to include it in the PEIS	See Public Concern Statement VE-5	
131	12	Vegetation	N/A	The PEIS is no exception; it claims, without discussion or qualification, that higher elevation areas are more resistant and resilient, and will therefore tolerate disturbance. The primary flaw in this assumption is that it ignores the influence of human activities such as livestock grazing. In addition, the relationship between elevation and resistance/resilience is no so straightforward. While resistance and resilience do generally increase with elevation (Chambers et al. 2007, Davies et al. 2012, Boyte & Wylie 2016, Chambers et al. 2007), high-elevation sites may remain vulnerable to weed invasion and wildfire, especially following disturbance. Bromberg et al. (2011) report that cheatgrass has been found at altitudes over 10,000 in Colorado, while other researchers hypothesize that cheatgrass is capable or rapid growth and invasion at higher altitudes (Brown & Rowe 2004, Griffith & Loik 2010). Kao et al. (2008) stress the importance of preventing seed dispersal from invaded low-elevation sites to intact high-elevation sites. BLM must therefore re-examine its assumptions regarding high-elevation sites. These areas may in fact be vulnerable to colonization by invasive grasses, and construction of fuel breaks at high elevations could dramatically increase that vulnerability.	See Public Concern Statement VE-5	

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68	13	Vegetation	VE-6	The PEIS failed to recognize that juniper treatments tend to increase invasion by invasive plants. See Coop & Magee 2016. Integrating Fuels Treatments and Ecological Values in Piñon-Juniper Woodlands: Fuels, Vegetation, and Avifauna Final Report to the Joint Fire Science Program. Agreement number L13ACOO237. https://www.firescience.gov/projects/13-1-04-45/project/13-1-04-45_final_report.pdf ("Treatments exhibited rapid, large, and persistent increases in the frequency, richness, and cover of 20 non-native plant species including cheatgrass (Bromus tectorum). Exotic plant expansion appears linked to the disturbance associated with treatment activities, reductions in tree canopy, and alterations to ground cover. … [I]ncreased herbaceous surface fuels including exotic annuals are expected to alter potential fire behavior via … increased surface fire intensity, flame length, and rate of spread. … We encourage managers carrying out P-J mastication projects to explicitly consider 1) potential trade-offs between desired treatment outcomes and potentially unwelcome impacts …")	The PEIS does not adequately analyze the potential impacts of pinyon-juniper removal.	As described in the Draft PEIS in Section 3.4, Vegetation, Miller et al. (2014a) identify the successional phases of pinyon-juniper used to identify encroachment. Appendix F, Section F.2 outlines the datasets used to determine potential treatment areas, including pinyon-juniper. Large scale removal of pinyon-juniper would not occur as a result of this PEIS due to the limitation on the locations and size of fuel breaks. Less than 1 percent of the pinyon-juniper habitat in the project area could be affected. The effects of the alternatives on pinyon-juniper removal are described in Sections 4.6 and 4.7 in the Draft PEIS (e.g., see page 87, Table 4-6, and subheaders for pinyon-juniper species in Section 4.7). Section 4.6.2 of the Final PEIS has been revised to include additional analysis of the impacts of pinyon-juniper removal. The Draft PEIS discusses prevention of nonnative invasive plant introduction and spread in several places. See Sections 2.2.7 (page 6), Table 2-1, Section 4.5.1 (page 69), and design features 23 through 26, which describe precautions that would be taken during fuel break creation and maintenance. The potential for alternatives to increase the spread of invasive, nonnative plants is analyzed in Section 4.5, Vegetation, in the Draft PEIS.
68	16	Vegetation	N/A	The PEIS failed to consider the trade-offs associated with juniper removal. One of those trade-offs involves the lost opportunity to store carbon that mitigates global climate change. Landscape scale expansion of juniper woodlands is providing an ecosystem service (carbon storage via natural afforestation) and juniper removal erases that benefit. Campbell, J.L., R. Kennedy, W.B. Cohen, and R. Miller. 2012. Regional carbon consequences of Western Juniper encroachment in Oregon. Journal of Rangeland Ecology and Management. 65(3):223-231. http://larse.forestry.oregonstate.edu/sites/larse/files/pub_pdfs/Campbell_etal_2012.pdf ("unlike forest growth which is balanced by natural disturbance, timber harvest, and land conversion, woody encroachment is assumed to be largely one-directional with the potential result of a [significant] North American net carbon sink. … [T]he highest biomass shrubs with which juniper competes in Oregon (namely, Artemisia spp.) have an average biomass per unit crown cover of only 8% that of juniper (derived from juniper allometry of Sabin [2008], and sage allometry of Rittenhouse and Sneva [1977]). This means that even when juniper cover replaces sage cover on a one-to-one basis (as reported by Miller et al. 2005), aboveground biomass lost in shrubs is less than 8% that gained in aboveground juniper biomass. … This study illustrates the capacity of woody removal, over very small areas, to offset encroachment over very large areas …"); See also Barger, N.N., A.R. Archer, J.L. Campbell, C. Huang, J.A. Morton, and A.K. Knapp. 2011. Woody plant proliferation in North American drylands: A synthesis of impacts on ecosystem carbon balance. Journal of Geophysical Research. 116, G00K07, doi:10.1029/2010JG001506. http://fes.forestry.oregonstate.edu/sites/fes.forestry.oregonstate.edu/files/PDFs/Barger_2011_JGR.pdf ("The greatest tree biomass response occurred in Great Basin sagebrush steppe sites encroached upon by western juniper (J. occidentalis), sites strongly dominated by winter precipitation. … Changes in [above ground biomass] pools were greatest in systems experiencing Juniperus and Pinus spp. Encroachment …"]	See Public Concern Statement VE-6	
68	11	Vegetation	N/A	The PEIS failed to take a hard look at the trade-offs involved in large scale juniper removal (described in Oregon Wild's 2-13-2018 scoping comments), e.g., degrading habitat, reduced carbon storage, spreading weeds, degraded watershed functions, adverse impacts to soil and biotic crusts, etc. The current expansion of juniper is a natural response to the environmental conditions the species is experiencing, e.g. reduced fire, increased grazing, elevated ambient CO2, etc. Juniper should be held in check with natural processes, not active management.	See Public Concern Statement VE-6	
131	27	Vegetation	N/A	On page 5 of the PEIS, it is stated that fuel breaks would be placed in, "current and historic extent of sagebrush vegetation communities within the project area, including those areas where pinyon-juniper has encroached." What criteria will BLM use to determine if a plant community has been "encroached" by pinyon-juniper?	See Public Concern Statement VE-6	

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4	2	Vegetation	N/A	The Indomitable Juniper Animals find the juniper very inviting. The berries are edible and are a staple for jackrabbits, coyotes and a variety of birds. This is important for the tree as well since it helps to disperse its seeds. http://www.nps.gov/cany/naturescience/utahjuniper.htm More About "Encroaching" Junipers on Juniper Mountain by Ken Cole (excerpts below) While investigating the claim that junipers don't belong on Juniper Mountain, I was asked to look at the original public lands surveys found on General Land Office Records site and found surveys for this landscape from 1914 and 1921. While the surveys don't quantify junipers or show their density they do document their presence and in the General Description notes at the end of each survey the surveyors noted "thick juniper" and "scattered juniper" in every township. When doing the surveys the surveyor walked the lines between each and every section (a square mile) to mark section corners and quarters. At the end of each section line they noted the type of timber. To map this I read the notes for each and every section line and noted the documentation of juniper. I was able to give each section a score of 0 to 4. If all four section lines noted "timber: juniper" then the section was given a score of 4. What I found was that nearly every section had juniper presence just as they do today. The surveys also mention "good growth of bunch grass which affords excellent range" even though today the understory is composed of very sparse grass and a nonnative semi annual grass called Poa bulbosa that is a very poor range plant with little habitat value. Small islands of these healthy bunch grasses can be seen in areas that can't be reached by cattle and the contrast is quite startling. http://www.thewildlifenews.com/2013/03/07/more-about-encroaching-junipers-on-juniper-mountain/	See Public Concern Statement VE-6	
76	2	Vegetation	N/A	Be truthful with the public concerning the success/failure rates of seedings in a desert environment. Many initial fuel break seedings may not be adequately "successful" due to annual weather conditions. These seedings have to be repeated or the fuel break becomes ripe for annual weed invasion. I doubt BLM has much information on the success / failure rates of past fuel strips but this reality must be discussed in the EIS. The costs of replanting failed fuel strip plantings must be included.	N/A	The potential for fuel breaks to fail to establish successfully is included as an assumption in Section 4.1.1 of the Draft PEIS and is analyzed by resource throughout Chapter 4. Some areas may require several treatments depending on the existing vegetation and project objectives (see Table 2-1, page 8, for example). In all cases, Section 2.2.7 of the Draft PEIS identifies monitoring, maintenance, and adaptive management necessary to determine whether a fuel break has been successfully established.
131	52	Visual Resources Management (Not Anlayzed)	VI-1	Because the PEIS has overlooked the full impacts to Visual Resources and 18 BLM Resource Areas would be impacted, a supplemental EIS would be appropriate.	The PEIS does not adequately analyze the full impacts on fuel breaks on visual resources.	The introduction of Chapter 3 has been revised to include a description of how visual impacts are analyzed in the Draft PEIS. Appendix G has also been revised to further describe that site-specific Contrast Rating Forms would be completed before implementing projects to ensure VRM Class objectives are met.
98	33	Visual Resources Management (Not Anlayzed)	N/A	Sec. 4.10.2: The PEIS states that "The removal, modification, or replacement of vegetation to create a fuel break could also result in scenic degradation and disruption of the aesthetic and visual quality of the recreation setting over the short and long terms." However, the PEIS fails to disclose any BLM requirements to avoid or minimize or mitigate such degradation. How will the BLM protect these scenic values through compliance with Visual Resource Management requirements in all fuel break projects?	See Public Concern Statement VI-1	
82	1	Visual Resources Management (Not Anlayzed)	N/A	The proposed action will change the appearance of 11,000 miles of roads driven by a public motivated to drive around the west to enjoy the beautiful scenery. Why is there no analysis other than a disclaimer in a hard to find Appendix?	See Public Concern Statement VI-1	
131	55	Water Resources (Not Anlayzed)	WA-1	It should be emphasized that the proposed Riparian conservation area exclusion zone does not adequately protect surface water resources. At best these exclusion zones will prevent the fuel breaks from actually being constructed within surface water channels. But it is easy to envision fuel breaks being constructed up-slope from surface water, and increased erosion working its way down hill to affect the surface water, even if the fuel break is some distance away. Additionally, proceeding with the proposed action without any analysis of hydrologic conditions or impacts and without authorization from the Army Corps of Engineers may be in violation of the Clean Water Act. The proposed action will potentially increase sedimentation in surface waters, requiring a Section 404 permit from the Army Corps. BLM either needs to apply for and obtain such a permit, or needs to exclude any proposed fuel breaks up-slope from surface water resources.	The PEIS does not describe how the removal of vegetation for proposed fuel breaks could contribute to increased erosion and associated short- and long-term impacts on water resources like water pollution and sedimentation.	The potential for erosion from the construction and maintenance of fuel breaks is analyzed in Section 4.4 of the Draft PEIS. In addition, Design Features (Appendix D) have been included to reduce impacts associated with erosion and sedimentation, such as Design Features 4, 14, 33-38, and 41 in the Draft PEIS. An additional design feature has been included to avoid chemical drift into the riparian exclusion area or other aquatic species-specific buffers (see design feature 45 in the Final PEIS). Appendix G describes why there would be no significant impacts on water resources, based on these impacts and design features.

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131	54	Water Resources (Not Anlayzed)	N/A	The lack of analysis of the impacts of the proposed action to ground and surface water resources in the PEIS is shocking and a clear violation of NEPA. There is no disclosure of the affected hydrologic environment, and no analysis of the impacts of the program alternatives on ground and surface water resources. The section of the PEIS on soils describes numerous avenues for potential impacts to water resources. The primary concern is increased soil erosion due to disturbance from mechanical treatments, due to removal of vegetation and breaking down of cryptobiotic soil crusts, and from increased grazing pressure due to targeted grazing (PEIS at 62-68). This is particularly true for the brown-stripped areas. In each case, increased soil erosion could lead to a decrease in surface water quality in watersheds in which the fuel breaks will be constructed. Since the proposed action will has an obvious potential for impacts to these resources, BLM must include a ground and surface water section in the EIS.	See Public Concern Statement WA-1	
3	2	Water Resources (Not Anlayzed)	N/A	Include all short and long term increased water pollution due to increased erosion caused by tree removal and soil disturbance in the total plan area and the wilderness areas in the vicinity of the project, including the Wilderness Study Areas (WSA) and its effect on all wildlife in the area.	See Public Concern Statement WA-1	
121	4	Wildlife	WL-1	Minimization of impacts to perennially utilized wildlife migration corridors must be emphasized when prioritizing and creating fuel breaks.-This impact is not addressed within this PEIS.	The PEIS fails to disclose impacts to wildlife habitat and migration corridors as a result of creating and maintaining fuel breaks.	The PEIS provides a of the environmental consequences, including the cumulative impacts, of the presented alternatives. The Final PEIS provided sufficiently detailed information to aid in determining whether to proceed with the proposed plan in a manner such that the public could have an understanding of the environmental consequences associated with the alternatives, in accordance with 40 CFR 1502.1. Section 4.6 of the Draft PEIS adequately discloses the impacts of the proposed alternatives on wildlife. Additional analysis and a new design feature (design feature 44) have been included to address the potential for habitat fragmentation in Section 4.7 and Appendix D of the Final PEIS. Section 2.2.6 of the Final PEIS states that no new roads would be created and the BLM would not improve roads beyond their current definition. This text has been revised in the Final PEIS to specify that this includes the maintenance level. Since the maintenance level of the road would remain the same, the same types of vehicles would be able to access the roads. No fuel break is anticipated to provide better driving conditions than the road it is adjacent to, since most fuel breaks would be vegetated. As a result, there would be no increase in the likelihood for additional user-created routes.
121	17	Wildlife	N/A	It seems hard to believe that a 500 ft fuel break on a level 1 road wouldn't bring about huge changes to wildlife usage of that area as well as changing the characteristics of that road.	See Public Concern Statement WL-1	
98	30	Wildlife	N/A	Sec . 4.6.2: The PEIS fails to consider the impacts of fuel breaks on many wildlife uses of level 1, 3, and 5 roads and roadsides in Nevada, as demonstrated by numerous daily road kills of animals trying to cross the roads or using roadkills as part of their daily diets. The PEIS also totally fails to consider fuel break impacts on seasonal wildlife corridors in Nevada.	See Public Concern Statement WL-1	

Letter #	Comment Number	Comment Code Name	Concern Statement Number (if applicable)	Comment Text	Concern Statement Text	Draft Response
109	7	Wildlife	N/A	The BLM failed to analyze habitat loss and fragmentation for wildlife species (especially the many birds that reside in the Great Basin) due to the proposed large-scale implementation of a system of fuel breaks. These types of analyses are easy to implement and the BLM shows habitat layers for a number of wildlife species. The BLM failed to analyze the proposed fuel breaks with wildlife habitat data and run fragmentation analyses to determine the degree of habitat fragmentation and loss to these species habitats. The PEIS states that the proposed system of fuel breaks is intended to fragment and break-up the landscape and this is the goal for the fuel break system. However, this fragmentation will have severe impacts on wildlife species populations and movements. There are a number of species that are currently in sharp population declines and are state sensitive species and are found along roadsides (e.g. burrowing owls / pygmy rabbits) where these fuel breaks would be placed. These impacts were not analysed and no information on how much habitat will be effected for these many species was provided. There needs to be a better assessment of the impacts of fuel breaks to wildlife species habitats and populations. This PEIS mistakenly assumes that fuel breaks would protect species habitat from fire by reducing fire across the Great Basin but provides no evidence of this occurrence. In addition, the BLM failed to work with the state wildlife agencies in determining potential impacts to wildlife species.	See Public Concern Statement WL-1	
131	45	Wildlife	N/A	The PEIS needs to disclose and analyze the impacts to big game from habitat fragmentation due to the construction of the fuel breaks in the proposed action.	N/A	Additional analysis regarding fragmentation has been added to Section 4.7, Wildlife, in the Final PEIS.
135	10	Wildlife	N/A	The area also includes habitat for 3,000 species of amphibians, reptiles, birds, and mammals. Some of these species (greater sage-grouse, pygmy rabbit, and sage thrasher) are 'sagebrush-obligate' meaning they require sagebrush for at least part of its life cycle. The preferred alternative fails to identify how it would better support this biological diversity and the sagebrush obligate species than the no action alternative.	N/A	The BLM adequately analyzed impacts on sagebrush habitat and sagebrush obligate species in Section 4.5, Vegetation, and Section 4.6, Wildlife of the Draft PEIS (see, for examples, pages 86 and 87 of the Draft PEIS). Sagebrush-dependent special status species are analyzed under a separate subheader in Section 4.7, Special Status Species, in the Draft PEIS. Additional analysis and a new design feature (design feature 44) have been included to address the potential for habitat fragmentation in Section 4.7 and Appendix D of the Final PEIS.
4	1	Wildlife	N/A	I request that you review the following documents and take into consideration the proposed project's effects on native birds and wildlife. Sharing the Land with Pinyon-Juniper Birds - Partners in Flight http://www.partnersinflight.org/pubs/PJ%20manual%20Nov%2008%20low-res.pdf Across a broad spectrum of habitat types, no wildlife group is as species-rich, as visible, or as vocal as birds. Juniper woodlands are no exception - more than 70 species are known to breed in pinyon-juniper woodland. Juniper woodlands support one of the highest proportions of obligate or semi-obligate bird species among forest types in the West (Paulin et al. 1999). Species closely tied to pinyon-juniper (scientific names of all species mentioned in the text are listed in the Appendix) include Black-chinned Hummingbird, Ash-throated Flycatcher, Cassin's Kingbird, Gray Flycatcher, Western Scrub-Jay, Pinyon Jay, Juniper Titmouse, Bushtit, Bewick's Wren, Northern Mockingbird, Blue-gray Gnatcatcher, Gray Vireo, Black-throated Gray Warbler, Lark Sparrow, and Black-chinned Sparrow (Balda and Masters 1980). However, not enough research and information is available on management practices that benefit bird communities in juniper woodlands.	N/A	The PEIS does not anticipate the removal of a large amount of pinyon-juniper woodlands. Effects from removal of pinyon-juniper are included in the Draft PEIS in Section 4.6, Wildlife (see, for example, pages 84 and 89 of the Draft PEIS). Pinyon-juniper dependent species are analyzed under a separate subheader in Section 4.7, Special Status Species, in the Draft PEIS.

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