Chapter 3.0: Affected Environment and Environmental Consequences

3.1 Introduction

This section describes the resources and values on BLM administered lands in Montana and the Dakotas that could be affected by each alternative, given the analysis assumptions listed below.

Information on the affected environment is summarized from the Final Environmental Impact Statement Vegetation Treatment on BLM lands in 13 Western States (BLM 1991). Much of the detailed information on fire effects on land and vegetation is also summarized from the 1991 Vegetation Treatments EIS.

The 14 resources that are "BLM Critical Elements of the Human Environment" are identified. In some cases, a negative declaration of presence or effect is all that is required for a particular Critical Element in relation to this proposed action.

3.1.1 Analysis Assumptions

3.1.1.1 Priorities for Treatment

Fuels treatments of grasslands, shrublands, and forestlands would be prioritized according to the following order:

1. Treatments to reduce the risk to human life and property;
2. Treatments to reduce the risk and cost of fire suppression in areas of hazardous fuels buildup; and 3) Treatments to achieve other resource objectives.

The top priority for fuels treatment would be areas in Condition Class 2 and 3 in the wildland urban interface (including currently identified and future communities at risk). This does not mean, however, that all priority 1 and 2 projects would be completed before any treatments to achieve other resource objectives.

Condition Class: Condition Classes are described as "a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic species, insects and disease (introduced or native), or other past management activities" (Schmidt et al, 2002).

Condition classes 2 and 3 represent the highest degree of departure from historic fire regimes. The attributes of Condition Classes 2 and 3 are as follows:

- Fire regimes have been moderately to significantly altered from their historical ranges.
- Moderate to high risk of losing key ecosystem components.
- Fire return frequencies have departed from historical frequencies by more than one, and in some cases multiple, return intervals. This results in dramatic changes to one of more of the following: fire size, frequency, intensity, severity, or landscape patterns.
- Vegetation attributes have been moderately to significantly altered from their historical ranges.

Communities at Risk: Areas with high potential for escaped fire or loss of life or property would be priorities for treatment.

BLM Field Office staff in 1999 completed a survey that indicated that 79 priority communities are within 1/2 mile of BLM lands. The following characteristics identified for these communities are representative of the values that will be considered in determining priority for treatment:

- 17 have high escaped fire potential (brush, ponderosa pine, mixed conifer, steep slopes, south aspect, dense fuels, ladder fuels, history of high fire occurrence) and/or high potential for loss of life or property (narrow dead end roads, steep grades, one-way in/out, no/minimal fire fighting capacity, no fire hydrants, no surface water, no pressure water system, no emergency operations group, no evacuation plan, fire conducive landscape)
- 50 have moderate escaped fire potential (moderate slopes, moderate fuels and ladder fuels, history of some large fires, moderate response time, moderate fire occurrence) and/or moderate potential for loss of life or property (has some characteristics of both high and low potential for loss of life or property).
- 9 have low escaped fire potential (grass, sparse fuels, little slope, north aspect, history of low fire occurrence, low wind exposure, quick response time) and/or low potential for loss of life or property (multiple entrances/exits, well equipped fire department, wide loop roads, fire hydrants, active emergency operations group, evacuation plan in place, fireproof landscape).

Wildland fires have since occurred in or near 6 of the 79 priority communities identified in 1999.

Since 1999 additional communities and wildland urban interface areas have been developed, and additional areas will be developed in the future.

3.1.1.2 Role of the prescribed fire prescription

Use of prescribed fire under both alternatives would include development of a prescribed fire prescription. These prescriptions would be designed with regard to site characteristics and the reproductive characteristics of the plant species present on the site. Fire effects on a particular plant community or species can be controlled through the choice of weather and fuel moisture conditions under which the fire is staged, the time of year when the site is burned, the size of the burned area as it relates to post-fire livestock and wildlife use, and pre- and post-fire site management. Prescribed burns would generally be conducted in spring or fall, when temperatures are cooler and ground and fuels moisture is higher Given the prescribed fire prescription, the analysis would consider factors such as plant mortality, postfire sprouting, reproduction from seed, effect of season of burning, effects of weather, postfire plant productivity, relationship of fire to animal use, and postfire plant competition (BLM, 1991). Background on each of these relationships is reviewed in Appendix F of the 1991 Vegetation Treatment EIS.

Necessary measures such as artificial reseeding for plant communities in poor condition or dominated by undesirable species (BLM, 1991, p. F-5) are also considered during the prescribed fire planning process.

The development of prescribed fire prescriptions would minimize negative effects on vegetation (and related/ dependant resources), as compared to wildland fire. This relationship is analyzed further for particular resources in the sections that follow.

3.1.1.3 Description of Treatments

The National Fire Plan and the 2001 Federal Fire Policy set fire and fuels management expectations for federal agencies. While these expectations include the need to reduce hazardous fuels, none of the treatments listed below would be implemented without site-specific analysis. The following description of treatments identifies different tools and how they would be used in fuels management and resource projects under both alternatives:

a. *Prescribed burns and mechanical treatment in grasslands and shrublands:* The primary objective of treating grasslands and shrublands, with mechanical treatments and/or prescribed fire, would be to remove encroaching conifers. Encroachment is indicated by the presence of young conifers (e.g., ponderosa pine, Douglas-fir, limber pine, and juniper) progressing from a forest or woodland into grasslands or shrublands. Mechanical treatments would generally be applied to remove these individual conifers within a grassland or shrubland, rather than to manipulate the grasses or shrubs themselves.

   Prescribed fire may also be used to meet resource objectives, such as restoring fire-adapted grass and shrublands, or increasing variation of age classes in shrublands. Treatments would be designed to achieve mosaic patterns, which would also reduce the potential of entire stands being destroyed by wildland fire. Most sagebrush treatments would be on mountain big sagebrush or silver sagebrush

b. *Prescribed burning and mechanical treatments in forestlands:* Past management practices, including fire suppression and timber harvest, have created buildups of small-diameter trees in densities beyond what would naturally occur. These small diameter trees create "ladder fuels" that carry fire from the ground into the canopy of the larger overstory trees, where the fire becomes more difficult and dangerous to fight. In some cases, prescribed fire could be used to thin small diameter timber and remove dead and down woody vegetation. However, where prescribed burns would be difficult or impossible to control because of existing fuels buildup, mechanical or manual preparation may be needed to reduce stand densities and allow a controllable prescribed burn. Non-commercial thinning would be used where the trees to be thinned are too small to be of commercial value.

   Commercial thinning may be used to reduce density and the potential for crown fire. Overstory density is a concern where crown continuity creates a high potential for wildland fires to become crown fires. Overstory-class trees may also be removed to reduce competition, allowing individual trees to grow larger and acquire fire-resistant characteristics. For the purposes of reducing wildland fuels, commercial timber harvest would be used. The objective of using timber harvest as a fuels management technique is to create conditions such that, in the future, harvest may not be needed—the more open structure could be safely maintained with prescribed fire treatments.

c. *Support activities, including chemical weed treatments for fuels projects:* Chemical weed treatments would be applied where other fuels treatments would create conditions favorable for expansion of noxious weeds or other undesirable invasive species. For example, weeds are often present in areas of conifer encroachment. When the canopy is opened by mechanical treatments or prescribed burns, the conditions are favorable for the weeds or invasive species to expand. Nearly all of the weed treatments would be applied either before and/or after the areas are treated with prescribed fire or mechanical methods. The anticipated level of activity identified for the alternatives did not include application of chemical treatments for purposes other than control of noxious weeds in association with fuels treatments.

Other support activities may include strategic development of water sources for fire suppression, development of fuel breaks, and construction of access roads for vegetation treatments. These roads would be rehabilitated after use. Some relocation/redesign of existing roads would also be anticipated under both alternatives.

d. *Fire use:* Until a Fire Management Plan is developed and approved, fire use would not be a viable management option with either alternative. With Alternative B, in order to manage naturally ignited wildland fire to accomplish specific pre-stated resource management objectives, areas must be designated as Category C or D and an approved Fire Management Plan (FMP) must be developed.

e. *Other treatments (e.g., biological):* Other activities, such as livestock grazing, may also be used to achieve specific fuels management objectives. These treatments would be used to help achieve and maintain healthy, properly functioning ecosystems within the historic and natural range of variability for long-term sustainable use and to comply with standards for rangeland health and guidelines for livestock grazing management. The type and level of biological treatments may be considered to meet specific objectives at the site-specific level, and are not included as part of this detailed analysis.

Treatments would be influenced by RMP decisions and objectives. It should not be inferred that all areas that exhibit conditions listed above (i.e. conifer encroachment) would be treated. Rather, distinct areas would first be identified for treatment based on fire/fuels management objectives, property values at risk, or resource objectives. The project would then be designed using one or more of the treatment methods listed above, and the project would be analyzed within the context of other resource needs and RMP decisions. In general, fuels treatments would focus on improving Condition Class 2 or 3 attributes, and would be refined for the project/watershed level

Table 5 lists broad levels of treatment anticipated over the next 10 years, by the general vegetation type on which anticipated activities would occur under each alternative. These treatment levels are used as a basis for impact analysis.

3.1.1.3 Wildland fires

Past wildland fire history provides a reasonable basis upon which to predict future wildland fire activity.

- Between 1980 and 2001, federal agencies responded to 18,808 wildland fires in Montana and the Dakotas. These fires burned over 3.1 million acres. Maximum fire size was 387,400 acres and the average fire size was 165 acres. Records are not available for those wildland fires to which federal agencies did not respond. Between 1978 and 2000, 782 fires were reported to have started on BLM land.

- As hazardous fuel loads are reduced, the potential for intense, severe wildland fire should also be reduced. Everything else being equal, when a wildland fire does occur in a treated area, the fire should be characterized by:

  - shorter flame length,
  - cooler burns,
  - greater chance of being a surface fire instead of a crown fire, and reduced chance of being a stand replacement fire.

- The fire suppression tactics that are effective in controlling wildland fires depend on, among other things, the amount of fuel and the flame length. From widely held and commonly agreed upon experience, the following are reliable rules (Rothermel 1983):

  - Flame length of less than 4 feet: Fire lines constructed with hand tools, such as shovels and axes, can be effective at the front of the fire. These tactics are often referred to as "light on the land" tactics.

  - Flame lengths of 4 to 8 feet: Fire lines constructed with bulldozers and heavy equipment are needed to be an effective fire line. If bulldozers are not available, fire engines with hoses and water may be required to "knock down" the flames before fire crews with hand tools can be effective. Or fire crews must construct a fireline at a considerable distance from the fire.

  - Flame length of 8 to 11 feet: The use of fire suppressing retardant from airtankers or water from helicopters may be necessary to reduce the fire's rate of spread before fire lines constructed by crews or bulldozers can be effective.

  - Flame length more than 11 feet: Direct suppression efforts are usually ineffective. Retreating to existing roads, streams, and other barriers is appropriate. Burning out vegetation between the

<table>
<tr><th colspan="2">Table 5 Comparison of Anticipated Activities within 10 years</th></tr>
<tr><th>Alternative A</th><th>Alternative B</th></tr>
<tr><td colspan="2">• Most fuels reduction projects would require an integrated strategy in which a combination of prescribed fire, mechanical treatments, and chemical treatments would be applied over a period of years.

• Once an area is treated, it would likely require either mechanical or prescribed fire maintenance treatments. Prescribed fire would be more commonly used as the re-treatment method.

• If noxious weeds exist on the project area, chemical treatments may be applied before and after each treatment (both maintenance and original treatments) to limit the spread of noxious weeds.</td></tr>
<tr><td>Prescribed fire: 158,000 acres would be treated.[1]
Treatments would occur on:

• 50,000 acres of grass lands (32 percent re-treatment)
• 8,000 acres of shrub lands (17 percent re-treatment)
• 99,000 acres of forest lands (33 percent re-treatment)
• 1,000 acres of agricultural lands (50 percent re-treatment)

Mechanical treatments: 35,000 acres would be treated.[1]
Treatments would occur on:

• <200 acres of grass lands
• 1,000 acres of shrub lands
• 31,000 acres of forest lands (13 percent re-treatment)
• 3,000 acres of agricultural lands (16 percent re-treatment)

Chemical weed treatments to support fuels treatments: 3,500 acres would be treated.[1, 2]
Treatments would occur on:
• 500 acres of grass lands
• 1,900 acres of shrub lands
• 1,100 acres of forest lands

Support Activities:
• 1 mile of new road per decade statewide would be associated with fuels management, which would be rehabilitated after use.</td>
<td>Prescribed fire: 299,000 acres would be treated.[1]
Treatments would occur on:

• 78,000 acres of grass lands (25 percent re-treatment)
• 41,000 acres of shrub lands (1 percent re-treatment)
• 176,000 acres of forest lands (26 percent re-treatment)
• 4,000 acres of agricultural lands (80 percent re-treatment)

Mechanical Treatments: 158,000 acres would be treated.[1]
Treatments would occur on:

• 12,000 acres of grass lands
• 36,000 acres of shrub lands
• 107,000 acres of forest lands (21 percent re-treatment)
• 3,000 acres of agricultural lands (16 percent re-treatment)

Chemical weed treatments to support fuels treatments: 185,000 acres would be treated.[1, 2]
Treatments would occur on:
• 46,000 acres of grass lands
• 103,000 acres of shrub lands
• 36,000 acres of forest lands

Support Activities:
• 3 miles of new road per decade statewide would be associated with fuels management, which would be rehabilitated after use.</td></tr>
</table>

[1]Re-treatments may increase after the first decade. Acres treated more than once are double counted.
[2]When patches of noxious weeds on a portion of an acre are treated, the entire acre is counted for reporting purposes.

fireline and the advancing fire front may be necessary to eliminate wildland fuels.

- The following areas and values would be protected from wildland fire on BLM-administered lands: buildings and structures; oil and gas fields and related facilities; communication sites and related facilities; coal mines and related facilities; rock art, cultural sites, and historic structures; power lines; communities; important wildlife habitat; campgrounds and other developed recreation areas; forested areas where potential loss of key ecosystem components is high; lands having intermingled public, state, and private ownership where there are currently no agreements for using wildfire as a resource management tool; and other areas identified through continued public involvement in fire planning efforts.

- Acres burned and intensity of wild fires would decrease in treated areas as hazardous fuel loads are reduced. Damage to resources and property from wildland fire and fire suppression, as well as cost of suppression, should decrease on and near treated areas.

- With both alternatives, wildland fire trends concerning fire size, intensity, and severity would continue on untreated areas.

3.2 Vegetation

The direct, indirect, and cumulative impacts associated with the alternatives fall into two categories.

The first category of impacts includes the general effects of different vegetation treatment methods, such as the effect of prescribed fire on ponderosa pine. The 1991 Vegetation Treatments EIS (Chapter 3, Section 1) analyzed these impacts separately from any anticipated level of activity or alternative (BLM, 1991). This analysis of general effects is incorporated by reference into this analysis.

The second category of impacts would be based on the anticipated level of activity specific to each alternative. Based on the anticipated levels of activity, the general impacts analyzed in the 1991 Vegetation Treatments EIS are refined into a comparison of the alternatives.

The Montana Land Cover Atlas (University of Montana, 1998) provides a land cover classification system for existing vegetation in Montana. The atlas is a product of the Montana Gap Analysis project (MT-GAP) that provides digital data in geographic information system (GIS). This is used to describe the affected environment and to help assess impacts to vegetation in Montana. A land cover classification system is not available for North or South Dakota. Consequently, assessing impacts by vegetation type in the Dakotas is based on RMP information, analysis of soils maps, and personal observations of resource specialists.

Information about fire effects is summarized from the Northern Rockies Interagency Fire and Aviation Management Fire Effects Information System found at www.fs.fed.us/database/feis/welcome.htm. See Table 6 for a comparative summary of treatments by landcover and the relative amount of BLM land cover that would be treated.

Table 6 Land Cover and 10 Year Fuels Treatments by Land Cover

Land Cover	Total BLM Acres by cover type	Fuel Treatments (acres) [1,2]	Percent Treated of BLM Total	Fuel Treatments (acres) [1,3]	Percent Treated of BLM Total
		Alternative A		Alternative B	
Grass lands	3,790,000	50,000	1	90,000	2
Shrub lands	2,320,000	9,000	<1	77,000	3
Forestlands	770,000	130,000	17	283,000	37
Other (ag land, barrens)	1,430,000	4,000	<1	7,000	<1
TOTAL	8,310,000	193,000	2	457,000	5

[1] Fuel treatments include mechanical and prescribed burns only. Chemical weed treatments are not included because they mostly occur on areas with other treatments.
[2] Acres treated more than once are double counted. With Alternative A, it is estimated that between 13 percent and 31 percent of the treatments would occur on acres previously treated.
[3] Acres treated more than once are double counted. With Alternative B, it is estimated that between 15 percent and 24 percent of the treatments would occur on acres previously treated.

3.2.1 Grasslands

Affected Environment (Grasslands)

The MT Gap Analysis Project classifies grasslands as areas with more than 15 percent herbaceous cover, less than 15 percent shrub cover, and less than 10 percent forest cover. Grasslands accounted for about 45 percent of the land cover (about 3.79 million acres) on BLM administered lands.

As characterized by the 1991 Vegetation Treatment EIS, grasslands in Montana and the Dakotas can be classified into mountain/plateau grasslands, which occupy relatively higher elevations and are of more limited extent, and plains grasslands, which consist of mixed grass communities and the tall grass prairie. In addition, the sagebrush analysis region has a substantial grass/forb component.

Grasslands occupy a variety of topographical positions, from level areas or valley floors, to alluvial benches and foothills, to steep mountain slopes. Soil characteristics vary accordingly, ranging from deep and loamy, to poorly drained or fairly dry and rocky, or mildly alkaline to mildly acidic (Mueggler and Stewart 1980). The grass component of these communities is usually the most productive, followed by forbs, and then shrubs.

Important grasses in mountain/plateau grass communities include bromes, bluegrasses, sedges, wheatgrasses, fescues, needle grasses, hairgrasses, reedgrasses, bentgrasses, and junegrass. The forb component varies with site, latitude, and management and is diverse throughout the region.

The plains grassland analysis region includes the mixed grass communities of eastern Montana and the Dakotas. Sedges and cool season grasses, such as needlegrasses and wheatgrasses, dominate these communities; other important grasses include needle-and-thread grass, prairie sandreed, junegrass, sand dropseed, buffalograss, side-oats grama, and little bluestem. (Brown 1982, Mueggler and Stewart 1980). Warm season grasses (particularly blue grama) and forbs may also be important components of mixed grass communities.

Tall grass communities in the plains grassland are restricted to certain soil types and areas where grazing history has not been severe (Brown 1985). This type is much more extensive in the true prairie of the Dakotas. Tall grass communities are dominated by big bluestem, little bluestem, Indiangrass, switchgrass, and side-oats grama.

The plains grasslands evolved with grazing by native herbivores, and many of the grasses are well adapted to grazing. Climate is the dominant factor controlling these grasslands, but periodic fire was also an important factor in limiting woody vegetation to mosaics or a savanna situation (Wright et al. 1980). Fire suppression has led to the establishment of fire disclimax associations of shrubs in some areas (Brown 1982).

Encroachment of conifers (e.g. ponderosa pine, limber pine, and Douglas-fir) indicates that fire regimes in fire-dependent grasslands have been altered, which results in changed ecological conditions.

According to Condition Class spatial data, it is estimated that fire regimes are within an historical range and the risk of losing key ecosystem components is low on about 94 percent of the BLM-administered grasslands (Condition Class 1). Vegetation attributes (species composition and structure) are intact and functioning within an historical range.

The other 6 percent of the BLM-administered grasslands are classified as Condition Class 2 or 3. Section 3.1.1.1 describes characteristics.

Environmental Consequences (Grasslands)

Under either alternative, National Fire Plan and 2001 Federal Fire policy objectives would focus on reducing hazardous fuels and reintroducing fire as a natural process in fire-adapted ecosystems.

Based on the conditions created by fire exclusion in grasslands (i.e. encroachment of conifers), prescribed fire would be the primary tool used to achieve hazardous fuels reduction and function of natural processes in fire-dependent grassland ecosystems. Therefore, the analysis of effects focuses on the impacts associated with prescribed and wildland fires on grasslands. Mechanical treatments of grasslands would also largely be used in combination with prescribed fire to control conifer encroachment.

In general, the effect of fire on grasses depends on the growth form, and how burning influences soil moisture and other environmental and prescribed burning conditions. Many of the grass species are fairly fire resistant and can produce new shoot growth even after moderate to high-severity burns.

Prescribed burns can release understory plants present in sagebrush communities, which may be desirable or undesirable depending on the plant species present. Spring or fall fires are most desirable and effective because the soils are moist and cool, and the burning is more selective. Sprouting shrubs such as bitterbrush, mountain snowberry, and Gambel oak respond favorably, and perennial grasses are benefited. Burning can be used to increase edge effect and increase plant diversity (Bowns 1990).

Large bunch-grasses are more affected than small grasses with coarse stems, and rhizomatous species tolerate fire well (Everett 1987a). Bunchgrass plants that survive a fire can return to pre-burn coverage and production within 2 years

(West and Hassan 1985), but the recovery time may be shorter or much longer, depending on the amount of damage sustained by the plant, its recovery potential, site productivity, postfire weather, and postfire animal use.

The tolerance of forbs to burning depends upon the timing of the fire relative to active plant growth (Wright and Bailey 1982). Those forbs that start growing after the burning season are least affected, because they have the entire growing season to recover from any injury that the fire may have caused. Perennial forbs are usually only slightly damaged by fire, except those mat-forming species such as Antennaria spp. (Wright and Bailey 1982, Everett 1987a).

Downy brome (Cheatgrass) may increase after burning (Wright and Bailey 1982) if it is present in the stand or in the area before burning, if few residual native bunchgrass plants remain on the site, or if good post-fire grazing management practices are not followed. If bunchgrass communities are in good condition when the site is treated, Downy brome may persist for only a few years.

Prairie shortgrasses are generally harmed by wild fires during dry years. Buffalograss, annual bluegrass, and western wheatgrass may take three or more years to recover (Wright and Bailey 1982). During years with above normal spring precipitation, these grasses can tolerate fire with no herbage yield reduction following the first growing season (Wright 1974a). Burning usually increases production of switchgrass but decreases little bluestem production where these grasses occur (Wright and Bailey 1982).

Prescribed burn projects would be planned to allow for recovery of key plant species, and typically are scheduled during periods of higher soil and fuel moisture, higher relative humidity, and lower temperature. Native vegetation would be more likely to re-establish naturally (without rehabilitation) following fires under these conditions. Wildland fires typically occur during summer months, when soil and fuel moisture and relative humidity are lower, and temperatures are higher. In general, artificial restoration (rehabilitation) would be necessary more often following wildland fire than following prescribed fire. However, if plant communities are not in good condition prior to prescribed burning, restoration treatments may be necessary to prevent undesirable species such as downy brome (cheatgrass) from taking over the site.

In some cases, short-term reductions in desirable species/uses may be necessary to achieve long-term benefits such as increased plant productivity. For example, burning rangelands may reduce grass or forage production, thus reducing the available forage for livestock and wildlife.

Livestock and wildlife are often attracted to burned areas. When wildland fires or prescribed burns occur, livestock grazing would be deferred or temporarily suspended to allow establishment and maintenance of new vegetation.

The nature and general objectives for fuels treatments are described in section 3.1.1.3. With Alternative A, about 50,000 acres would be treated with prescribed fire, and 200 acres would be mechanically treated. See Table 6 for a summary comparison of treatment acres by landcover type and alternative.

Chemical weed treatments would be applied to about 500 acres of grasslands under Alternative A and 46,000 acres under Alternative B. Nearly all of the weed treatments would be applied either before or after the areas would be treated with prescribed fire or mechanical methods. Herbicide application would be expected to increase grasses and decrease broadleaf species, shrubs and forbs.

Alternative B would better meet fire management goals on nearly twice as many acres as Alternative A (see Table 6). In the long-term, total plant productivity would also improve with Alternative B.

3.2.2 Shrublands

Affected Environment (Shrublands)

The Montana Gap Analysis (MT-GAP) project classifies shrublands as areas with more than 15 percent shrub cover and less than 10 percent forest cover. Shrublands account for about 28 percent of the land cover (about 2.3 million acres) on BLM administered lands. While sagebrush is the most common category of shrublands, the shrublands category includes other shrub types as well.

Important shrubs include big sagebrush, black sagebrush, low sagebrush, rabbitbrushes, Mormon tea, bitterbrush, snowberry, and horsebrush (Cronquist et al. 1972). Important perennial grasses associated with these shrub communities include bluebunch wheatgrass, Sandberg bluegrass, Idaho fescue, rough fescue, western wheatgrass, Great Basin wildrye, junegrass, Indian ricegrass, squirreltail, muttongrass, needle-and-thread grass, and Thurber needlegrass. Downy brome (cheatgrass) is an introduced annual grass that may exist in some areas.

Environmental diversity has resulted in a comparable variety of species, subspecies, and varieties of sagebrush adapted to specific habitats (Tisdale and Hironaka 1981). Basin big sagebrush and Wyoming big sagebrush usually dominate between 2,000 and 7,000 feet. Basin big sagebrush occupies deep, well-drained alluvial soils where annual precipitation averages 10 to 16 inches, and Wyoming big sagebrush occupies an 8- to 12-inch precipitation zone on shallow soils (Wright et al. 1979). Mountain big sagebrush can be found at elevations from 5,000 to 10,000 feet where annual precipitation varies from 14 to 20 inches (Wright et al. 1979).

Mixed xeric shrubs are associated with dry rocky sites. Dominant species include bitterbrush, creeping juniper, greasewood, mountain mahogany, rabbitbrush, and shadscale. Mixed xeric shrubs are the dominant species with 20 to 50 percent cover. This category of shrublands is found on about 8 percent of public lands.

Other shrub species found in Montana and the Dakotas include juniper, silver sagebrush, buffaloberry, sumac, rabbitbrush, western snowberry, gooseberry, red osier dogwood, common chokecherry, American plum, and greasewood.

The fire history of shrublands has not been firmly established, but fire was probably uncommon on drier sites because of sparse fuels, and more frequent, averaging 32 to 70 years, on more mesic sites with greater herbaceous production (Wright et. al 1979).

Based on Condition Class information, fire regimes are within an historical range and the risk of losing key ecosystem components is low (Condition Class 1) on about 88 percent of BLM-administered shrublands. Vegetation attributes (species composition and structure) are intact and functioning within an historical range.

About 11 percent of the BLM-administered shrublands are Condition Class 2 and less than 1 percent is Condition Class 3.

Environmental Consequences (Shrublands)

Section 3.1.1.3 describes the treatments anticipated on shrublands. Alternative A would treat less than 1 percent of BLM-administered shrublands over a 10-year period while Alternative B would treat about 3 percent. See Table 6. Shrubs are generally less tolerant of fire than grasses. However, the season and intensity of fire on shrublands also determines the effects of fire.

In mountain brush communities, certain species of shrubs resprout vigorously after fire. Sprouting shrubs, such as western serviceberry, true mountain mahogany, chokecherry, winterfat, saltbush, rabbitbrush, horsebrush, and silver sagebrush may regrow quickly postburn (Wright et al. 1979).

However, the big sagebrush species (Basin big sagebrush, mountain big sagebrush, and Wyoming big sagebrush) are vulnerable to fire and may take up to 20 years to recover. (Harniss and Murray 1973). Basin big sagebrush does not resprout and is eliminated by frequent fires. Mountain big sagebrush may be killed even by fires of light severity, and will not resprout if top killed. Wyoming big sage is also killed by fire. An understanding of big sagebrush's vulnerability to fire comes from past use of fire as an effective means of reducing big sagebrush to increase forage production.

Other sagebrush species, including the silver sagebrush complex, are moderately resistant to fire mortality.

Mechanical treatments and prescribed fire would primarily be used to remove encroaching conifers or open the canopy on dense, stagnant, even-aged stands of sagebrush that are at risk of destruction by wildland fire. In shrublands where conifer encroachment is treated with mechanical treatments and prescribed fire, the density and canopy of shrub stands would be reduced in treated areas. The duration of the reduction would depend on whether the shrubs sprout after fire and post-fire management actions (such as reseeding).

Herbaceous species would increase in density and production in response to burning and as canopy cover is reduced. Perennial forbs would also increase.

3.2.3 Forestlands

Affected Environment (Forestlands)

The Montana Gap Analysis (MT-GAP) project classifies areas with more than 10 percent forest cover as forestlands. Forestlands account for about 9 percent, or 770,000 acres, of BLM lands.

Forestlands are a composite of the many high-elevation evergreen conifer and deciduous forest types that occur throughout Montana and the Dakotas. Species dominance varies with altitude, latitude, slope aspect or other topographical position, soil characteristics, and climatic regime. The BLM administers small acreages of these diverse forest types. Important forest communities include climax ponderosa pine, seral ponderosa pine, Douglas-fir, Douglas-fir mixed with other conifers, aspen, lodgepole pine, and spruce fir.

In May 1977 the USDA Forest Service published Technical Report INT-34, "*Forest Habitat Types of Montana*". This report, commonly referred to as Pfister's Habitat Typing book, is a well-known and often-cited publication.

A general distribution of Climax Series exists throughout Montana. The series begins with the grasslands on the driest, warmest sites and extends through the Alpine Tundra series on the coldest, moistest sites. The first forest type encountered is the Limber Pine Series.

Limber Pine Series: Limber Pine rarely occurs West of the Continental Divide and is typically found on the very driest sites capable of supporting trees. Trees tend to be very short and stubby, (less than 20 ft.) with an understory of native grasses and shrubs such as bluebunch wheatgrass, Idaho fescue and common juniper. These forest stands offer little for timber productivity but do provide value as escape cover for wildlife and some grazing value for domestic livestock.

Fire history indicates that these areas burned with low intensities because of the sparse vegetation.

Ponderosa Pine Series: If the Limber Pine Series is absent, the first forest zone that typically appears is the Ponderosa pine Series. Usually there is a "belt" of climax ponderosa pine that exists between the grasslands and climax Douglas-fir. The difference between the grassland zone (with a few scattered trees), and the ponderosa pine- savanna is recognized to be capable of supporting 25 percent coverage by tree canopy. Fire history indicates that these areas burned with frequent, low intensity ground fires and pure stands of ponderosa pine were often uneven-aged (Pfister, 1977). Stands were probably kept open by light fires that periodically burned through the understory. Older trees tolerate fire well, but young trees are easily killed (Daubenmire 1952). In the absence of frequent understory fires that historically occurred, many stands of ponderosa pine are now dense and stagnant, with thickets of understory reproduction (Wright and Bailey 1982).

Douglas-fir Series: The Douglas-fir series makes up a large portion of the climax forests, but does not extend greatly onto the plains. This is a very broad and diverse forest type. Douglas-fir is more shade tolerant than other associated tree species and the drier stands were maintained through frequent fires. This series begins to have some significant timber productivity potential although the lower elevations and warmer aspects still provide for critical big game winter range and livestock forage.

The range of quaking aspen, which is the most widely distributed native North American tree species (DeByle et al. 1985), coincides closely with Douglas-fir. Fire is responsible for the abundance and even-aged structure of most stands throughout the West. Without human intervention, fire appears to be necessary for the continued well-being of aspen on most sites (DeByle et al. 1985), and most stands will die out or be replaced by conifers without disturbance. The occurrence of fire in aspen stands has been reduced by fire suppression and by lack of understory fuels. The lack of understory herbaceous fuel caused by livestock grazing precludes the occurrence of fire in most aspen stands (Jones and DeByle 1985).

Spruce, Grand Fir, Red Cedar, Hemlock Series*:* This series is found on the most moist and cool sites and covers a significant portion of the landscape in northwest Montana. The drier habitat types of this series do extend into the central and south central portions of the state. This series includes some of the better timber producing sites and supports a variety of tree species. These habitat types often occur adjacent to streams and other water bodies and are also important big game habitat. History shows that these forests tended to burn infrequently but with a stand replacing fire. Lodgepole pine occurs primarily in western and southcentral Montana. At higher elevations, it gives way to spruce fir forest. Lodgepole pine forms dense, often pure stands with little understory. Fire plays an important role in the maintenance of these forests. The Rocky Mountain lodgepole pine contains some proportion of closed cones that retain seeds but quickly release them after fire or cutting (Lotan et al. 1981). Lodgepole pine colonizes burned areas, frequently replacing previous stands of lodgepole pine. Without fire, lodgepole pine may eventually be replaced by ponderosa pine, Douglas-fir, Englemann spruce, cedar hemlock, or Englemann spruce/subalpine fir stands. Lodgepole pine may persist as a climax species on sites too cold for Douglas-fir or ponderosa pine, too dry for spruce fir, or too wet or infertile for other coniferous species (Wright and Bailey 1982).

Fuel hazard and declined forest health are not necessarily the same, but commonalities do exist between fuels and ecological conditions. If all fires are excluded from ponderosa pine, Douglas fir, and western larch forest types, which historically had high frequencies of understory fire, the result can be the eventual weakening of the stand, an increase in activity of bark beetles, and an increase in the proportion of dead trees. Barrett (1988) and Stark (1977) also cited accumulations of understory dead woody fuels, as well as the establishment of trees that provide fuel ladders between the surface fuels and the tree crowns, and substantially altered forest succession in some forest types as resulting from fire exclusion. Fuels and/or bug-killed trees lead to stand-destroying fires. Many acres in the West have had fire excluded for 50 to 75 years, and some fires in recent years are likely a result of the accumulation of fuels and insect activity (BLM, 1991, p. F-13).

Fire exclusion on forests with long stand replacement cycles results in increased fire hazard because flammability increases over much greater contiguous areas of forest and younger, less flammable stands are no longer present. For example, lodgepole pine stands that have had time to develop an understory of Englemann spruce and subalpine fir are much more flammable than before those species became established. Complete fire protection will allow less fire-tolerant species to replace more fire-tolerant species, as well as permit coniferous species to take over most sites presently dominated by aspen (DeByle et al. 1985).

Condition Class definitions operate on the degree to which fire has been excluded and thus, in these types, the degree to which the abovementioned characteristics, including ladder fuels, fire sensitive species in the understory, and overstocking, may be present. Treatments would focus on Condition Class 2 and 3 areas, as described below.

About 15 percent of the BLM-administered forestlands are Condition Class 1, 27 percent are Condition Class 2; and 58 percent are Condition Class 3.

Environmental Consequences (Forestlands)

The nature of thinning and prescribed fire treatments in forestlands is described in section 3.1.1.3.

Mechanical treatments and prescribed burning can be effective management tools in forested vegetative communities in the West. Fire can be used to reduce surface fuels in the understories of fire resistant trees; to remove understory reproduction in ponderosa pine, Douglas-fir, and western larch forests, which provide a fuel ladder to the overstory; to thin overstocked stands of trees; to prune lower branches from trees; to create seedbed; to reduce vegetative competition with naturally regenerated or planted conifers; to enhance forage values; to maintain and improve browse quality and quantity; and to rejuvenate old stands of deciduous trees.

Prescribed fire can produce favorable conditions for conifers. Burning ponderosa pine forests increases grasses and top-kills shrubs, such as chokecherry, western serviceberry, and bitterbrush, which will sprout the next year. In general, fire is beneficial to grasses and forbs in ponderosa pine associations but not where shrub understories dominate (Wright and Bailey 1982). Burning Douglas-fir forests would increase shrubs such as snowbush, ceanothus, Western serviceberry, common snowberry, and sticky currant. In some Douglas-fir areas, ponderosa pine and quaking aspen may become fire climax species. Although easily killed by surface fires, quaking aspens quickly sprout from roots, making the tree a quick competitor in many Douglas-fir and spruce fir forests.

The understories of ponderosa pine, Douglas-fir and western larch communities are all adapted to fire. Some later successional species that may have established because of fire exclusion might not be favored, but the natural shrub, forb, and grass associates of these species would recover by sprouting or from seed stored in the forest soil organic layer (duff) after fire. The exact response varies by fire prescription, season, moisture condition, and plant species.

Slash from thinning and selective logging can be burned to reduce fire hazard without harming the residual trees in these communities. Without fire, ponderosa pine and Douglas-fir sometimes invade grasslands and shrublands, and prescribed fire can be used to eliminate these trees when they are young.

Mature stands of juniper are frequently too open or contain insufficient herbaceous fuel to carry a fire (Lotan and Lyon 1981). However, burning can easily kill nonsprouting juniper, especially trees less than 4 feet tall (Dwyer and Pieper 1967). Larger trees require heavy amounts of fire fuel within their canopy coverage to crownkill (Jameson 1962). Where understories include sagebrush, large juniper trees can be killed by fire (Bruner and Klebenow 1978).

Postfire recovery of juniper after fire depends on seed reproduction, and the rate of reinvasion depends on distance to seed source, the size of the burned area, and the presence of dispersal agents.

Older trees are generally more fire resistant as bark thickens and the crown becomes more open, and may be able to survive low intensity fires. It is difficult to kill trees in fairly closed stands of juniper because there is little live or dead fuel on the surface, and a prescribed fire will not carry unless there are extremely high winds, a situation in which risk of fire escape is high. A treatment in juniper stands is to manually cut the trees, leave the slash scattered, wait several years for grasses and shrubs to recover, and then burn the site. This removes most of the dead fuel, greatly reduces the fire hazard, and kills any residual or newly germinated juniper trees. If a site is mechanically or manually treated only, forage and browse production will probably be enhanced for about 20 years. Prescribed burning of the site about 3 to 5 years after treatment, once an understory has established, will maintain the productive character of the site for about 50 years (West 1979, as cited in Tiemenstein 1986b, Wright et al. 1979, as cited in McMurray 1986b). If high rates of forage utilization (which reduce fuels) and fire exclusion continue to be practiced on sites invaded by juniper, tree density will continue to increase, and juniper will continue to expand onto shrub- and grass-dominated sites (Burk-hardt and Tisdale 1976). An active management program that includes prescribed fire would reduce the amount of tree encroachment and would better achieve the desired resource condition.

The occurrence of fire in aspen stands has been reduced by fire suppression and by lack of understory fuels. The lack of understory herbaceous fuel caused by livestock grazing precludes the occurrence of fire in most aspen stands (Jones and DeByle 1985). Without fire, conifers invade many aspen stands, gradually eliminating the aspen, because aspen sucker replacement is often insufficient to replace overstory aspen mortality (Schier 1975). Aspen communities on sites not suited for conifer establishment may eventually be replaced by grasses and shrubs (Schier 1975). Suckering is prevented by the presence of mature trees as the trees and roots gradually deteriorate. Loss of aspen stands because of this phenomena has been observed in several western states. A fire that occurs in an aspen stand that is still producing a few suckers, or in a mixed aspen conifer stand is likely to result in the rejuvenation of the aspen stand. The amount of postfire suckering is enhanced by warmer soil temperatures, which usually occur as a result of the blackened soil surface and reduced thickness of the litter and organic layer (Jones and DeByle 1985). As is true for rangeland sites, an aspen site must be rested from grazing until the community recovers to some degree (Brown and Simmerman 1985). Wildlife use can be regulated to some extent if a large enough burned area is selected, or if several areas in the same general vicinity are burned, thus dispersing use over a greater acreage.

Treatments would provide a range of forested and non-forested vegetative successional stages that reflect natural processes and maintain or improve ecosystem health. Both alternatives would reduce the amount of dense, multistory stand conditions. Both alternatives would maintain mosaics of untreated component of high percent canopy cover, multistory, dense, mature to overmature stand conditions within treated areas.

Treatments (commercial harvest, pre-treatments, and prescribed fire) would result in increased sunlight, increased soil moisture, and decreased needle mat, which would stimulate growth of understory plants.

On untreated areas, tree density would continue to increase. This would increase competition for limited water, nutrients, and light in absence of disturbance. This would result in decreased health and vigor of the trees and reduce forest health.

Nearly all of the weed treatments would be applied before and/or after the areas are treated with prescribed fire or mechanical methods.

Fewer acres of dense, multi-story stand and closed-canopy conditions would be treated under Alternative A. These conditions heighten the risk of stand replacement wildfire. Forest health would also continue to decline on more areas with Alternative A, since fewer dense, overstocked stands would be treated.

Hazardous fuels treatments of ponderosa pine forestlands in the Big Dry Planning Area would be affected by an existing decision that prohibits sales of sawtimber (except for salvage harvest and sale of ponderosa pine affected by insects, fire, or other natural causes). Remaining management options for treating hazardous fuels would include the use of prescribed fire and mechanical treatments that do not include sale of sawtimber (i.e., treatment of small-diameter trees and cutting but piling or chipping sawtimber-sized logs). However, treatments that involve piling or chipping sawtimber (rather than making it available to sustain the local economy) would be inconsistent with the intent of forest manual 5000-1, which establishes utilization of commercial products as a basic tenet of the forestry program. Therefore, those treatments that necessitate removal of sawtimber before prescribed fire can be used safely or small-diameter trees can be treated effectively would be inconsistent with current RMP decisions. Since dry, low elevation forests like ponderosa pine have been among those most affected by departure from the nautral fire regime, the limitation on management options within the Big Dry planning area would severely constrain BLM's ability to treat hazardous fuels and allow fire to play its natural role.

Although Alternative B includes more acres of treatment and thus increases potential for spread of noxious weeds, chemical weed treatments would be applied in support of the fuels project to mitigate the increased potential. These treatments would generally be applied before fuels reduction treatments, and would also be applied after treatments if necessary.

Under Alternative B, dense, overstocked multistory stand conditions would be reduced on more than twice as many acres with Alternative B than with Alternative A. The intensity and severity of wildland fires would be reduced on 37 percent of BLM forestlands over a 10-year period. As fires become less severe, the adverse impacts of wildland fire suppression activities would also be reduced on these areas, as would the extent of rehabilitation needed after wildland fire.

With Alternative B, the sale of sawtimber in the Big Dry Planning Area would be allowed. This would make fuels treatments less costly, more effective, and more feasible.

3.2.4 Special Status Plant Species

Affected Environment (Plants – Special Status Species)

BLM Manual 6840 provides policy and direction for the conservation of special status species of plants and animals, and the ecosystems upon which they depend. Categories of Special Status Species (SSS) are: A.- Federally Listed Threatened and Endangered Species and Designated Critical Habitats; B. – Federally Proposed Species and Proposed Critical Habitats; C. – Candidate Species; D. – State Listed Species; and E. – BLM Sensitive Species.

An analysis of effects to federally listed threatened, endangered, and proposed species, proposed and designated critical habitat is provided in the Biological Assessment and is summarized in Section 3.8 of this document. The Biological Assessment prepared for this proposed action, along with the Letter of Concurrence and Biological Opinion from the Fish and Wildlife Service, are incorporated in their entirety into this Environmental Assessment by reference and are available upon request.

Other plant species that exist in the area of influence and are given special consideration under BLM Manual 6840 include 28 BLM sensitive plants. See Table 7.

The State (North and South Dakota) threatened and endangered species list and the Montana Species of Concern list contain other species in addition to those on the federal list. BLM gives all special status species consideration to ensure continued survival.

Environmental Consequences (Plants - Species of Concern):

Unidentified, unknown populations of special status plants in or near a treatment area would be vulnerable to any of the impacts discussed under impacts to vegetation. Special status plants could benefit from treatments designed to enhance habitats; e.g., removal of competing exotics.

All BLM actions would be evaluated for potential effect on BLM Sensitive and federally listed species. However, some direct and indirect impacts would occur.

Little or no impact would be anticipated since sites would be inventoried for species of concern prior to treatment. Because of current guidance, there would be no impact on BLM land to federally listed species, under either alternative. BLM would consult with appropriate state agencies for adverse impact to state-listed species. Species of concern that are not federally protected may be impacted by habitat changes or in association with vegetation removal.

Table 7 BLM (Montana and Dakotas) Designated Plant Sensitive Species

Common Name	Scientific Name	Known Occurrence
Cusick's horse-mint	*Agastache cusickii*	Dillon FO
Sapphire rockcress	*Arabis fecunda*	Butte FO, Dillon FO
Painted milkvetch	*Astragalus ceramicus apus*	Dillon FO
Geyer milkvetch	*Astragalus geyeri*	Billings FO
Bitterroot milkvetch	*Astragalus scaphoides*	Dillon FO
Railhead milkvetch	*Astragalus terminalis*	Dillon FO
Obscure evening-primrose	*Camissonia andina*	Billings FO
Small camissonia	*Camissonia parvula*	Billings FO
Craw's sedge	*Carex crawei*	Lewistown FO
Idaho sedge	*Carex parryana idahoa*	Dillon FO
Miner's candle	*Cryptantha scoparia*	Billings FO
Sand wild-rye	*Elymus flavescens*	Dillon FO
Smooth buckwheat	*Eriogonum salsuginosum*	Billings FO
Garnet bladderpod	*Lesquerella carinata languida*	Missoula FO
Pryor Mountains bladderpod	*Lesquerella lesicii*	Billings FO
Beautiful bladderpod	*Lesquerella pulchella*	Dillon FO
Taper-tip desert-parsley	*Lomatium attenuatum*	Dillon FO
Desert dandelion	*Malacothrix torreyi*	Billings FO
Nama	*Nama densum*	Billings FO
Pale evening-primrose	*Oenothera pallida idahoensis*	Dillon FO
Lemhi beardtongue	*Penstemon lemhiensis*	Dillon FO
Whipple's beardtongue	*Penstemon whippleanus*	Dillon FO
Bur oak	*Quercus macrocarpa*	Miles City FO
Shoshonea	*Shoshonea pulvinata*	Billings FO
Chicken sage	*Sphaeromeria argenta*	Dillon FO
Rocky Mountain dandelion	*Taraxacum eriophorum*	Butte FO, Dillon FO
Alpine meadowrue	*Thalictrum alpinum*	Dillon FO
Northwestern thelypody	*Thelypodium paniculatum*	Dillon FO

Conclusion (Vegetation):

Condition Class 2 and 3 characteristics occur on 6 percent of grasslands, 12 percent shrublands, and 85 percent of forestlands administered by the BLM.

With both alternatives:

- Little or no impact would be anticipated on Special Status plant species since sites would be inventoried for species of concern prior to treatment. Because of current guidance, there would be no impact on BLM land to federally listed species, under either alternative. BLM would consult with appropriate state agencies for adverse impact to state-listed species. Species of concern that are not federally protected may be impacted by habitat changes or in association with vegetation removal.

- With proper management, including application of Standards for Rangeland Health, most treated lands would move toward proper functioning condition.

- Treatments would help sustain the ecological health and function of fire-adapted grasslands, shrublands, and forestlands.

- The size, intensity, and severity of wildland fires would be reduced within treated areas. The risk of losing key ecosystem components would be reduced.

- On areas with Condition Class 2 and 3 attributes that are not treated, trends (conditions) created by fire exclusion would continue, including:
  - o Dense, overstocked stands of timber in fire adapted forests that are beyond their natural fire return intervals. These stands are typically vulnerable to insects and disease.
  - o Loss of grassland and shrubland habitats to conifer encroachment.
  - o Moderate to high potential for catastrophic wildland fire.

- Based on the proportion of total BLM lands that would be treated over 10 years and application of Standards for Rangeland Health, no unacceptable adverse or significant impacts on vegetation would be anticipated with fuels treatments proposed under either alternative.

Neither alternative would cause a significant impact to the ecological health of grasslands, shrublands, or forestlands.

With Alternative A:

- About 193,000 acres would be treated within a decade (130,000 acres of forestlands, 50,000 acres of grasslands, 9,000 acres of shrublands, and 4,000 acres of other lands).

- Fuel treatments would affect about 1 percent of BLM administered grasslands and shrublands and about 17 percent of forestlands.

- After the treatments completed in the 10 years, Condition Class 2 and 3 characteristics would remain on an estimated 5 percent of grasslands, 11 percent of shrublands, and 68 percent of forestlands.

- Since fewer acres would be treated, full suppression would continue to be necessary on more acres compared to Alternative B. The opportunity for wildland fire to play its natural role or achieve resource benefits would also be limited on these acres.

With Alternative B:

- About 457,000 acres would be treated per decade (283,000 acres of forestlands, 90,000 acres of grasslands, 77,000 acres of shrublands, and 7,000 acres of other lands).

- Fuel treatments would affect about 2 percent of BLM administered grasslands, 3 percent of shrub lands, and about 37 percent of forestlands.

- After 10 years, Condition Class 2 and 3 characteristics would remain on an estimated 4 percent of grasslands, 9 percent of shrublands, and 48 percent of forestlands.

- Alternative B would reduce hazardous fuels, improve the ecological health of forestlands, and contribute to proper functioning condition on more than twice as many acres that are beyond their natural fire cycles as compared to Alternative A. Alternative B would better meet the goals of increasing protection of human life and property, reducing the risk and cost of severe wildland fires, minimizing the adverse effects of wildland fire suppression, and meeting other fire and resource management objectives.

3.3 Air Quality (BLM Critical Element)

Affected Environment (Air)

In undeveloped areas, ambient air pollutant levels should be near or below measurable limits. Locations near industrial developments and population centers are most vulnerable to air quality impacts from emissions sources such as automotive exhaust, residential wood smoke, and industrial pollution. Noise levels are site specific, and are variable. Rural noise levels should average less than 50 decibels A-weighted (dbA), with occasional peak levels to 70 dbA.

National Ambient Air Quality Standards limit the amount of specific pollutants allowed in the atmosphere: carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter (inhalable particulates, or PM_{10}, and fine particulates, or $PM_{2.5}$).

Any decisions or actions related to prescribed burning and other fuel reductions projects must comply with air quality legislation, including the Clean Air Act of 1977. Through the Clean Air Act, Congress established a system for the Prevention of Significant Deterioration (PSD) of areas with air pollutant concentrations below the national standards (designated as "attainment" or "unclassified"). PSD areas are classified by the additional amounts of nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and inhalable particulate matter (PM_{10}) degradation that would be allowed above a legally defined baseline level. PSD Class I areas, predominately large National parks, wilderness areas, and certain Indian reservations, have the greatest limitations; virtually any degradation would be apparent. Areas where moderate controlled growth can take place have been designated as PSD Class II. PSD Class III areas allow the greatest degree of degradation.

The PSD regulations also address potential impacts to Air Quality Related Values (AQRVs) within mandatory Federal Class I areas. These AQRVs include visibility, odors, and impacts to flora, fauna, soils, water, geologic and cultural structures. A possible source of impact to AQRVs is acid precipitation.

All BLM administered lands in Montana, South and North Dakota are designated PSD Class II. However several areas near BLM administered public lands are mandatory Federal Class I areas. These include the Anaconda-Pintler Wilderness, Gates of the Mountain Wilderness, Selway-Bitteroot Wilderness, Glacier National Park, Cabinet Mountain Wilderness, Mission Mountains Wilderness, Scapegoat Wilderness, Bob Marshall Wilderness, Medicine Lake Wilderness, UL Bend Wilderness, Yellowstone National Park, Red Rock Lakes Wilderness, Lostwood Wilderness, Theodore Roosevelt National Park (North Unit, Elkhorn Ranch Unit, and South Unit), Wind Cave National Park, and Badlands Wilderness. In addition, the Flathead Indian Reservation, Fort Peck Indian Reservation, and Northern Cheyenne Indian Reservation have been redesignated PSD Class I areas, although the Fort Belknap Indian Reservation remains a PSD Class II area.

Areas that consistently violate federal standards because of human activities are classified as "nonattainment" and must implement a plan to reduce ambient concentrations below maximum pollution standards. Nonattainment areas in Montana include Great Falls, Columbia Falls, Flathead County (Whitefish and vicinity), Kalispell, Polson, Ronan, East Helena, Libby, Missoula, Lame Deer, Sanders County (Thompson Falls and vicinity), Butte, Billings and Laurel. There are no nonattainment areas in North or South Dakota. All Bureau authorized or initiated activities within these areas are required to perform a "conformity" applicability determination and/or analysis before the action may take place.

Environmental Consequences (Air)

Fires are a source of air pollutant emissions during combustion of various ages, sizes, and types of vegetation. The amount of emissions depends on the size and intensity of the fire, the fuel type and moisture content, and the available fuel loading. The level of resulting air quality impact depends on the amount and duration of emissions, atmospheric dispersion conditions, and terrain. The most effective means of controlling air pollutant emissions from wildland fire is to reduce the number of large, catastrophic fires through selective vegetation treatments that break up heavy, continuous fuels. Depending on the conditions, managed natural fires, prescribed fires, and mechanical treatments can be effective methods to reduce heavy fuels. When properly executed, managed fires may be much smaller and involve less combustion, occurring when the fuel type, loading and fuel characteristics, as well as weather conditions, are optimized to enhance efficient fuel consumption and air pollutant dispersion. By reducing the risk of uncontrolled wildland fire, the risk of significant air quality impacts is also reduced.

Other impacts to air quality would include moderate increases in noise, dust, and combustion engine exhaust generated by manual and mechanical treatment methods, aerial application of fire retardant, moderate noise and minimal chemical drift from application of herbicides. Resulting impacts would be temporary, small in scale, and quickly dispersed. These factors, combined with standard operating procedures, would minimize potential air quality impacts. Applicable federal, state, tribal and local air quality regulations would not be violated.

Potential air quality impacts would be assessed before project implementation. Site-specific plans would be reviewed for compliance with applicable laws and policies, and existing air quality would be inventoried so that changes associated with the BLM proposals may be determined. Additional mitigation may be incorporated into specific project proposals to further reduce potential impacts. For example, prescribed burning activities must comply with the BLM Manual Sections 9211.31 (E), Fire Planning, and 9214.33, Prescribed Fire Management, to minimize air quality impacts from resulting smoke. This procedure requires compliance with individual state and local smoke management programs that specify the conditions under which burning may be conducted.

Particulate matter and carbon monoxide are the primary air pollutants emitted during prescribed burning. Compliance with local smoke management programs would minimize these effects. The timing, vegetation type, size of burns, fuel arrangement and moisture, ignition techniques and patterns, and weather conditions are all specified to keep smoke concentrations within acceptable limits. The actual level of impact will depend on a combination of all these factors. Prescribed burning would generally occur under more favorable atmospheric dispersion conditions to meet air quality regulations since the timing and location of wildland fires cannot be controlled.

The Montana/Idaho Executive Airshed Board, which includes members from federal and state agencies and private industry, coordinates regional smoke impacts and smoke management for prescribed fires.

Accumulation of smoke from controlled burning is limited through scientific monitoring of weather conditions and formal coordination of burns. For Montana, BLM submits a list of planned burns to the Monitoring Unit in Missoula, Montana. For each planned burn, information is provided describing the type of burn to be conducted, the number of acres, as well as the location and elevation at each site. Burns are reported by "airshed," which are geographical areas with similar topography and weather patterns. The program coordinator and a meteorologist provide timely restriction messages for airsheds with planned burning. Weather balloons may be launched and tracked to identify specific atmospheric conditions to aid in decision-making. The Missoula Monitoring Unit issues daily decisions that can restrict burning when atmospheric conditions are not conducive to good smoke dispersion. Restrictions may be directed by airshed, elevation or by special impact zones around populated areas. The Monitoring Unit announces burning restrictions through 17 airshed coordinators located throughout Idaho and Montana. There is no formal organization to coordinate smoke management issues in the Dakotas.

Potential cumulative impacts could occur when multiple fires occur simultaneously or when other non-fire related activities are also contributing to air quality impacts. Under current procedures, if the cumulative impacts are anticipated to violate applicable air quality standards, prescribed burns are not conducted until conditions improve.

Conclusion (Air):

Overall, air quality impacts would be greater from wildland fires than from fuel treatments since wildland fires are generally larger and often occur under poor atmospheric dispersion conditions. Since more severe wildland fires are expected to occur under Alternative A, air quality impacts are expected to be greater than under Alternative B, even though Alternative B would have a greater number of prescribed fires and other fuels treatments. Cumulative air quality impacts from multiple wildland fires are more likely under Alternative A.

Neither Alternative A nor Alternative B would exceed state or federal ambient air quality standards as the result of fire and fuels management.

3.4 Soils

Affected Environment (Soils)

Soils are extremely variable across Montana and the Dakotas, having different physical characteristics such as depth and texture; and different chemical properties such as alkalinity and nutrient content. These characteristics are influenced by parent material, regional and local climate, vegetation, slope, aspect and time. The hundreds of soil types that occur on BLM lands are referenced in most BLM Resource Management Plans (RMPs), and are available from related published soil surveys, electronic data files and various web sites.

Soils located on BLM lands in Montana and the Dakotas have developed in a semi-arid environment that provides for the many combinations of soil forming factors to affect soil development, use and management. These various combinations of soil properties influence and in many instances control the amount and types of vegetation, land use and potential vegetation.

Environmental Consequences (Soils)

Prescribed burning affects soils primarily by consuming live vegetative cover; litter; organic soil layers; down, dead, and wood fuels (Wright and Bailey 1982). Fire may alter soil chemical properties, nutrient availability, postfire soil temperatures, microorganism populations and their activity rates, and erosion. The degree of short-term effect on these characteristics depends on the ignition technique; dead fuel, live fuel, thickness, and density of litter and organic layers. Soil texture, soil moisture at the time of burning, and depth and duration of lethal heat penetration into organic and soil horizons are all critical factors. Significant deep soil heating would be anticipated when there is long duration burning in thick organic layers of heavy accumulations of dead woody debris, such as slash piles (Frandsen and Ryan, 1986). Moist soils limit the depth of soil heating.

Nutrient and soil losses from a burned site and postfire erosion are closely related to burn severity, soil type, topography, and remaining plant cover. The single most important erosion factor is the timing of vegetative recovery with the severity of precipitation events. If postfire rains are gentle, some nutrients released by a fire may be reabsorbed; however these nutrients are generally lost during severe, erosive rainfall.

Changes in soil chemical properties, including soil nutrients, caused by burning usually include an increase in soluble nitrogen, phosphorus, potassium, sulfur, magnesium, sodium, and calcium, and an increase in soil pH (Fuller et al 1955; Summerfield 1976). After very severe burns, however, actual increases/decreases may be different.

Soil microorganism mortality depends on depth and duration of soil heating; initial decline is anticipated postburn (Jurgenson et al 1979) but populations may quickly recover to greater than preburn populations (Wright and Bailey 1980). Nitrifying bacteria, however, are extremely sensitive to fire over wet and dry soil and do not recover quickly (Dunn and Debano 1977). Heterotrophic bacteria respond similarly but at higher temperatures (ibid). When related to metabolic processes, microbial populations are not adversely affected by prescribed burning (Wright and Bollen 1961, Jorgenson and Hodges 1971, Summerfield 1976).

Appreciable changes in soil mineral fractions would not be anticipated as a result of prescribed burning (Beaton 1959, Summerfield 1976). The impacts caused by severe fires; e.g., loss of structure and reduced porosity/infiltration rates (Ralston and Hatchell 1971) can be avoided with a properly designed prescribed fire prescription.

The potential for significant post-fire erosion depends on the amount of residual vegetation and organic matter, the rate and amount of vegetative recovery, and slope. These factors would be considered before prescribed burning. On forestland soils, litterfall of scorched conifer needles may minimize erosion. Effects to fragile or erodible soils can be mitigated by prescribing for the needed amount of fuel and organic layer moisture to minimize organic layer removal; timing the fire so that seasonal vegetation recovery would occur soon after the burn; and leaving mosaics of unburned areas within the fire perimeter.

Additional information specific to vegetation types is provided below.

Sagebrush: Most litter associated with sagebrush plants is located directly under the plant; physical and chemical effects from soil heating would primarily occur in this area. Wind erosion of topsoil is likely on exposed areas. Seasonal timing of the burn in relation to plant recovery is especially important; seasonal potential for severe precipitation or high winds should be considered for these sites during project planning.

Summerfield (1976) found that organic matter, pH, and nitrogen may increase in soil surface layers following prescribed burns, but an earlier report by Blaisdell (1953) found that pH did not change after sagebrush grass burning. Burning sagebrush and leaf mulch may produce short-term water repellency in soils under sagebrush plants; however, burning while soil and mulch are cool will reduce or eliminate this potential (Salik et al 1973).

Forest/Woodlands: Organic matter reduction is correlated to the reduction in total nitrogen on the forest floor; however, nitrogen accumulation occurs in the 0-to-2 inch soil layer (Wells et al 1979). Phosphorus, potassium, calcium, and magnesium may increase in the 0-to-2 inch layer of forest soils post-burn (Wells et al 1979), although Campbell et al (1977) reported lower levels of potassium in burned (as compared to unburned) plots. Prescribed burning does not appear to alter soil microorganism populations to the extent that soil metabolic processes would be impaired (Jorgenson and Hodges 1971); rather, it seems to enhance metabolic processes in the short term.

Physical properties, primarily water infiltration, would be most at risk from severe burning, whereas they are only slightly affected by light burning (Fuller et al 1955). Low moisture in fuels, duff and soil (e.g. during periods of drought), in combination with heavy fuel loads, create the potential for severe burning. Temporary increases in overland water flow and erosion may also result where severe fires denude soil cover and alter soil physical properties (Hendricks and Johnson undates, Holecheck et al 1989).

Holecheck et al (1989) also found that burning heavy fuels such as forest slash may decrease soil aggregates and porosity, and increase bulk density for up to four years; some forest soils beneath slash piles may also become temporarily resistant to wetting after piles are burned.

Soils that support juniper may show reduced infiltration rates following burns (Buckhouse and Gifford 1976a) and increased amounts of phosphorus, potassium, nitrogen, and carbon for the first year following debris pile burns (Gifford 1981). Buckhorse and Gifford (1976b) noted greater amounts of potassium and phosphorus in overland flow from burned areas as compared to unburned areas. The 1991 Vegetation Treatments EIS also noted potential for soil sterilization caused by pile burning on soils that support juniper. Burning the slash where it falls, rather than piling it, can reduce the potential for sterilization, and may improve nutrient release and efficacy of the fuels treatment as well.

Grasslands: Excessive litter accumulations may reduce microorganism activity (Wright and Bailey 1982) and nitrification; nitrogen-fixing and ammonification are increased by pH and the increased concentration of electrolytes after burning. Soil losses after burning on most grasslands are minimal because the grasses evolved under frequent fire regimes and have root systems adapted to fire. Roots from sod and bunch grasses remain in place, reducing erosion and facilitating rapid vegetation recovery.

Severe (high soil temperature) burns on mountain/plateau grassland sites may form a water-repellant layer in some soils (USDA 1988). However, this direct impact to soil infiltration rates in typically avoided with prescribed burns.

Conclusion (Soils)

Treatments associated with Alternative A would help achieve soil-related land health standards (soil stability and watershed function) on approximately 193,000 acres per decade. Indicators to assess soil stability and watershed function relate to soil erosion and infiltration or capture and use of precipitation.

The number of acres burned by wildland fires, the severity of those fires, and the acres needing rehabilitation, would be lower with Alternative B, mainly on category B and C fire management zones.

Treatments anticipated with Alternative B would help achieve soil-related land health standards (soil stability and watershed function) on more than twice as many acres over a 10-year period as compared to Alternative A.

3.5 Water Quality (BLM Critical Element)

The Safe Drinking Water Act of 1974 establishes protective measures for culinary water systems by providing standards that regulate allowable contaminant levels. This would not be affected by either fire management alternative.

The Clean Water Act of 1977, as amended by the Water Quality Act of 1987 provides national policy and mandates the control of non-point pollution. Agencies are directed to develop and implement programs to meet the goals of this act through the control of both point and non-point pollution.

Environmental Consequences (Water)

Wildland fires and fuel treatments reduce vegetation cover that buffers raindrops before they hit the soil surface. The lack of vegetative cover on burned or treated areas allows raindrops to increasing soil loss and sediment input to surface waters. Burned sites have lower soil-water infiltration rates which increases surface runoff and decreases soil moisture available for plants. Increased runoff can stress the stability of receiving streams and the associated aquatic biota. The seasonal timing, size, duration, and intensity of fires and fuels treatments determine the magnitude of impacts.

Intense wildland fires cause greater increases in water temperature, sedimentation, and turbidity by burning off vegetative cover, exposing mineral soil, and increasing runoff. Accelerated erosion also increases with surface disturbing activities such as the use of heavy equipment to blade fire lines, hand tool fire line construction, and off road vehicle use. Sediment from accelerated soil erosion and elevated levels of nitrogen and phosphorous from ash are common in water after wildfires. Water quality impacts related to fire and disturbance depend on the amount of accelerated erosion. Often these impacts are short term and conditions return to pre-fire levels once vegetation is re-established. Burning or killing streamside vegetation reduces shade and increases water temperature.

Fire retardant is never intentionally dropped on surface waters. However, accidental releases and fish kills do occur. When sodium ferrocyanide, commonly used as a corrosion inhibitor in fire retardant formulations, is dissolved in water and exposed to ultraviolet radiation, it breaks down to form hydrogen cyanide, which is toxic to aquatic life. Ammonia is highly soluble and typically results when fertilizers or retardants are added to water. In highly alkaline waters ammonia concentrations increase and can reach toxic levels. Guidelines for Aerial Delivery of Retardant or Foam Near Waterways require retardant or foam to be kept 300 feet from lakes, rivers, streams and ponds.

Both prescribed fire and mechanical fuels treatments increase stream nutrients, storm flows, and sediment loads; the amount of increase depends on fire severity or the amount of disturbance. Slash burns increase concentrations of some nitrogen compounds and cations; however, drinking water standards would not be exceeded. Underburns and grassland burns would have no significant effect on nutrients. Moderate slash burns may increase storm flow volumes and peaks to streams by reducing the water used by remaining vegetation. Severe burns expose mineral soil and increase surface runoff through decreased soil permeability. Decreased permeability is most common in shrub communities located on dry sandy soils (Debano et al. 1976), but also occur in forest soils (Zwolinski and Ehrenreich 1967). Underburns would not affect water quality, and grassland burns would affect it for only a few weeks until grass re-grows. These burns would not significantly affect stream flows.

Invading junipers often compete with and eventually reduce understory vegetation. Resulting bare soils are subject to accelerated erosion. These trees use much more moisture than shrubs, forbs, and grasses. Treatments that removes these trees cause increased water yield, rejuvenate springs, allow understory to recover, and provide more watershed protection.

To protect water quality and Special Status and sport fish habitat, a Streamside Management Zone (SMZ) would be maintained around riparian, streamside, lakeside, and wetland areas. This 50-foot (minimum) buffer zone helps preserve ecological processes by creating a vegetation filter that removes sediment before it reaches water bodies (Montana State University, 1991).

Properly maintained SMZs protect trout fry and other young fish; maintain water temperatures necessary for spawning; introduce insects and other fish food to the water from streamside vegetation; stabilize streambanks and floodplains; and protect bird habitat and wildlife travel corridors associated with riparian areas. To minimize erosion and the amount of sediment that reaches waterways, care would be given to maintaining an SMZ of appropriate width.

Conclusion (Water)

In the long term, treatments anticipated with both alternatives would help reduce the risks of wildland fire impacts by improving the resource condition. Treatments would improve the ecological health and function of grasslands, shrublands, and forestlands per decade and would help maintain water quality in water bodies within the affected watersheds. Indicators would include one or more of the following: dissolved oxygen concentrations, pH, turbidity, temperature, sedimentation, water color, and toxins.

Alternative B would better meet the land health standard of meeting state water quality standards because upland health would be improved by treating about 457,000 acres compared to 193,000 acres with Alternative A.

Many of the potential water quality impacts from prescribed fires and mechanical fuels treatments would eventually be offset by reduced impacts from wildland fires. There is a greater expectation of increased water temperature, sedimentation, pH, ammonium, phosphate, and turbidity under Alternative A because of a greater long-term likelihood of severe wildland fire, especially on forestlands. Wildfires in these areas burn hotter and are more likely to also burn riparian areas that protect stream and ponds.

3.6 Aquatic Habitats and Species (excluding federally listed Threatened, Endangered, and Proposed Species)

Affected Environment (Aquatic Habitat and Species)

Aquatic environments across the planning area are extremely variable, reflecting diverse geological settings, climates, disturbance histories, and past management. Aquatic habitat-types range from small, high-gradient montane streams to low-gradient large rivers such as the Missouri. Lakes, vernal ponds, wetlands and springs are all present across the planning area. Riparian and aquatic areas comprise only a small portion of the lands managed by the BLM; however, their ecological significance is far greater than their limited physical scope as these systems form some of the most dynamic and ecologically rich portions of the landscape (Elmore and Beschta 1987).

Under natural conditions, riparian and aquatic ecosystems have a high degree of structural complexity, reflective of past disturbances such as floods, fire, ice floes, wind storms, grazing, disease and insect outbreaks (Gregory et al. 1991). In planning area riparian woodlands, fires were historically infrequent but often severe, generally occurring at 65- 150-year recurrence intervals when appropriate weather, fuel, and ignition conditions were present. In the riparian shrub communities, fire was typically more frequent, occurring every 25 to 50 years.

Historically, whether streamside vegetative communities were substantially burned or not, fires altered watersheds and aquatic systems, primarily through changes in sediment and stream flow regimes. These effects, however, were extremely variable. Watershed characteristics such as vegetation structure and seral-stage, inherent geology, pattern of geomorphic proccesses, and local climate and weather combined to influence the trajectory and magnitude of post-fire change to aquatic systems.

Humans have altered stream aquatic and riparian environments by direct modifications (channelization, wood removal, diversion, dam-building, irrigation de-watering) and indirect impacts (from timber harvest, mining, grazing, and road building). These activities have altered channels by changing the rate at which sediment, water, and wood enter and are moved through streams. Anthropogenic activities have also affected the incidence, frequency, and magnitude of the natural disturbance events described above (McIntosh et al. 1994; Wissmar et al. 1994).

Fishes

Like the variety in aquatic and riparian habitat-types across the planning area, aquatic species communities are extremely diverse. Patterns of fish species diversity in the planning area reflect the glacial history of the area. East of the Continental Divide, after the retreat of the Laurentide Ice Sheet, the area Missouri River Basin was re-colonized by fishes from southern refugia in the Missouri River. In the Missouri Basin, salmonid species are present in colder, higher-gradient streams; however, a diverse assemblage of fishes adapted to warmer waters and lower-gradient streams is present. In addition to numerous species in the Cyprinidae and Catastomidae families, glacial “relicts” such as pallid sturgeon and paddlefish are present.

Fish species assemblages on the west side of the Continental Divide (primarily the Missoula Field Office) are typical of formerly glaciated regions: the absence of major refugia meant that fewer species survived glaciation, but among those species, numerous genetically divergent populations or “stocks” evolved. These unique stocks often exhibit unique morphology, behavior, and life histories specially adapted to their home environment (Wood 1995, Schluter 1996).

Fishes in the planning area evolved in habitats characterized by frequent and occasionally severe disturbance. Floods, fire, and wind storms helped to create and maintain the structurally complex environments important for the all life stages of many fish species. In montane aquatic environments in particular, fire and flood were the two primary natural disturbance mechanisms responsible for initiating stream dynamics and increasing habitat complexity and diversity. Erosion and woody debris recruitment following forest fires was critical in re-establishing young, biologically rich stream systems (Keane et al. 1999). Over longer time periods, fires recycled nutrients, regulated forest development, and biomass. The effects of these processes were ultimately transferred to stream channels. It is likely that drainage-scale extirpations of fishes followed large-scale, intense wildfires; however, regional populations were strong enough to provide individuals to quickly recolonize impacted areas.

Habitat fragmentation by dams, road culverts, stream dewatering, or temperature barriers have isolated populations and can preclude fish from moving to avoid localized fire effects. Historically, if local extinctions did occur, these areas were refounded by nearby populations through an "open" stream network. Current conditions often prevent this as populations have been isolated by irrigation withdrawals, dams, culverts, etc. Thus, local impacts may affect population viability more than they would have historically.

Habitat condition (quality) has declined and become less diverse, leaving native fish populations less fit and less resilient to watershed disturbances. Roads have been identified as one of the most significant factors in stream habitat degradation (Meehan 1991, USDA 1997). Historically, roads were not present and didn't affect hydrologic or erosional patterns. Now, however, extensive road networks contribute chronic sediment inputs to stream systems. Effects are compounded when fires remove trees and other vegetation within drainages.

The depletions of native fishes in the Planning Area have been well documented. Westslope cutthroat trout currently occupy only 2.5 percent of their historic range in Montana; Yellowstone cutthroat trout are found in 32 percent of their historic range (primarily in headwater streams); and fluvial Arctic grayling are limited to 4 percent of their native range. Only salmonids are described because much more is known about their population trends. The 18 Special Status fish species are listed in Table 8.

Amphibians

Amphibians (salamanders, frogs, and toads) are extremely important in aquatic and riparian ecosystems. Because they reach tremendously high biomasses in some areas, they represent a potentially important food source for animals at higher trophic levels and thus probably play an important role in energy flow through the system (Plough 1980). Factors influencing the distribution of amphibians include glaciation, the proximity of "source" species for post-glaciation recolonization, present geography and topography, and local climate. In particular, the presence of water or moist conditions is extremely important to amphibians and significantly affects their patterns of distribution at local and regional scales as well as activity patterns and ability to disperse following disturbance (Gregory 1988).

Like fishes, amphibians evolved in environments characterized by episodic and occasionally severe disturbance. Natural disturbance patterns are important in creating and maintaining habitats crucial to their life histories. Periodic fires likely contributed to the amount of down woody debris required by terrestrial amphibians (Russel et al. 1999).

It is difficult to explain the decline of amphibians. The factors most pertinent to the proposed project are: timber harvest, livestock grazing, fire and fire management activities, road and trail development and on- and off-road vehicle use, development and management of recreational facilities and water impoundments, and habitat fragmentation.

Amphibians (particularly salamanders) have complex life histories, characterized by distinct developmental stages. Each stage requires a complex set of habitats connected by suitable migratory corridors. Loss or exclusion from any one of these habitats may cause the species to decline or be extirpated from a local area. Thus, although amphibians evolved in an environment characterized by disturbance, anthropogenic factors such as stream culverts (blocking upstream migration), road system (blocking overland migration), timber harvest (exposing large areas of ground to increased desiccation from thermal radiation) have depleted the capacity of amphibians to re-populate areas once local populations are extirpated.

Amphibians also have suffered substantial regional declines. The Planning Area contains seven species of amphibians for which low population numbers or extremely rare sightings have warranted listing as BLM Sensitive and State Species of Concern. One species, the Coeur d-Alene salamander is currently a candidate for listing under the ESA.

See Table 8 for seven Special Status amphibians in the Planning Area.

Table 8: Aquatic Special Status Species in the Planning Area			
Species Name	**Status[1]**	**Species Name**	**Status[1]**
Pallid sturgeon *Scaphirhynchus albus*	LE, S1	Blue Sucker *Cycleptus elongatus*	S2, SS
Bull trout *Salvelinus confluentus*	LT, S2	Pearl Dace *Semotilus margarita*	S2, SS
Westslope cutthroat trout *Oncorhynchus clarki lewisi*	LR, S2, SS	Sturgeon Chub *Macrohybopsis gelida*	S2, SS
Yellowstone cutthroat trout *Oncorhynchus clarki lewisi*	S2, SS	Sicklefin Chub *Macrohybopsis meeki*	S1, SS
Arctic grayling (fluvial) *Thymallus arcticus montanus*	LC, S1	Coeur d'Alene salamander *Plethodon idahoensis*	S2,SS
Paddlefish *Polydon spatula*	S1,S2, SS	Canadian toad *Bufo hemiphrys*	S1 SS
Shortnose gar *Lepisosteus platstomus*	S1, SS	Wood frog *Rana sylvatica*	SR, SS
Northern Redbelly X Finescale Dace *Phoxinus eos x P. neogaeus*	S3, SS	Spotted frog *Rana luteiventris*	S4, SS
Tailed frog *Ascaphus truei*	S4, SS	Snapping turtle *Chelydra serpentina*	S3, SS
		Spiny Softshell turtle	S3, SS

[1]Status

Federal Status
LE = Listed as Endangered under the ESA
LT = Listed as Threatened under the ESA
LC = Candidate for Listing under the ESA
LR = Under status review for potential listing
SS = BLM Sensitive Species: imperiled in at least part of its range and documented to occur within area of BLM jurisdiction.

State Status (Montana Only)
S1 = Critically imperiled because of extreme rarity or because of some factor(s) in its biology making it especially vulnerable to extinction.
S2 = Imperiled because of rarity or because of other factors demonstrably making it very vulnerable to extinction throughout its range.
S3 = Either very rare or local throughout its range, or found locally (even abundantly in some locations in a restricted range, or vulnerable throughout its range because of other factors.

Environmental Consequences - Aquatic Habitat and Species

Aquatic resources could be affected by:

- presence/absence of protective guidelines for aquatic species and habitats;
- changes in wildfire frequency and severity;
- need for more frequent aggressive wildfire suppression;
- intensity and scope of projects.

1. Guidelines for Aquatic Species and Habitat

Key effect: Implementation of Alternative B would facilitate protection of aquatic resources during fuels management planning.

With Alternative A, little guidance for protection of aquatic species, especially amphibians, is provided. Except for projects where ESA-listed species are present or mandatory terms and conditions apply, fuels management must comply with State-required minimum Stream Management Zone (SMZ) to protect aquatic resources. The SMZ, a 50' no-treatment zone where sideslopes are ≤35 degrees (Montana Dept. of Natural Resources 1995), is intended to limit sedimentation; however, these SMZs are often insufficient to protect key functional elements of aquatic and riparian ecosystems (see review in Quigley et al. 1997). Isolated wetlands, which are important amphibian habitats, receive ***no*** formal protection. Thus, there would be greater uncertainty for ecological outcomes under Alternative A based on the absence of consistent protection of aquatic resources and reliance on state-required minimum riparian protections.

Guidance under Alternative B would provide greater protection of aquatic species and habitat. Guidance that establishes Riparian Protection Zones (RPZs) would be incorporated into fuels management projects, where riparian resources receive primary management emphasis, and require analysis of project-related impacts to specific elements of riparian and aquatic function. The configuration of the RPZs are based on widely accepted riparian and aquatic protection strategies (FEMAT (1993), PACFISH (1995), and INFISH (1995)). These RPZs are designed to protect a comprehensive suite of ecological processes, and would protect amphibians and fishes. Alternative B would also require that specific risk analyses at the project scale be conducted for fragmented, at-risk populations (such as isolated populations of genetically pure westslope cutthroat trout) which may be substantially affected or potentially extirpated by both wildfire and fuels management activities. Thus, fewer adverse effects to aquatic resources would likely occur under Alternative B.

2. Severity and Frequency of Wildfire

Key effect: Implementation of Alternative B would reduce severity of wildfire.

Wildfire, by itself, does not pose a particular risk to aquatic biota. Species have evolved in a dynamic and sometimes severe fire regime. Wildfire contributes large woody structure critically important in stream ecosystem function. Many of the habitat features such as deep pools and beaver ponds, extensive riparian wetlands, and saturated floodplains that historically enabled aquatic species to survive during wildfire and to re-colonize following fire have been substantially diminished. In some areas, past management activities have reduced the abundance and quality of those features. Habitat fragmentation by dams, roads, culverts, and dewatering can prevent individuals and populations from escaping wildfire effects and may block re-colonization. Species found in small, montane streams (e.g., westslope cutthroat trout and tailed frog larvae) may be particularly vulnerable to wildfire because these hillslope-constrained systems lack substantial surface flow, moist floodplains, and the associated riparian microhabitats that buffer larger, unconstrained systems from adjacent flames.

Under Alternative A, substantially fewer acres would be treated to reduce fire risk. Remaining high fuel loads would result in more severe wildfires than historically occurred (especially in areas dominated by coniferous forests). Although fire is an important component of aquatic ecosystem function and a natural disturbance element to which native aquatic species are adapted, the severely diminished capacity of native species to survive or escape from fire is a source of substantial risk to the persistence of isolated populations. This has significant implications for the persistence of westslope cutthroat trout across the planning area. These fish have been severely impacted by introgression (interbreeding with exotic species and subsequent loss of substantial portions of the historic diverse genetic resource). Remaining isolated populations are considered critical for maintaining genetically pure stock for future broodstock should the fish be restored to historic habitats. Many of the remaining genetically pure populations are located in small, isolated stream channels on BLM-managed lands within the area where increased fire risk has been identified (particularly in the Garnet Mountains, managed by the Missoula Field Office).

Fuels management projects under Alternative B would reduce the risk of severe fires that could potentially threaten the survival of populations. Although there are adverse impacts associated with the implementation of the projects (see Section 4, below), carefully planned reduction of risk may be preferable for selected populations without the natural capacity to survive a wildfire.

3. Greater Reliance on Emergency Suppression

Key effect: Reducing wildfire risk and intensity reduces the future need for aggressive emergency suppression.

The risk of severe wildland fire would be greater under Alternative A and there would be more frequent and widespread use of fire suppression. Suppression operations introduce fire retardant, aviation fuel, or lubricants into streams and wetlands; expose soils on steep slopes adjacent to streams during fire line construction; damage riparian vegetation and soils from use of heavy equipment off of established roads; reduce natural streamflow during drafting and pumping; and damage vegetation and soils if fire camps are established in or adjacent to sensitive riparian areas. Although minimum-impact suppression techniques (M.I.S.T.) and "light-on-the land" techniques have been developed, the primary objective during emergency suppression is to protect life and property. Because species and habitat protection is logically placed below protection of human life and property, there is no assurance that MIST techniques can and will be followed in all situations.

Alternative B would reduce the severity of fires and the use of aggressive suppression operations on treated areas. Fuels projects would be designed and implemented in a "non-emergency" manner that minimizes impacts to aquatic resources.

Although wildfires may still occur in areas where hazardous fuel loads have been reduced, fires that may occur are expected to be predominately ground fires rather than crown fires. Ground fires are easier to control with lower-impact suppression methods (such as hand-built fire line) that are less likely to adversely affect aquatic resources. In contrast, the crown fires associated with heavier fuel loads often require suppression techniques likely to have greater adverse impacts to aquatic habitats and species (e.g., retardant drops or heavy machinery to construct the wide lines required to contain them). Thus, in the long term, the need for suppression and the concurrent impacts of aggressive emergency suppression should be reduced under Alternative B.

4. Intensity and Scope of the Projects

Key Effect: More acres would be treated with fuels projects under Alternative B.

The nature of fuel treatments would be similar under both alternatives. Mechanical treatments would include pre-commercial and commercial thinning, commercial timber harvest, overstory reduction, and construction of fuel breaks. Chemical treatments would be used for noxious weed control. Permanent water sources would be developed to support future fire suppression**.** Roads would be constructed and re-located. The direct and indirect effects of these activities are summarized below.

- General Vegetation Management: Meehan (1991) reviews the effects of timber harvest and vegetation management on aquatic resources. In summary, removal of vegetation from hillslopes removes canopy cover and increases soil loss, resulting in increased stream temperatures and reduced supplies of large down wood. Timber harvest in these areas may alter streamflow regimes, accelerate surface erosion and mass wasting, resulting in increased sediment delivery and turbidity in streams. Small streams are likely to be more affected by activities on adjacent hillslopes than large streams because smaller channels respond more quickly to changes in hydrologic and sediment regimes, and because riparian vegetation is a more dominant factor in terms of organic inputs and shading (ICBEMP Vol 2).

  Removal of vegetation to reduce future fuel loads may be accomplished with minimal impacts in some areas, but in others, sensitivity to ground disturbance from loss of vegetation can cause increased erosion, compacted soils, and a loss of nutrients (USDA 2000, Beschta et al. 1995). Fuels management activities that increase the probability of chronic sediment inputs to aquatic systems may pose greater threats to fish, amphibians and aquatic ecosystem integrity than natural events associated with undesired forest stand condition (Frissell and Bayles, 1996).

- Road Construction and Maintenance: Impacts of building forest roads have been documented by Reid and Dunne (1984), Chamberlain et al. (1991), and Furniss et al. (1991). Roads contribute more sediment to streams than other land management activity and most sediment from vegetation management activities is related to roads and road building and associated increases in erosion rates (Gibbons and Salo 1973, Swanson and Dyrness 1975, Swanston and Swanson 1976, Beschta 1978, Gardner 1979, Reid and Dunne 1984, Meehan 1991, Rhodes et al 1994).

  One mile of new road construction per decade would be anticipated with Alternative A compared to three miles of new roads under Alternative B. These would be rehabilitated after use.

- Prescribed Fire: Although uncommon, improperly planned or "escaped" prescribed fire may burn riparian vegetation, reducing shade, exposing streamside soils, etc. Prescribed fires conducted in the spring (when drainage-bottoms are still snow covered) helps to protect streamside vegetation and soils, but may adversely affect amphibians. Many of Montana's amphibians are most active on the ground surface during moist periods in the spring (see Turner 1957; Beneski et al. 1986; Hill 1995). As these animals migrate between terrestrial and aquatic habitats they may be particularly susceptible to fire because many migrate in mass and most remain closer to the ground surface where they may be more easily reached by flames. However, fire may also have positive indirect effects by restoring natural openings that allowed terrestrial amphibians to bask and forage (Kirkland et al. 1996). In addition, removal of forest trees immediately adjacent to wetlands may enhance the length of time ephemeral wetlands are present by reducing evapotranspiration (Russell et al. 1999b) and may reduce the length of the larval period of many amphibians by increasing solar radiation, thereby ensuring that metamorphosis takes place prior to pond drying (Russell et al. 1999b).

  An estimated 1-2 percent of prescribed fires "escape" bureau-wide (Al Carrier, NIFC, personal conversation, 2003).

- Chemical Treatment: The effects of chemical treatment of noxious weeds are summarized in Norris et al (1991). The introduction of a variety of chemicals into streams and wetlands may result in acute and chronic toxicity to aquatic species. Residents of small streams, springs, and wetlands are more likely to be affected because these habitats contain less water to dilute the chemical, and are less easily seen from the air (and avoided) during aerial application. Little if any research has been done on the effects of herbicides on amphibians in Montana/Dakotas, but it is expected that amphibians would be most affected since the habitat-types they often occupy (i.e., small streams and seeps) are less efficient at diluting herbicide concentrations, and chemicals can more easily penetrate the breathable, permeable skin of amphibians.

  Following label directions for chemical use, BLM Manual 9011, BLM Handbook H9011-1 Chemical Pest Control Guidance, and the Riparian Protection Zone guidance (under Alternative B, See section 2.5.3.1) would reduce the likelihood of introducing chemicals that may be toxic to aquatic and amphibian species into streams and wetlands.

Protection of life and property would have priority over resource objectives relating to aquatic resources and species during fire suppression; and maintenance of aquatic habitats and species are not included in "Required Outcomes" for all fuels reduction projects. Some projects involve multiple treatments of the same area, repeated entry into watersheds, and the maintenance of a road-based infrastructure. The negative effects of wildland fire may be severe, but wildfire represents an acute and isolated disturbance. "Refuge-taking" by aquatic species is effective for survival during periodic, short-lived disturbance (e.g. wildfire), but negative effects from road construction and related management can be chronic or persistent, with effects lasting for decades (Poff and Ward 1990, Rieman and Clayton, 1997). Alternative B guidelines are designed to reduce the risk of these impacts.

The primary difference between the alternatives is the magnitude of treatments planned. Although Alternative B would more than double the treatment acres, the presence of protective guidelines would reduce potentially greater impacts. Specific design features of Alternative B would be incorporated at the project scale to reduce impacts to particularly sensitive populations to the non-significant level.

Conclusion (Aquatic Habitats and Species)

Under Alternative A, aquatic organisms (especially isolated, depressed populations in smaller streams) would be at greater risk from severe wildfire because severe wildfire would be more likely. A lower level of fuels projects would occur, reducing the risks from management actions as compared to Alternative B. However, during fuels projects that did occur, a lower level of protection would be provided to aquatic species because projects would rely on existing RMP decisions and state guidance.

Under Alternative B, the impacts of severe wildland fire and future needs for emergency wildfire suppression would be reduced. The potentially greater risks associated with higher levels of fuels treatment would not reach significant levels because of the guidelines included in the alternative. These design features also require that measures be included in project plans to reduce impacts to isolated, depressed populations of species that are at particular risk of extinction to non-significant levels.

3.7 Terrestrial Species and Habitat (except for federally listed Threatened, Endangered, and Proposed Species)

Affected Environment (Terrestrial Species and Habitat, including SSS)

Plant communities on many western rangelands are no longer pristine and do not support pristine populations of wildlife species. Many rangeland plant communities have herbaceous weeds or a higher ratio of woody to herbaceous perennial vegetation than under pristine conditions. These vegetation conditions may favor certain wildlife species, such as chukar partridge, which utilize cheatgrass for food (Weaver and Haskell 1967), and disfavor other species, such as the pronghorn antelope, which require mixed-plant communities rather than those plant communities dominated by a few woody or herbaceous species (Yoakum 1975). In general, the greater the diversity of the plant community, the greater the diversity of the associated animal community (Gysel and Lyon 1980).

Special Status Species

This section analyzes candidate species, BLM sensitive species, and State listed species. The Biological Assessment (BA) completed for consultation with US Fish and Wildlife Service contains an analysis for federally listed threatened, endangered, and proposed species, as well as proposed and designated critical habitat. These findings are summarized in this document, and the Biological Assessment (BA).

Designated BLM sensitive wildlife species include 26 species of birds, 14 species of mammals, and 7 species of reptiles and amphibians. A complete list of BLM Sensitive Species is summarized in Table 9.

Environmental Consequences (Terrestrial Species and Habitat, including SSS)

Prescribed Fire: Prescribed fire would generally change vegetation communities to lower seral (earlier succession) stages. Forestlands would change to forest/grass understory and treated shrublands would change to grass/forb communities. Wildlife adapted to lower seral stage habitat would benefit and possibly increase. Species that reproduce and feed in grass/forb vegetation such as ground squirrels, elk, mountain plover, and species of birds are examples of wildlife that would benefit. Refer to Table 10 for a brief listing of wildlife adapted to different habitats. For example, in areas occupied by elk and mule deer, elk would be favored where vegetation moves toward a higher percent composition of grass. Big game populations would move toward stability in the long term, but occupy different proportions of habitats .

Table 9: BLM Sensitive Species within the analysis area		
Species Common Name ***(Scientific Name)***	**Field Offices* In Range (R) and with Habitat Present (H)**	**Field Offices* with documented occurrence**
Bairds sparrow *(Ammodramus bairdii)*	R - all but MT 100 H - 010, 020, 030, 040, 060, 064, 070, 090, 92	MT 010, 020, 030, 040, 060, 064, 090, 092
Black-backed woodpecker *(Picoides arcticus)*	R - MT 010, 020, 050, 060, 070, 100 H - same as above	MT 020, 050, 060, 070, 100
Black Tern *(Chlidonias niger)*	R – all Habitat - all	MT 020, 030, 040, 050, 060, 064, 090, 092, 100
Boreal owl *(Aegolius funereus)*	R - MT 010, 050, 060, 070, 100 H - same as above	MT - 050, 060, 100
Burrowing owl *(Athene cunicularia)*	R – all H – all	All except MT100
Canvasback duck *(Aythya valisineria)*	R – all H – all	All
Columbian sharp-tailed grouse *(Tympanuchus phasianellus)*	R - MT 050, 070, 100 H - same as above	MT 050, 070, 100
Common loon *(Gavia immer)*	R - MT 020, 030, 040, 050, 060, 064, 070, 100 H - same as above	MT 020, 040, 050, 060, 064, 100
Dickcissel *(Spiza Americana)*	R - MT 010, 020, 030, 040, 060, 064, 090, 092 H - same as above	MT 020, 040
Ferruginous hawk *(Buteo regalis)*	R – all H – all	All, except MT100
Flammulated owl *(Otus flammeolus)*	R - MT 010, 050, 060, 070, 100 H - same as above	MT 070, 100
Great gray owl *(Strix nebulosa)*	R - MT 010, 050, 060, 070, 100 H - same as above	MT 050, 060, 070, 100
Hairy woodpecker *(Picoides villosus)*	R – all H – all	All
Harlequin duck *(Histrionicus histrionicus)*	R - MT 010, 050, 060, 070, 100 H - MT 050, 070, 100	MT 050
LeConte's sparrow *(Ammodramus leconteii)*	R - 010, 020, 030, 040, 060, 064, 090, 092 H - same as above	MT 020
Loggerhead shrike *(Lanius Ludovicianus)*	R – all H – all	all
Long billed curlew *(Numenius americanus)*	R – all H – all	all
Northern goshawk *(Accipiter gentiles)*	R – all H - 010, 020, 040, 050, 060, 090	MT 020, 040, 050, 064,
Peregrine falcon[1] *(Falco peregrinus)*	R – all H - MT 010, 020, 050, 060, 064, 070, 100	MT 010, 020, 050, 060, 070, 100
Pileated woodpecker *(Dryocopus pileatus)*	R - MT 010, 050, 060, 070, 100 H - MT 010, 050, 060, 070, 100	MT 050, 100
Sage grouse[2] (*Centrocercus urophasianus)*	R- all H- all	MT 010,020, 030, 040, 050, 060, 064, 070, 090, 092
Sage sparrow (*Amphispiza belli)*	R - MT 010, 020, 040, 050, 060, 064, 070, 090, 092 H - same as above	MT 020, 040, 050
Swainson's hawk (*Buteo swainsoni)*	R – all H - all	all

Table 9: BLM Sensitive Species within the analysis area *(continued)*		
Species Common Name ***(Scientific Name)***	**Field Offices* In Range (R) and with Habitat Present (H)**	**Field Offices* with documented occurrence**
Three-toed woodpecker (*Picoides tridactylus)*	R -MT 010, 050, 060, 070, 100 H -MT 010, 050, 060, 070, 100	MT 010, 050, 060, 070, 100
Trumpeter swan *(Cygnus buccinator)*	R - all H - all	MT 010, 020, 040, 050, 060, 064, 070, 100
White-faced ibis *(Plegadis chihi)*	R - all H - all	MT 020, 050, 060, 062, 092
Black-tailed prairie dog[3] *Cynomys ludovicianus*	R - MT 010, 020, 030, 040, 050, 060, 064, 070, 090, 092 H - same as above	MT 010, 020, 030, 040, 060, 064, 070, 090, 092
Fisher (*Martes pennati)*	R - MT 010, 050, 060, 070, 100 H - same as above	MT 050, 060, 070, 100
Meadow jumping mouse (*Zapus hudsonius)*	R - MT 010, 020, 030, 040, H - MT 010, 020, 030, 040, 060, 064, 090, 092	MT 010, 020,
Merriam's shrew (*Sorex merriami)*	R – all H - MT 010, 020, 030, 040, 070, 064, 090, 092	MT 010, 020, 060, 064,
North American wolverine (*Gulo gulo luscus)*	R - 010, 050, 060, 064, 070, 100 H - same as above	MT 010, 050, 060, 064, 070, 100
Northern Bog Lemming *(Synaptomys borealis)*	R - MT 050, 060, 070, 100 H - same as above	MT 050, 060, 100
Preble's Shrew (*Sorex preblei)*	R – all H – all	MT 010, 020, 060, 070,
Pygmy rabbit (*Brachylagus idahoensis)*	R - MT 050, 070 H - 050, 070	MT 050
Spotted bat (*Euderma maculatum)*	R - MT 010, 020, 050 H - MT 010, 020	MT 010
Swift fox (*Vulpes velox)*	R - MT 010, 020, 030, 040, 050, 060, 064, 070, 090, 092 H - same as above	MT 010, 020, 030, 040, 060, 064, 070, 090, 092
Townsend's big-eared bat *(Plecotus townsendii)*	R – all H - all	MT 010, 020, 040, 050, 060, 064, 070, 090
Western spotted skunk *(Spilogale putorius)*	R - MT 010, 020, 040, 050, 070, 100 H - same as above	MT 010, 040, 050, 070, 100
White-tailed prairie dog (*Cynomys leucurus)*	R - MT 010 H - MT 010	MT 010
Woodland caribou (*Rangifer tarandus caribou)*	R - MT 100 H - MT 100	none
Snapping turtle (*Chelydra serpentina)*	R – all H - all (except 050)	MT 010, 020, 030, 040, 100
Spiny softshell turtle (*Trionyx spiniferus)*	R - MT 010, 020, 050, 060, 064, 070, 090, 092 H - MT 010, 020, 060, 064	MT 010, 020, 060, 064,
Canadian toad (*Bufo hemiopharys)*	R - 030, 060, 064, 090, 092 H - same as above	none
Coeur d'Alene salamander *(Plethodon idahoensis)*	R - MT 050, 100 H - MT 050, 100	MT 050
Spotted frog[4] (*Rana pretiosa)*	R - MT 010, 050, 060, 064, 070, 100 H - same as above	MT 050
Tailed frog (*Ascaphus truei)*	R - MT 050, 060, 064, 070, 090, 100 H - MT 050, 060, 070,	MT 050, 060, 070, 090, 100

Table 9: BLM Sensitive Species within the analysis area *(continued)*		
Species Common Name ***(Scientific Name)***	**Field Offices* In Range (R) and with Habitat Present (H)**	**Field Offices* with documented occurrence**
Wood frog (*Rana sylvatica)*	R – all H - all (except 050)	MT 040
Arctic grayling (fluvial population)[5] (*Thymallus arcticus)*	R - MT 050, 070,100 H - MT 050, 070, 100	MT 050, 070
Blue sucker (*Cycleptus elongates)*	R - MT 020, 090, 092 H - MT 020, 090, 092	MT 020, 092
Northern redbelly X Finescale dace (*Phoxinus eos X Phoxinus neogaeus)*	R - MT 020, 092 H - 020, 092	MT 020, 092
Paddlefish (*Polyodon spathula)*	R - MT 010, 020, 030, 040, 064, 090, 092 H - MT 010, 020, 030, 040, 060, 064,090,092	MT 020, 040, 064, 090
Pearl dace (*Margariscus margarita nachtriebi)*	R - MT 020, 040 H - MT 020, 040	MT 020, 040
Shortnose gar (*Lepisosteus platostomus)*	R - MT 020, 030, 040, 090, 092, H - same as above	MT 020, 092
Sicklefin chub *(Macrhybopsis (Hybopsis) meeki)*	R - MT 040, 090, 092 H - MT 040, 090, 092	MT 040, 090, 092
Sturgeon chub (*Macrhybopsis (Hybopsis) gelida)*	R - MT 020, 040, 060, 064, 090, 092 H - same as above	MT 020, 040, 092
Westslope cutthroat trout *(Oncorhychus clarki lewisi)*	R - MT 050, 060, 070, 100 H - same as above	MT 050, 060, 070, 100
Yellowstone cutthroat trout *(Oncorhychus clarki bouvieri)*	R - 010, 020, 050 H - 010, 020, 050	MT 010, 050

Comments

[1] recently delisted from Endangered
[2] interim BLM sensitive species (pending list revision)
[3] federal Candidate species
[4] this should be the Columbia spotted frog *(Rana luteiventris)*
[5] Federal Candidate

**Field Office Codes:*

MT 010 - Billings
MT 020 - Miles City
MT 030 - North Dakota
MT 040 - South Dakota
MT 050 - Dillon
MT 060 - Lewistown
MT 064 - Havre
MT 070 - Butte
MT 090 - Malta
MT 092 - Glasgow
MT 100 - Missoula

Effects on wildlife from fire management depend on the timing, intensity, and vegetative species burned. Treatments that cause changes in wildlife forage and habitat, may be beneficial or negative, depending on the species.

Prescribed fires may change forage quality and quantity, intersperse new feeding areas with areas providing cover, and rejuvenate decadent browse plants. Changes in vegetation structure and dispersion of burned areas are key factors when planning prescribed fires for wildlife purposes.

Many different wildlife (vertebrate) responses to fires have been reported. Fire effects on wildlife vary with (1) animal species complex, (2) mosaic of habitat types, (3) size and shape of fire-created mosaic, (4) fire intensity, (5) fire duration, (6) fire frequency, (7) fire location, (8) fire shape, (9) fire extent, (10) season of burn, (11) rate of vegetation recovery, (12) species that recover, (13) change in vegetation structure, (14) fuels, (15) sites, and (16) soils. Other factors that alter fire effects on vegetation and soils also influence wildlife responses to burning.

Fires kill the less mobile birds and animals, alter environments, and influence postfire habitat succession (Lyon et al. 1978). Killing vertebrates by prescribed burning is rare (Lyon et al. 1978). The most exposed habitat sites are dry, exposed slopes, hollow logs with a lot of exposed wood, burrows less than 5 inches deep, lower branches of trees and shrubs, and poorly insulated underground/ground nesting areas (Lawrence 1966, as cited by Peek 1986). Effects of prescribed burning on ground cover depend on fire severity. Less severe fires on wet sites would remove less cover than more severe fires on dry sites.

Fire may create habitat diversity by recreating lost or degraded habitats for indigenous species, and by allowing the reintroduction of extirpated species when habitat degradation was significant to their extinction. Immediate postfire conditions raise light penetration and temperatures on and immediately above and below soil surfaces and can reduce soil moisture (Lyon et al. 1978).

Burning cover and removing trees, shrubs, and forage will modify habitat structure (Lyon et al. 1978, Peek 1986). The loss of small ground cover and charring of larger branches and logs (with diameters greater than 3 inches) can affect small animals and birds. Early, vigorous vegetation growth immediately after a fire alters feeding and nesting behaviors (Lyon et al. 1978). Postfire plant and animal succession effects creating seral and climax mosaics in habitat cannot be generalized in their effects on wildlife (Lyon et al. 1978, Peek 1986). Adverse impacts can be lessened if the treatment avoids the bird nesting season and other critical seasons when loss of cover would be critical to wildlife; for example, during critical reproductive periods and prior to severe winter weather conditions.

No significant changes in small mammal species were observed for one year postburn in sagebrush-grassland (Frenzel 1979, as cited by Starkey 1985), but shrews and other species with narrow niches require patches of unburned vegetation to sustain populations, although total small mammal numbers may not be altered (McGee 1982). Habitat changes induced by fire may temporarily decrease the number and diversity of small mammals in sagebrush vegetation (Klebenow and Beall 1977). By increasing habitat diversity, associated bird communities may be increased by burning (Starkey 1985).

Low fire frequencies may be useful in maintaining productive habitat for sage grouse (Peek 1986). Large intense fires affect other bird species, such as yellowthroat, yellow-breasted chat, Traill's fly-catcher, and yellow-billed cuckoo, because they require dense shrub cover (McAdoo and Klebenow 1978). Conversely, sparrow species require relatively less shrub cover (McAdoo and Klebenow 1978). Because chuckar partridge rely heavily on cheatgrass, fire could conceivably be used to improve the habitat for this species (Wright and Bailey 1982). Prescribed burning in these types also may improve the habitat for higher numbers of sheep, pronghorn antelope, and mule deer (Klebenow 1985). Fire suppression has favored the expansion of mule deer populations in some sagebrush areas because of the increased forage or cover (Crouch 1974). In areas of limited rainfall and forage production the thermal cover provided by sagebrush may be critical to deer and other wildlife survival (W. A. Molini, pers. comm. 1990). Big sagebrush is a valuable forage plant on critical deer winter range and should be protected from fire in these areas (Vallentine 1980).

While complete type conversion of juniper sites to grassland may reduce wildlife diversity, creating a mosaic of successional stages with prescribed burning can benefit wildlife (Severson and Medina 1984). Spotty burning would favor the greatest diversity of rodent and bird species (Wright and Bailey 1982). Fire suppression has favored expansion of mule deer populations in some juniper areas because of the increased forage or cover. Deer and elk use of burned juniper areas depends on postfire successional stages (Stager and Klebenow 1987), because burning can eliminate some important deer browse species (McCulloch 1969). An important factor in the degree of use of burned juniper habitats by deer and elk is the interspersion of burned habitats, which provide food, and unburned sites, which provide thermal and hiding cover. Old growth juniper stands may offer unique and valuable wildlife habitats, adding to the variety within juniper stands. When planning site-specific treatments, it should be recommended that these old growth communities be left standing as islands and edge communities to the prescribed burning areas.

Fire can improve habitat for some species of prairie wildlife. Dabbling ducks and sharp-tailed grouse production increased on burned grassland as compared to undisturbed grassland in North Dakota (Kirsch and Kruse 1972). Prescribed burning also improved upland plover production. Fires that burn shrubs destroy songbird nesting habitat (Renwald 1977). Periodic burning is desirable to maintain ideal prairie chicken habitat in tallgrass prairie, but burned areas may not be preferred habitat for sharp-tailed grouse for several years postfire (Wright and Bailey 1982).

Fire alters grassland habitat, by reducing shrub cover (Samson and Knoph). Reduced shrub cover could enhance areas for prairie dogs (Player and Urness, 1982), but the loss of sagebrush habitat and the threat of exotic grass introduction appear to make fire an undesirable tool for prairie dog habitat management."

Fire effects on wildlife in coniferous forests depend on ecological relationships and animal habitat needs. Ground fires have little direct influence on tree squirrels and may even be favorable by perpetuating ponderosa pine communities (Wright and Bailey 1982). Ground squirrels initially decreased in burned ponderosa pine communities but increased later as early successional advances were made (Lowe et al. 1978). Fire would probably adversely affect chipmunks in those communities where drier conditions prevail, but chipmunks may increase postburn on more moist sites (Lowe et al. 1978, Wright and Bailey 1982). Total bird numbers increased initially after burning in ponderosa pine communities but fell to below prefire levels later, although some individual species responded in an opposite manner (Lowe et al. 1978).

In one study, both deer and elk decreased their use of areas immediately following a burn but quickly increased levels of use as compared to control plots. Benefits to deer and elk from fires in these types are generally related to increases in understory vegetation (Leege and Hickey 1971, Severson and Medina 1983). Burns in Douglas-fir and ponderosa pine communities improved forage palatability to mule deer (Keay and Peek 1980). Prescribed fire also can improve winter forage for mountain sheep (Hobbs and Sporwart 1984). Prescribed fire can be used to rejuvenate old aspen stands, increasing habitat for moose, elk, deer, ruffed grouse, and snowshoe hare, all of which depend on the forage or cover produced in a young aspen community (DeByle 1985).

Mechanical Treatments: About 123,000 acres more would be mechanically treated with Alternative B than with Alternative A. Because mechanical treatments have the advantage of being highly selective, impacts to wildlife can be minimized through properly designed treatment plans developed in site-specific environmental analyses. These treatments would benefit wildlife that adapt to lower seral stages of vegetation referred to in prescribed fire. See Table 10 for a general list of wildlife habitat preferences. Wildlife species diversity may be reduced in the treatment areas, but the habitat edges created by the treatments will have increased wildlife species diversity.

Mechanical methods can result in soil compaction, damaging the subterranean habitat used by burrowing animals. In general, mechanical treatments can be beneficial for wildlife if the treatment areas are arranged in strips and patches and if methods are selected that increase browse and forage availability.

Chemical Weed Treatments: Chemical treatments have traditionally been applied most frequently to decrease woody plant cover and increase the production of grasses. The most common objective of chemical treatments in the fuel treatment areas is to control noxious weed infestations. Most of the noxious weed infestations will be small isolated populations that would be spot treated on the ground using vehicles or manual application devices. Large area chemical applications, with aircraft or vehicles, would only be used occasionally in extreme large area weed infestations.

The control of broadleaf woody plants and noxious weeds with selective herbicides often results in the control of associated broadleaf forbs. Both categories of vegetation have plant species that may be important food for many different wildlife species. The spraying of 185,000 acres for weeds (Alternative B) would reduce habitat for wildlife species dependent on some broadleaf forbs and affected shrubs in the short term (1-2 years). Examples of species associated with broadleaf forbs would be sage grouse, ground squirrels, and prairie dogs. Species associated with shrubs, such as sagebrush or bitterbrush, are sage grouse, mule deer, white-tailed deer, antelope, and several species of passerine birds.

The impacts to the wildlife will usually be greater by allowing noxious weeds to displace native habitat and create a monoculture of weeds. A monoculture of weeds reduces habitat and species diversity.

<u>BLM Sensitive Species</u>

Effects from the proposed fire management activities and/or fuels reduction treatments to BLM sensitive species of wildlife depend on the type of activities or treatments (e.g., wildfire control activities, prescribed burn, mechanical treatment, chemical treatment), timing, duration, intensity, and habitat type or vegetative community treated. Treatments that cause shifts or changes in the vegetative community, changes in the seral stage of the plant association, or changes in the structural integrity of the habitat, may have beneficial or negative effects, depending on the species considered.

Wildland Fire Management:
Management activities resulting from wildfire management would be similar for both alternatives. These activities would include all suppression actions and the associated activities and infrastructure necessary to support the suppression effort. Activities such as fire camps, helibases, helispots, opening of closed roads, creation of temporary roads, development or improvement of water sources (pump chance), staging areas, are some of the activities that may occur.

Direct and indirect effects to BLM sensitive species could result from these actions/activities. These effects would, for the most part, be limited to insignificant, short-term negative effects due to disturbance and possible displacement of individuals.

There would be some risk of direct take on individual animals from vehicle collisions, aerial suppression (retardant or water drops), heavy equipment operations, and human activities. These effects would generally be limited to juvenile individuals or the less mobile species such as amphibians, reptiles, and small mammals. There could also be some risk of long-term indirect effects from loss of essential habitat. Destruction of courting (grouse leks), nesting, denning, communal roosts, or other habitat necessary to maintain or improve reproductive levels could result. Conservation and protection measures should be incorporated into activity plans to mitigate these potential effects.

Prescribed Fire:
Comparison of Alternative A and B for effects to BLM sensitive species from prescribed fire finds no significant difference for potential impacts on grasslands or shrublands. When compared with the total acres of each cover type available on BLM administered lands, the differences between Alternative A and B are negligible.

Table 10: Example[1] of Wildlife Life-forms/Habitat Requirements			
Reproduces	**Feeds**	**No. of Species[1]**	**Examples**
In water	In water	1	bullfrog
In water	On the ground, in bushes, and/or in trees	9	long-toed salamander, western toad, Pacific treefrog
On the ground around water	On the ground, and in bushes, trees and water	45	common garter snake, killdeer, western jumping mouse
In cliffs, caves, rimrock and/or talus	On the ground or in the air	32	side-blotched lizard, common raven, pika
On the ground without specific water, cliff, rimrock,or talus association	On the ground	48	western fence lizard, dark-eyed junco, elk
On the ground	In bushes, trees, or the air	7	common nighthawk, Lincoln's sparrow, porcupine
In bushes	On the ground, in water, or the air	30	American robin, Swainson's thrush, chipping sparrow
In bushes	In trees, bushes, or the air	6	dusky flycatcher, yellow-breasted chat, American goldfinch
Primarily in deciduous trees	In trees, bushes, or the air	4	cedar waxwing, northern oriole, house finch
Primarily in conifers	In trees, bushes, or the air	14	Golden-crowned kinglet, yellow-rumped warbler, red squirrel
In conifers or deciduous trees	In trees, in bushes, on the ground, or in the air	24	goshawk, evening grosbeak, hoary bat
On very thick branches	On the ground or in water	7	great blue heron, red-tailed hawk, great horned owl
In own hole excavated in tree	In trees, in bushes, or on the ground, or in the air	13	common flicker, pileated woodpecker, red-breasted nuthatch
In a hole made by another species or in a natural hole	On the ground, in water, or in the air	37	wood duck, American kestrel, northern flying squirrel
In a burrow underground	On the ground or under it	40	rubber boa, burrowing owl, Columbian ground squirrel
In a burrow underground	In the air or in the water	10	bank swallow, muskrat, river otter
	Total	327	

[1] Species assignment to life-form is based on predominant habitat-use patterns. Based on Thomas et al 1979, Blue

Potential effects resulting from prescribed burning in the grassland or shrubland cover types could include direct effects resulting in mortality of individuals as well as disturbance and displacement of individuals.

Some immature and less mobile animals unable to escape the effects of smoke and fire may perish. Others may become separated from the adults and succumb either to the effects of the fire or to indirect effects from starvation or predation. Certain species may be inherently more susceptible to mortality due to more sedentary lifestyle or small size and inability to cover long distances. Timing burns to avoid risk to immature animals and design of burns to avoid high potential habitat for sensitive species that may be unable to escape the effects of a burn would be important conservation measures to incorporate into burn prescriptions.

Displacement of individuals would generally be short-term in nature unless the treatment significantly changes the plant association (shifts to an earlier succession stage), shifts the seral stage of the plant community, changes the composition of plant species, or significantly alters the structure of the habitat. Any of these changes in the vegetative conditions could result in long-term habitat modification that would make the area (stand, patch, watershed) unsuitable for an indeterminate time for certain species. This shift in conditions could also make the area more suitable for some species.

Treatment of grassland cover types would generally not cause long-term changes to the plant association, shift the seral stage, or significantly change the composition of plant species. Grassland species are generally more resilient and, having adapted to fire, recover fairly quickly if consideration is given to timing and intensity of burns.

Shrubland species are more variable in their response to fire. Many shrub species (basin big sage, Wyoming big sage, black sage, mountain mahogany, shadscale) do not recover from burning by means other than regeneration from seed. This can require 10 years or more and may leave a stand altered from preburn conditions. Based on site specific environmental analysis, projects would not be recommended where burning these vegetative types is anticipated to cause long-term effects on wildlife habitat.

Other shrub species, (three-tip sagebrush, rabbit brush, snowbrush) resprout after fire and recover more quickly. Burning of these types may have short-term negative effects but long-term beneficial effects by rejuvenating the stand and making the vegetation more productive, more palatable, and/or nutritious (if used as a forage).

Burning of shrublands can also alter the structure of the stand. Large, decadent stands of basin big sagebrush (*Aremesia tridentatatridentata*) may provide excellent nesting conditions for certain species of passerine birds (Brewer's sparrow) but very poor conditions for sage grouse brooding habitat. Burning might improve the habitat conditions for sage grouse brooding but make it totally unsuitable for passerine nesting.

The potential effects to species dependant on forestlands would be essentially the same as those effects to the grassland and shrubland species. However, due to a larger proportion of the cover type being proposed for treatment, effects would be proportionately greater. There is also an inherently greater likelihood for loss of structure and changes in plant composition due to the greater diversity of plant species in a forested community. If treatment significantly changes the plant association (shifts to an earlier succession stage), shifts the seral stage of the plant community, changes the composition of plant species, or significantly alters the structure of the habitat it would generally constitute a long-term effect due to the longer timelines for regeneration of the forest community types.

When the effects from prescribed burning are considered alone, neither Alternative A nor B pose significant risks to populations of sensitive species. The magnitude of proposed treatments in both alternatives is minimal in relation to the availability of habitat on BLM administered lands. However, when considered along with past, present, and future activities the cumulative effects may pose substantial risks to isolated populations of certain species.

This is especially true if one considers effects from probable wildfire. If wildfire burned areas of essential habitat for certain species, nearby unburned patches of suitable habitat would be infinitely more important. To ensure persistence of certain species, adequate patch size and spatial arrangement of suitable habitat must be maintained

This preplanning would allow for the analysis of effects of proposed fuels treatment projects at a larger landscape scale than just the project area and compare the proposed action in relation to any recent wildfire events. This would enable decision makers to ensure their actions would not lead sensitive species toward federal listing.

Mechanical Treatments:
Mechanical treatments pose similar threats to sensitive species as prescribed burns except the risk of direct mortality is much lower. Mechanical treatments have the advantage of being a more "controlled" treatment and thereby being more capable of minimizing direct effects if a sensitive species or previously unknown key habitat is discovered. It is far more likely (as compared to prescribed burning) that mechanical activities could be modified to avoid a nest or den site or to move activities from an area where a sensitive species is discovered.

Mechanical treatments could still cause disturbance and displacement both from direct effects of the treatment activities as well as changes in habitat conditions. As with prescribed burning, any changes in the vegetative conditions could result in long-term habitat modification that would make the area (stand, patch, watershed) unsuitable for an indeterminate time for certain species. This shift in conditions could also make the area more suitable for certain other species.

Comparison of alternatives for effects to BLM sensitive species from mechanical treatments finds an increase in potential impacts from Alternative A to Alternative B. However, when compared to the total BLM administered acres, even the upper limit of treatments under Alternative B represents less than 2 percent of the total BLM acreage in Montana and the Dakotas.

This comparison carries through when the proposed treatments by the various cover types (grass, shrubs, forest) are compared for Alternative A and B. The potential effects for all three cover types are far greater under Alternative B due to the significant increase in acres proposed for treatment.

Although Alternative B represents substantial increases in acres proposed for treatment as compared to Alternative A, when compared in context with the total acres under BLM administration of each cover type, even the upper level of treatment would be insignificant. The higher level of treatment under Alternative B represents 0.3 percent of the grasslands, 1.5 percent of the shrublands and 10.1 percent of the forestland administered by BLM.

Beneficial effects would result from mechanical treatments for some sensitive species. Removal of encroaching tree species from shrub and grassland communities would maintain the habitat over time to benefit species dependent on those communities. Reducing stocking levels of forested stands by removal of seedling, sapling, and pole size understory vegetation would reduce the risk of stand replacement fires which in turn would maintain the forest stands over time to benefit species associated with forestland communities.

Chemical Weed Treatments:
Chemical treatments are planned in support of other fuels reduction treatments. The objective of chemical treatments is to control noxious weed infestations that may exist prior to the primary fuels treatment or result post treatment. In some cases where there is a significant weed component in a proposed fuels treatment area, chemical control may be used both prior to and post fuels treatment projects. Most chemical treatments will be on relatively small isolated populations that would be spot treated using ground vehicles or manual application devices.

Chemical treatments would be used on 3,500 acres in Alternative A and 185,000 acres in alternative B. Although the specific locations of these treatments have not been identified, acres of chemical weed treatments would have nearly a complete overlap with other types of fuels reduction treatments. Thus, effects from chemical treatments would not contribute additional acres of disturbance but would contribute to the cumulative impacts on those acres treated.

Direct effects from chemical control would result if individuals were directly exposed to the application. Some take of individuals could occur depending on the type of chemical and the amount of exposure an individual incurred. The potential effect should be limited to small mammals, amphibians, reptiles, and juveniles that are relatively immobile and unable to flee the treatment area. If timing of treatments were planned to avoid applications when young of the year are present, most effects may be mitigated.

Direct effects could also result from disturbance and displacement of individuals due to the human presence and associated activities with the treatment. These effects would be short-term in nature and should not pose a risk of take.

Indirect, long-term effects may result from a change in plant composition on the treatment area. Application of herbicides to control noxious weeds would generally remove other desirable broad leaf forbs and possibly shrubs. This change in species composition could render the area unsuitable or at least lower the productivity of the site for use by certain species. If control is limited to relatively small areas or spot treatment the effects should be insignificant due to the availability of adjacent habitats for animals to move to.

An indirect, long-term beneficial effect should result from the control of noxious or invasive species. Many noxious weeds can out-compete and displace native plant species thereby reducing productivity of a site or rendering the site unsuitable for many species. Control of noxious weeds could help maintain the native species plant composition over time thereby maintaining the suitability of the habitat for use by many more species than would be provided for if infested with noxious or invasive plant species.

Conclusion (Terrestrial Habitat and Species, including Special Status Species)

At first, comparing Alternative A to Alternative B involves comparing effects of wildland fire on wildlife to the effects of prescribed burning on wildlife. While some vertebrates are killed directly by fire, it is rare to kill vertebrates by prescribed burns. The other major effects of fire on wildlife, altering immediate postfire environments and influencing postfire habitat succession, would be determined as rehabilitation after wildland fire but could be considered as part of prescribed burning activity. Additionally, Alternative B would involve the selective introduction of fire to certain habitats and could be avoided in areas or at times where fire is not desired (e.g., in the immediate vicinity of sage grouse leks during nesting season). Eventually, application of prescribed fire on more acres (Alternative B) would reduce the likelihood of wildland fire and the associated impacts on wildlife and restore a more natural habitat to fire-adapted wildlife to a greater extent than with Alternative A.

Prescribed Fire: Prescribed fire would be applied when timing, season, and the severity of the fire can be controlled. Wildlife impacts would be mitigated by controlling fire effects on vegetation and habitat. Size, intensity, pattern, fuel, and soil moisture can be manipulated in the burn plans to have desirable effects on local wildlife. Prescribed fires would be less severe than wildfires, and the recovery of wildlife habitat and the associated vegetation would be quicker with prescribed fire.

Alternative B would favor wildlife species adapted to lower seral stages on an additional 106,000 acres of forestlands and shrublands treated with prescribed fire. Grasslands and agricultural lands would remain in the same seral or ecological succession stage.

Refer to Table 10 for a summary of wildlife habitat associations from a similar area. Wildlife that feed and reproduce on the ground and in grasslands would be favored on these treatment acres.

Mechanical Treatments:
An additional 123,000 acres would be mechanically treated in Alternative B. These treatments would benefit wildlife adapted to lower seral stages of vegetation referred to in prescribed fire. Wildlife species diversity may be reduced in the treatment areas, but the habitat edges created by the treatments would increase wildlife species diversity.

Chemical Weed Treatments:
In the fuel treatment areas, 185,000 acres of chemical treatments will be used to treat noxious weeds. This will reduce habitat for wildlife species dependent on some broadleaf forbs and affected shrubs in the short term (1-2 years). Examples of species associated with broadleaf forbs and shrubs would be sage grouse, ground squirrels, prairie dogs, sage grouse, mule deer, white-tailed deer, antelope, and several species of passerine birds.

Greater cumulative impacts on the wildlife community would occur from allowing noxious weeds to displace native habitat and create a monoculture of weeds, as compared to applying chemical treatments. A monoculture of weeds reduces habitat and species diversity.

All Treatments:
Site-specific environmental assessments for each vegetation treatment will ensure that local wildlife specie concerns are addressed. All treatments would affect some change in the wildlife communities, which would be analyzed in the site-specific environmental analysis. The project would not be recommended if the impacts to the wildlife community are unacceptable or cannot be mitigated. Properly designed treatments can enhance wildlife and species diversity by creating edge effect. The amount of edge per unit area is directly related to habitat and species diversity. Any improvement of vegetative communities that increases structural (both horizontal and vertical) and species diversity would indirectly benefit wildlife.

Vegetation treatments can be considered tools for wildlife habitat management when vegetation responses and habitat requirements are understood. Accordingly, determinations on whether particular vegetation treatments will increase or decrease wildlife populations must be made on a site-specific basis, with consideration for local vegetation and wildlife information and responses to treatment.

The proposed action would result in fewer cumulative impacts to wildlife species and habitat compared to cumulative effects of the large, catastrophic wildfires that would be prevented. If fuels are left untreated, many of these wildfires would be stand replacement fires with a drastic change in ecological condition from late seral climax vegetation to an early seral stage.

Refer to Appendix B for possible wildlife design featuers based on the identifications of risk included in this analysis.

Conclusion - BLM Sensitive Species

Effects to sensitive species would result from either alternative. Although Alternative A would have fewer acres of fuels reduction treatments it could potentially result in greater number of acres burned by wildlfire. Either of these activities could disturb and displace individuals, injure and/or kill individuals, and change habitat conditions that could make the site unsuitable for use by certain species. Changes in habitat conditions could also make a site more suitable for certain species thereby having beneficial effects.

It is impossible to quantify these effects without having site-specific project proposals. Even with specific project design, the effects of fire, either wildfire or prescribed fire, can be significantly different even on the same vegetative communities. Response of different vegetative communities (even in similar cover class (e.g., shrub, grass, forestland)) can have vastly different responses to similar treatments let alone different treatments or timing and intensity of treatments.

About 2.4 percent and 5.7 percent of the BLM administered lands would potentially be affected by Alternative A and Alternative B respectively. Chemical treatments for weeds may cause additional or cumulative effects but would be on the same acres as treated with prescribed fire and/or mechanical treatments. Considering that these treatments would be applied over a period of 10 years, the difference between the effects from Alternative A and B are negligible.

Impacts would occur from more acres of treatment on BLM administered lands under Alternative B (457,000 acres) compared to Alternative A (193,000 acres), and the overall effects of these impacts could result in disturbance, displacement, harm, or death of individual animals.

Fire (wildland fire and prescribed fire) would also change conditions of the habitat. Effects from wildfire should be considered in terms of cumulative effects and presumably would be greater in Alternative A.

It is assumed that fire risk would be reduced on treated acres. Given that the treatments would occur over a ten-year period, the difference between acres affected (protected from wildfire) is relatively negligible when considered in context of the entire project area. Thus, although some beneficial effects would result from fuels treatments and reduced risk of wildfire, it is questionable that either alternative poses any greater or lesser cumulative effects that the other.

Of primary importance for conserving and recovering any sensitive species is to maintain suitable habitat in adequate patch size, spatially arranged across the landscape to allow for dispersal of young and availability of alternate home range should an individual be displaced from its current territory.

To ensure desired conditions are maintained to provide adequate amounts of suitable habitat, fuels treatment projects must be considered in context with recent wildfire events. Due to the uncertainty of wildfire, maximum limits of allowable habitat conversion (by habitat type) should be established within specific geographic areas to ensure habitat is maintained throughout the range over time.

Mitigation and protection measures will be used as design criteria in the specific project planning to minimize adverse impacts to the species. With application of these design criteria and attention paid to providing adequate amounts of suitable habitat spatially arranged across the landscape, no BLM sensitive species should be moved toward federal listing.

3.8 Federally Threatened, Endangered, and Proposed Species (BLM Critical Element)

Affected Environment (T/E/P Species):
There is potential for six endangered species, eight threatened species, and one species proposed for listing to occur within the project influence area in Montana and the Dakotas. There is also designated critical habitat for piping plover and proposed critical habitat for bull trout. Distribution by field office is summarized in Table 11.

Environmental Consequences (T/E/P Species)

Wildland Fire Management:
Management activities resulting from wildfire management would be similar for both alternatives. These activities would include all suppression actions and the associated activities and infrastructure necessary to support the suppression effort. Activities such as fire camps, helibases, helispots, opening of closed roads, creation of temporary roads, development or improvement of water sources (pump chance), staging areas, are some of the activities that may occur.

Prescribed Fire:
Comparison of Alternative A and B for effects to federally listed and proposed species from prescribed fire finds no significant difference for potential impacts to species that inhabit grasslands or shrublands. When compared with the total acres of each cover type available on BLM administered lands, the differences between Alternatives A and B are negligible.

For treatment of forestlands, Alternative A would treat 99,000 acres (less than 13 percent) and Alternative B would treat 176,000 acres (less than 23 percent) of the total 760,000 acres of forestland administered by BLM Montana/Dakotas. Thus the effects of Alternative B (Preferred Alternative) would be nearly double that of Alternative A (No Action). Although Alternative B proposes to treat less than 23 percent of the forestland administered by BLM, treatment of 176,000 acres would pose risk of adverse affects to forest dwelling T&E species (Canada lynx, grizzly bear, grey wolf, bull trout, bald eagle).

Mechanical Treatments:
Mechanical treatments pose similar threats to federally listed species as prescribed burns except the risk of direct mortality is much lower. Mechanical treatments have the advantage of being a more "controlled" treatment and thereby being more capable of minimizing direct effects if a species or previously unknown key habitat is discovered. It is far more likely (as compared to prescribed burning) that mechanical activities could be modified to avoid a nest or den site or to move activities from an area where a T&E species is discovered.

Comparison of alternatives for effects to BLM sensitive species from mechanical treatments finds an increase in potential impacts from Alternative A to Alternative B. Alternative A would treat 35,000 acres total compared to the 158,000 acres under Alternative B. However, when compared to the total BLM administered acres, even the upper limit of treatments under Alternative B represents less than 2 percent of the total BLM acreage in Montana and the Dakotas.

This comparison carries through when the proposed treatments by the various cover types (grass, shrubs, forest) are compared for Alternative A and B. The potential effects for all three cover types are far greater under Alternative B due to the significant increase in acres proposed for treatment.

Although Alternative B represents substantial increases (6,000 percent in the grassland communities) in acres proposed for treatment as compared to Alternative A, when compared in context with the total acres under BLM administration of each cover type, even the upper level of treatment is somewhat insignificant. The higher level of treatment under Alternative B represents 0.3 percent of the grasslands, 1.5 percent of the shrublands and 10.1 percent of the forestland.

Chemical Weed Treatments:
Chemical treatments are planned in support of other fuels reduction treatments. The objective of chemical treatments

Table 11: Threatened and Endangered Species, by Field Office				
Species Listed by FWS on 8/24/02 in MT, ND, SD Common Name Scientific Name	**Status**	**BLM Field Offices** with administrative jurisdiction in counties identified by FWS with species present**[1]	**Field Offices** with habitat present**[2]	**Field Offices** with documented occurrence within the project area of influence**
Eskimo Curlew *Numenius borealis*	Endangered	None	N/A	N/A
Interior Least Tern *Sterna antillarum*	Endangered	MT 020, 030, 040, 092	MT 010, 020, 030,040, 060, 064, 090,092	MT 020, 030, 040
Whooping Crane *Grus Americana*	Endangered	MT 010, 020, 030, 040, 050, 060, 064, 090, 092	MT 010, 020, 050, 090, 092	MT 020, 050
Black-footed Ferret *Mustela nigripes*	Endangered	MT 010, 020, 030, 040, 060, 064, 070, 090, 092	MT 010, 020, 030, 040, 060, 064, 070, 090, 092	MT 040, 090
Gray wolf *Canis lupes*	Endangered	MT 010, 050, 060, 064, 070, 100	MT 010, 050, 060, 064, 070, 100	MT 010, 050, 070, 100
Pallid Sturgeon *Scaphirhvnchus albus*	Endangered	MT 020, 030, 040, 060, 064, 090, 092	MT 020, 030, 040, 060, 064, 090, 092	MT 020, 030, 040, 060, 064, 090, 092
Topeka Shiner *Notropis topeka* (South Dakota)	Endangered	MT 040	None	N/A
White Sturgeon *Acipenser transmontanus*	Endangered	MT 100	None	N/A
Scaleshell Mussel *Leptodea leptodon*	Endangered	None	N/A	N/A
American Burying Beetle *Nicrophorus americanus*	Endangered	MT 040	MT 040	None
Bald Eagle *Haliaeetus leucocephalus*	Threatened	All	All	All
Piping Plover *Charadrius melodus*	Threatened	MT 010, 020, 030, 040, 060, 064, 090, 092	MT 010, 020, 030, 040, 090, 092	MT 020, 092
Canada Lynx *Lynx canadensis*	Threatened	MT 010, 050, 060, 070, 100	MT 050, 060, 070, 100	MT 050, 070, 100
Grizzly Bear *Ursus arctos horribilis*	Threatened	MT 010, 050, 060, 070, 100	MT 010, 050, 060, 070, 100	MT 050, 060, 070, 100
Bull Trout *Salvelinus confluentus*	Threatened	MT 100	MT 100	MT 100
Spalding's Catchfly *Silene spaldingii*	Threatened	MT 100	None	N/A
Ute Ladies'-tresses *Spiranthes diluviali*	Threatened	MT 050, 070, 100	MT 050, 070, 100	MT 050, 070
Water Howellia *Howellia aquatilis*	Threatened	MT 100	MT 100	None
Western Prairie Fringed Orchid *Platanthera praeclara* (North Dakota)	Threatened	MT 030	MT 030	None
Mountain Plover *Charadrius montanus*	Proposed	All but MT 100	All but MT 100	MT 010, 020, 050, 060, 064, 070, 090, 092

[1] If BLM administered lands are not present in County identified by FWS no effects determination is needed
[2] If habitat is not present within the area of influence no effects determination is needed.
***Field Office Codes*

MT 010—Billings MT 050—Dillon MT 090—Malta MT 020—Miles City MT 060—Lewistown
MT 092—Glasgow MT 030—North Dakota MT 064—Havre MT 100—Missoula MT 040—South Dakota
MT 070—Butte

is to control noxious weed infestations that may exist prior to the primary fuels treatment or result post treatment. In some cases where there is a significant weed component in a proposed fuels treatment area, chemical control may be used both prior to and post fuels treatment projects. Most chemical treatments will be on relatively small isolated populations that would be spot treated using ground vehicles or manual application devices.

Large area chemical applications, with aircraft or vehicles, should be the exception and would only be used in areas of extreme weed infestations.

Chemical treatments would be used on 3,500 acres in Alternative A and 185,000 acres in alternative B. Although the specific locations of these treatments have not been identified, acres of chemical weed treatments would have nearly a complete overlap with other types of fuels reduction treatments. Thus, effects from chemical treatments would not contribute additional acres of disturbance but would contribute to the cumulative impacts on those acres treated.

Obviously, the level of disturbance will be considerably greater on an additional 181,500 acres of treatment under Alternative B. This disturbance would be in addition to other effects resulting from the fuels treatments.

Alternative A (No Action) may result in greater cumulative impacts on the wildlife community from allowing noxious weeds to spread and potentially displace native habitat and associated species, as compared to the application of chemical treatments under Alternative B.

<u>Interior Least Tern (Endangered)</u>
There is no known nesting or roosting occurring on BLM administered lands. However, one island in the Yellowstone River adjacent to BLM land (Miles City Field Office) contains a colony of nesting least terns. There is high likelihood that foraging occurs in sections of the Missouri and Yellowstone Rivers with BLM administered lands.

Due to the limited areas of use by interior least terns and the specific nesting habitat requirements, it is unlikely that any activities from wildland fire management or fuel reduction treatments would ever occur in close proximity of nesting birds. Given the characteristics of typical nest sites being dry, flat, sparsely vegetated sand and gravel bars within a wide, unobstructed, water-filled river channel there would be no fuels treatment planned for this habitat and therefore no direct effect from this activity.

There may be potential for indirect effects resulting from associated actions of fuels treatments in the uplands. Heavy equipment for mechanical treatments, equipment for prescribed burning, and/or chemical control all pose risk of hazardous fuel spills. Chemical treatments in the watershed also pose risk of down stream contamination. These hazards could indirectly effect the preybase (fish) and/or nesting habitat. The likelihood of these effects is so small as to be discountable and would not adversely affect the species.

There is potential for insignificant direct and indirect impacts from wildland fire suppression activities. Wildland fires are not common along the major tributaries. When they occur they are usually small and quickly contained. If a fire occurs on a wooded island or wooded shoreline, human activities associated with suppression may cause short-term direct effects. Human traffic from fire crews, vehicle traffic, and possibly aircraft could disturb terns. It is discountable these actions would occur. If they did, they would be insignificant and would not adversely affect the species through abandonment of a nest site or other impact.

Suppression activities associated with fires near river corridors would usually use the corridor as a natural firebreak. Aerial suppression (fixed wing retardant drops or helicopter bucket drops) may be used to contain the fire near the river. Helicopter buckets may be filled in deep calm pools in the rivers. These pools usually are not close to suitable nesting sites and the prey base (fish). Effects of filling buckets, if any, would be short-term and discountable and would not adversely affect the species.

Cumulative Effects – When considered in context with past, present, and foreseeable future (non-federal) actions, the Proposed Action seems very insignificant. In relation to effects from large dams, irrigation ditch diversions, non-point source pollution, channelization, urban development, and instream alterations, the proposed action becomes moot. Although there is potential for insignificant minor effects these would not contribute, cumulatively, to cause adverse effects to the species.

<u>Whooping Crane (Endangered)</u>
Whooping cranes migrate over the analysis area and potential habitat exists but there has been no documented nesting, roosting, or foraging on BLM lands in the analysis area.

Since cranes prefer wetland sites with wide, open panoramas, they would be naturally insulated from the effects of wildland fire management activity and there would be no direct or indirect effects.

No fuels reduction treatments are planned for any riparian or wetland areas.

Cumulative Effects – There would be no direct, indirect, or cumulative effects.

<u>Black-footed Ferret (Endangered)</u>
Prairie dog towns are naturally insulated from wildfire effects due to the lack of vegetative cover resulting from prairie dog grazing. Wildfire would generally not burn a

prairie dog town but may burn areas around and between prairie dog towns. Fire suppression activities are not likely to effect prairie dog towns but could occur in nearby areas.

Direct effects to black-footed ferrets would be limited to disturbance from fire suppression activities and effects from smoke. These short-term effects would be insignificant, and not likely to adversely affect any black-footed ferrets.

Indirect effects may result from changes in vegetative cover and species types in areas disturbed by fire suppression activities. These effects would generally be limited to narrow corridors of fire line or travel ways on the fringes of prairie dog towns and in the surrounding areas. These effects could result in some reduced expansion rates of prairie dogs and/or reduced densities of prairie dog numbers on the edges of towns. This would be discountable and insignificant and would not likely adversely affect the black-footed ferret.

Due to the inherently low fuel levels on and around prairie dog towns there are no fuels treatments planned for these habitats and therefore no effects.

Cumulative Effects – When considered in context with past, present, and foreseeable future (non-federal) actions, the alternatives are insignificant. Although there is potential for insignificant minor effects, these would not contribute to cumulative adverse effects to the species.

Gray Wolf (Endangered)

Effects from wildland fire management activities would generally be limited to disturbance and displacement. Suppression activities, except aerial support, are usually restricted to the flanks of a fire. Fireline construction, and associated human presence and motorized equipment, should not cause direct effects to wolves. Wolves would usually flee in advance of an approaching fire and be out of the area of influence associated with suppression activities.

Aerial support could encounter wolves fleeing the area and cause some short-term direct effect from disturbance. There may also be short-term direct effects from disturbance caused by the increase in human activity, vehicle traffic, and associated infrastructure such as fire camps. These effects would be insignificant.

If fire suppression activities occur in suitable wolf habitat from April 15 to June 30, disturbance or displacement of a den or rendezvous site could result in adverse affects. Disturbance or displacement of a pack from a denning area or rendezvous site at this time could result in pups being separated from the pack thus leaving them susceptible to predation or, if orphaned for longer period of time, starvation.

Indirect, short or long-term effects resulting from fire suppression activities may result if new roads are created or previously closed roads are opened. Wolves may be inhibited from returning to the area if vehicular traffic and human presence increases. This increased disturbance, resulting in the displacement of a wolf pack from an area, could potentially lead to adverse affects if the packs productivity is reduced. If a pack were displaced from an area that had provided suitable denning habitat for the pack to successfully reproduce and the pack subsequently relocated to an area that did not provide adequate habitat for successful reproduction, the resulting affect would be reduced productivity of the pack. Reduced productivity of a species resulting from the direct or indirect effects of an agency's action would constitute adverse affects to the species.

Fuels reduction treatments would target areas of overstocked stands of fire climax forest types, primarily ponderosa pine. Priority areas of treatment would be near communities but would not be limited to those areas. Generally, these are not areas frequented by wolves due to the presence of humans and/or marginal habitat.

Fuels treatments are proposed on over 280,000 acres of forested lands per decade. These treatments would include approximately 176,000 acres of prescribed fire and 107,000 acres of mechanical treatments. This represents 3 percent of the total BLM land acreage and up to 37 percent of the forested land type under BLM administration. If fuels reduction treatments are conducted in areas frequented by wolves it may cause both direct and indirect effects to the gray wolf.

If fuels treatments are conducted in the spring or early summer in areas inhabited by wolves there is potential for direct effects from disturbance and displacement of a pack and associated family unit. Juvenile, young of the year wolf pups could be fairly mobile at the time of project implementation; however, any project activities prior to June 30 pose the risk of adverse effects resulting from the displacement from a den site and the possible abandonment or segregation of a pup from the pack. If a pup were separated from the pack at this early age it would be very susceptible to predation or starvation.

To avoid possible adverse effects, fuels treatments shall be planned using the screening guidelines for gray wolf, as provided in the Northwest National Fire Plan Consultation Packet for Public Lands. These guidelines require that "no human disturbance or associated activities should be allowed within one mile of a den or rendezvous site from April 15 to June 30."

If fuels treatments are conducted in areas of existing or potential den sites, indirect effects could result from changed conditions that could render an area unsuitable for denning. Given the limited area of BLM jurisdiction that provides suitable wolf denning habitat, the lack of known den sites on BLM administered lands, and the relatively small acreage of potential denning habitat that may be treated per decade, it is extremely unlikely and therefore discountable that fuels treatments would cause changed conditions of potential den sites such that it might impair the reproductive capability of a wolf pair and thereby adversely affect gray wolves.

Cumulative Effects – When considered in context with past, present, and foreseeable future (non-federal) actions, the proposed action may cause adverse effects as a result of the incremental increase of effects. Due to the potential for direct and indirect effects from this action to result in the displacement of an individual or pack, and if other actions in the area (past, present or future) result in an animal being unable to find secure habitat and it results in an animal being harmed, injured, or killed as a result of this displacement, these effects would contribute, cumulatively, to cause adverse affects to the species.

<u>Pallid Sturgeon (Endangered)</u>
The primary factors associated with the decline of sturgeon are the past and present destruction and modification of habitat (USDI 1999b). The development of water resource projects within the Missouri River basin during the 1950's and 1960's, continued maintenance and operation of these projects, construction and operation of main stem and tributary dams and reservoirs, construction of river training structures, construction of levees for navigation and flood control, and water diversion projects have degraded sturgeon habitat.

The past and continuing destruction and alteration of the large river functions and habitat once provided by the Missouri and Mississippi Rivers is believed to be the primary cause of declines in reproduction, growth, and survival of large river fish such as the endangered pallid sturgeon.

The possibility of increased wildfire severity (under Alternative A) is not expected to adversely affect the endangered pallid sturgeon because it inhabits lower-elevation habitats in the Missouri River that are less responsive to federal land management and wildfire effects.

Some increased sedimentation could result from wildland fire management actions and fuel treatments in the uplands. Increased sedimentation could cause minor effects to water quality. These effects would be negligible, given the current non-point sources of pollution, existing levels of sedimentation, and natural erosion near large rivers.

Because of the great size of the rivers that pallid sturgeons inhabit and the typical water depths in which they have been found, the proposed activities would not contribute to direct, indirect, or cumulative effects and would not further compromise the status of the pallid sturgeon.

<u>American Burying Beetle (Endangered)</u>
This endangered species is very rare and listed only for the South Dakota portion of the project area. Within South Dakota it is only known to occur in Gregory and Tripp Counties of which BLM has 172 and 160 surface acres, respectively. There is no documented occurrence of the species on BLM lands.

There is a very low likelihood of the species occurring within the area of influence of the proposed action; however, if the American burying beetle did occur in the project area, activities associated with wildland fire management and/or fuels treatments may disturb and/or displace individual beetles. Since the American burying beetle is capable of flight it would generally flee in advance of activities associated with wildland fire management and/or fuels treatments; it is therefore so unlikely as to be discountable that any adverse effects would result.

Cumulative Effects – When considered in context with past, present, and foreseeable future (non-federal) actions, the proposed action is insignificant. Although there is a remote chance for activities to displace beetles the effects would not contribute, cumulatively, to cause adverse affects to the species.

<u>Bald Eagle (Threatened)</u>
Specific direction is provided in the July 1994 Montana Bald Eagle Management Plan to eliminate potential threats to nesting bald eagles through the use of nest site management zones. These zones have various levels of restricted use. BLM has adopted these guidelines as standards in addition to recovery plans and conservation strategies. In general, fuels projects are not planned for areas inhabited by bald eagles. Adherence to these standards and guidelines in site specific project planning would ensure that no adverse effects result from fuels reduction projects.

Although it is unlikely that any activities from fuels treatments would affect eagles, there is potential for effects from wildland fire management activities.

Wildland fires are not common along major waterways and when they do occur they are generally small and quickly contained. Suppression activities along a wooded shoreline may cause direct effects resulting from disturbance due to human activities. Human traffic from fire crews, vehicle traffic, and possibly aircraft could disturb eagles. These actions could take place during the nesting period; if they did, the disturbance could potentially cause the abandonment of a nest site, thus resulting in adverse affects to the species.

It is possible that wildland fire suppression activities, primarily aerial support, could cause the loss of a nest structure. Any known nest sites would be protected from effects of suppression activities including aerial retardant or water drops from fixed wing or helicopter. However, with the recent increased recruitment of new nest sites, a previously undiscovered nest could be impacted. If a low level flight, retardant drop, or helicopter bucket drop occurred near an occupied nest, birds could be hit, nests could be destroyed (blown from the tree), young eagles could be displaced from the nest at too early of an age, nest trees could be damaged (top breakage), or other impacts could result in long-term loss of pair productivity or direct take of a bird.

Cumulative Effects – When considered in context with past, present, and foreseeable future (non-federal) actions, cumulative effects from proposed actions would be no greater than the direct and indirect effects.

Piping Plover (Threatened)

There would be very little likelihood that wildland fire would occur in the types of areas that typically contain nest sites, (e.g., barren sand-pebble beaches, islands in freshwater and saline wetlands, and shorelines or exposed beds of larger reservoirs and rivers). If wildland fires occurred near occupied nesting habitat, it is not likely that suppression activities would disturb suitable nesting habitat, since the nesting habitat would act a natural firebreak.

There is potential for insignificant direct and indirect effects from wildland fire management activities. Should a fire occur on a wooded island or on a wooded shoreline, suppression activities may cause direct effects resulting from disturbance due to human activities. Disturbance resulting from fire crew activity, vehicle traffic, and possibly aircraft could present disturbance factors. It is discountable these actions would take place in close proximity to nesting piping plover and if they did the disturbance would be short-term, insignificant and would not adversely affect the species.

Although no fuels treatments are planned for piping plover habitat, there may be some potential for indirect effects resulting from associated actions of fuels treatments in the uplands. Heavy equipment for mechanical treatments, equipment for prescribed burning, and/or chemical control all pose some risk of hazardous fuel spills. In addition, any chemical treatments in the watershed pose some risk of down stream contamination. All of these hazards pose some threat of indirect effects to nesting habitat. The likelihood that any effect resulting from these risks is so small as to be discountable, and therefore are not likely to adversely affect the species.

When considered in context with past, present, and foreseeable future (non-federal) actions, the proposed action is insignificant. In relation to effects from large dams, irrigation ditch diversions, non-point source pollution, channelization, urban development, instream alterations, etc., the proposed action quickly becomes moot. Although there is some potential for insignificant minor effects these would not contribute, cumulatively, to cause adverse affects to the species.

Piping Plover Designated Critical Habitat

BLM does not have surface management authority on any areas of Designated Critical Habitat for the Piping Plover. Proposed Critical Habitat is within the area of influence of the proposed action and there may be short-term effects from smoke, increased vehicle traffic on existing roads and trails, and possibly application of aerial retardant or water for fire suppression. These effects would be insignificant and not likely to adversely affect critical habitat.

Canada Lynx (Threatened)

Wildland fire management activities may disturb and displace Canada lynx. Suppression activities, except aerial support, usually flank fires. Fireline construction, and associated presence of humans and motorized equipment, should not cause direct effects to lynx. Lynx would usually flee in advance of an approaching fire and be out of the area of influence associated with suppression activities. An exception to this would be if an early season fire occurred in the vicinity of a den site. If kittens are not able to keep in contact with the mother, or if fire suppression activities encounter young that are temporarily left by the female while she is hunting, segregation or abandonment could result in direct adverse affects.

Aerial support, including fixed wing and helicopter, could encounter lynx fleeing the area and cause direct effect from disturbance. There may also be direct effects from disturbance caused by increased human activity, including vehicular traffic and associated infrastructure such as fire camps. These short-term effects would be insignificant.

Indirect, short or long-term effects from fire suppression activities may result from opening previously closed roads, constructing new or temporary roads, and building firebreaks and machine lines, etc. Effects would be most likely on ridges, saddles, or areas that would create permanent travel ways that could facilitate increased access by competitors (e.g., coyote, bobcat). Lynx may also be inhibited from returning to the area, after being displaced, due to reduced prey base or increased human presence as a result of increased vehicular traffic from increased open road densities. Increased access by competitors may cause indirect effects from competition for prey base.

Fuels treatments are proposed on over 280,000 acres of forestlands per decade. These treatments would include approximately 176,000 acres of prescribed fire and 107,000 acres of mechanical treatments. This represents 3 percent of the total BLM land and up to 37 percent of the forested land type under BLM administration. Fuels treatments conducted in areas frequented by lynx may cause both direct and indirect effects to the Canada lynx.

Fuels treatments would target areas of overstocked stands of fire climax forest types, primarily ponderosa pine. Priority areas of treatment would be near communities and developments but would not be limited to those areas. These are not areas frequented by lynx due to the presence of humans and unsuitable habitat. Any treatments prescribed in suitable lynx habitat shall follow the appropriate conservation measures provided in the Canada Lynx Conservation Strategy (LCS) and incorporated by this Proposed Action through land use plan amendments. Site-specific projects shall design fuel reduction treatments using the screening guidelines for Canada lynx, as provided in the Northwest National Fire Plan Consultation Packet for Public Lands and will also be subject to consultation requirements under Section 7 of the Endangered Species Act.

If fuels treatments are conducted in the spring or early summer in areas inhabited by lynx, there is potential for direct effects from disturbance and displacement of a family unit. Juvenile, young of the year lynx would generally not be very mobile at the time of project implementation. Any project activities prior to June 30 pose the risk of adverse effects resulting from the displacement from a den site and the possible abandonment or segregation of young from the female. If a kitten were separated from the female at this early age it would be very susceptible to predation or starvation. For that reason, seasonal restrictions would be imposed on fuels treatments in suitable lynx denning habitat to eliminate the potential for adverse effects.

If fuels treatments are conducted in areas of existing or potential den sites, there is potential for indirect effects resulting from changed conditions. By adhering to the conservation measures prescribed in the LCS, these effects would be insignificant, and suitable denning habitat would be retained in a spatial arrangement over time that would maintain the suitability of the area for denning.

Cumulative Effects – When considered in context with past, present, and foreseeable future (non-federal) actions, the proposed action may lead to adverse effects. Due to the potential for direct and indirect effects from this action to result in the displacement of a female with young, and if other actions in the area (past, present or future) result in the female and/or juveniles being unable to find secure habitat, and it results in an animal being harmed, injured, or killed as a result of this displacement, these effects would contribute, cumulatively, to cause adverse affects to the species.

By applying the conservation measures provided in the Lynx Conservation Strategy, habitat would be maintained or improved by any fuels treatment projects. Wildland fire management actions would also adhere to LCS guidelines. If lynx denning habitat is limited in an area of BLM treatments, the treatment(s) must be consistent with the intent of the LCS and maintain suitable quantity and quality of foraging and denning habitat. If LCS standards are followed, no cumulative effects would result.

Grizzly Bear (Threatened)
There are no BLM administered lands within defined core areas. Effects to the grizzly bear would be limited to impacts outside the core areas. Use of BLM administered lands by grizzly bears outside the core areas is limited to transient bears moving between seasonal forage or moving between blocks of core areas.

Wildland fire management activities outside of core areas would be limited to insignificant short-term effects from disturbance and displacement. Suppression activities such as fireline construction with the associated presence of humans and motorized equipment should not cause any direct effects to grizzly bears. Bears would usually flee in advance of approaching fire and be out of the area of influence associated with suppression activities. If however, suppression activities were staged in advance of an approaching fire, grizzly may be encountered prior to their voluntary departure. Aerial support, including fixed wing and helicopter, could encounter grizzly either prior to their fleeing the area or while they are fleeing the area. Any interaction with the bear would cause some direct effect from disturbance.

There may also be some direct effects from disturbance caused by increased human activity in the area. These activities may increase vehicle traffic and the associated infrastructure such as fire camps. There is also a remote possibility of a direct encounter with a grizzly by an individual or group involved in fire management activities. Any direct encounter would most likely result in the bear being displaced from the area and could potentially result in adverse affects resulting from vehicular collision or human depredation.

Indirect, long-term effects from fire suppression activities may result from opening previously closed roads, constructing roads, firebreaks, machine lines, etc., and would contribute to the open and total route densities that are limited in these areas to protect grizzly bears. In accordance with Interagency Grizzly Bear Guidelines, BLM would make such routes inaccessible to motorized use or the routes would be included in access density calculations and thereby subject to appropriate access limitations.

Fuels treatments are proposed on over 280,000 acres of forestlands per decade. These treatments would include approximately 176,000 acres of prescribed fire and 107,000 acres of mechanical treatments. This represents 3 percent of the total BLM land acreage and up to 37 percent of the forested land type under BLM administration. If fuel treatments are conducted in areas frequented by grizzly bears it may cause short and long-term, direct and indirect effects.

Fuel treatments would target areas of overstocked stands of fire climax forest types, primarily ponderosa pine. Priority areas of treatment would be near communities but would not be limited to those areas. These are not areas frequented by grizzly due to the presence of humans and other disturbance factors. Treatments prescribed in suitable grizzly habitat shall follow the appropriate measures for the specific ecosystem (Northern Continental Divide or Greater Yellowstone), as provided in the Interagency Grizzly Bear Guidelines and incorporated by this Proposed Action through land use plan amendments. Site-specific projects shall design fuel reduction treatments using the Interagency Grizzly Bear Guidelines as well as the grizzly bear screening guidelines provided in the Northwest National Fire Plan Consultation Packet for Public Lands and will be subject to consultation requirements under Section 7 of the Endangered Species Act.

Cumulative Effects—When considered in context with past, present, and foreseeable future (non-federal) actions, the proposed action may cause adverse affects as a result of the incremental increase of effects. Due to the potential for direct and indirect effects from this action to result in the displacement of an individual and, if other actions in the area (past present or future) result in an animal being unable to find secure habitat and it results in an animal being harmed, injured, or killed as a result of this displacement, these effects would contribute, cumulatively, to cause adverse affects to the species.

Bull Trout (Threatened)

Because sediment delivery and removal of riparian vegetation due to land management activities are commonly considered an impact to aquatic species, it is logical to conclude that preventing intense wildfire and the resulting decrease in post-fire erosion and sedimentation would be a benefit.

Suppression of wildfires can also, in certain situations, have adverse effects on aquatic populations. Fire lines, water drafting, and fuel spills can have significant short and long-term impacts on stream and wetland systems, especially the smaller streams where much of the activity often occurs takes place. Fire behavior is rarely predictable and commonly requires a host of suppression activities across many locations to cover contingencies should a fire change direction or character. One unfortunate (but often unavoidable) result is a network of firelines (hand or machine-built), in and outside the fire perimeter, which can have similar impacts as roads designed below-standards. Water drafting, fuel spills, and inputs of retardant also may also adversely impact aquatic species, especially in smaller streams (Norris et al. 1991).

Attempts to reduce future fire risk may result in significant impacts to fisheries with no guarantee of positive return. Salvage of burned trees to reduce future fuel loading may be accomplished with minimal impacts in some areas, but in others, sensitivity to ground disturbance from loss of vegetation can cause increased erosion, compacted soils, and a loss of nutrients (USDA 2000, Beschta et al. 1995). Post-fire activities that increase the probability of chronic sediment inputs to aquatic systems may pose greater threats to bull trout and the aquatic ecosystem integrity than natural events associated with undesired forest stand condition (Frissell and Bayles 1996). Bull trout (Missoula Field Office only) occupy streams where protective habitat features and downstream refugia are still present. As a result, should severe wildfires occur, bull trout are expected to persist.

Although minimum-impact suppression techniques (MIST) have been developed, the primary objective during emergency suppression is to protect life and property. As described above, the impacts of suppression are typically greater to aquatic species than the impacts of the fire. Additionally, because species and habitat protection is (naturally) ranked below protection of life and property, there is no assurance that MIST techniques can and will be followed.

Specific impacts to aquatic species and habitats that have been documented during suppression operations in the past include: introduction of fire retardant in streams and wetlands, spillage of aviation fuel or lubricants in streams or introduction into water tables, construction of fire line (hand- and machine-built) and exposure of soils on steep slopes adjacent to streams, damage to riparian vegetation and soils from use of heavy equipment off of established roads, eliminating natural streamflow during drafting, establishment of fire camps in or adjacent to sensitive riparian areas.

Prescribed fire activities are often identical to those described in the suppression category. However, because prescribed fires are not an emergency, it is assumed that there will be sufficient planning to develop design features for the projects that will prevent adverse impacts to aquatic habitat and species.

Because the activities in prescribed fire may be similar to those in suppression, potential impacts may be the same. Additionally, improperly planned or "runaway" prescribed fire may severely burn riparian vegetation, reducing shade, exposing streamside soils, etc. Therefore, even though there are no fuels reduction treatments planned for riparian habitat types, there would still be some potential for adverse effects to bull trout from these activities.

All wildland fire management activities and fuel treatments will follow the conservation measures provided in the Interim Bull Trout Habitat Conservation Strategy. If these measures are followed, effects to bull trout from wildfire activities and fuels treatments would be minimized but may still lead to adverse affects.

Bull Trout Proposed Critical Habitat

With application of the Interim Bull Trout Habitat Conservation Strategy, effects from wildfire management activities and fuels treatments would be insignificant. Conservation measures that provide protective buffer area (Riparian Habitat Conservation Area) would ensure that no adverse modification to proposed critical habitat occurs.

Ute Ladies'-tresses and Water Howellia (Threatened)

Surveys for Ute ladies'-tresses were conducted to delimit the range of distribution in Montana, including the most likely BLM and NFS lands. This species was not found on NFS or BLM lands (B. Heidel, pers. comm. 2000).

BLM lands with potential habitat for the Water Howellia have been inventoried and no occurrence of the species has been documented Due to low likelihood of occurrence for either species on BLM lands, the habitat for either species not being prone to wildland fire, and no fuels treatments planned for the habitat types that support either species, there would be no direct, indirect, or cumulative effects to either species.

If either species is located on BLM lands in the future, consultation for the action shall be reinitiated.

Western Prairie Fringed Orchid (Threatened)

This threatened species is restricted to areas in North Dakota. Due to the scattered nature and low number of BLM lands in North Dakota, the low likelihood of the species occurrence on BLM lands, and no fuels treatments planned for habitat types that support this species, there would be no direct, indirect, or cumulative effects.

Should populations of the species be located on BLM administered lands in the future, consultation for this action shall be reinitiated.

Mountain Plover (Proposed)

Due to the close association of the mountain plover with black-tailed prairie dog towns, the analysis for effects to this species are much the same as for black footed ferret.

Mountain plover would be most susceptible to effects caused by disturbance and displacement during the nesting and brooding season, which extends from mid-April through August. The preferred alternative may potentially cause direct effects to mountain plover during this time as a result of fire suppression or fuels reduction activities and effects from downwind smoke.

Areas suitable for mountain plover nesting such as prairie dog towns or habitat characterized by sparse vegetation with at least 30 percent bare ground are very unlikely to incur effects from wildfire. Prairie dog towns are naturally insulated from wildfire effects due to the lack of vegetative cover resulting from prairie dog grazing. Wildfire would generally not carry across a prairie dog town or other suitable nesting habitat but may burn areas around and between potential nesting areas. For this reason, it is discountable that fire suppression activities would be employed on prairie dog towns or come in contact with suitable nesting habitat, and therefore this action is not likely to adversely affect the mountain plover.

Indirect effects may occur as a result of changes in vegetative cover or species types in areas disturbed by fire suppression activities. These effects would generally be limited to narrow corridors of fire line or travel ways on the fringes of prairie dog towns and in the surrounding areas impacted by fire. These effects could result in some reduced expansion rates of prairie dogs and/or reduced densities of prairie dog numbers on the edges of towns. However, these corridors could also serve as dispersal corridors for prairie dogs to move off and colonize new areas, thereby creating additional habitat in the long term. Overall, it is discountable that these effects would occur and those that did would be insignificant in terms of acres of affected habitat, and therefore is not likely to adversely affect the mountain plover

Due to the inherently low fuel levels on and around prairie dog towns and other suitable nesting habitat, there are no fuels treatments planned for these habitats types at this time and it is unlikely that these habitat types would ever be targeted for fuels treatments. Therefore, no effects, either direct or indirect, would occur as a result of fuels reduction activities.

When considered in context with past, present, and foreseeable future (non-federal) actions, the proposed action would not cumulatively contribute to cause an adverse affect or jeopardy to the species. Since any effects would be insignificant or discountable they would not cumulatively cause adverse affects or jeopardy.

Conclusion (T/E/P Species):

The Biological Assessment (BA) of Threatened, Endangered, and Proposed Species provides direction to protect these species and to mitigate potential adverse effects.

The mandatory direction contained in section 2.5.3.1 was designed to reduce potential adverse effects to federally listed and proposed species. These measures were included as mitigation in the Biological Assessment for this action and consulted on with the Fish and Wildlife Service under the requirements of Section 7 of the ESA. These measures would be followed during wildland fire management activities and fuels reduction projects, unless there is risk to human life or a more preferable way of minimizing the effects, based on characteristics of individual projects, could be developed through consultation with the Fish and Wildlife Service.

Wildland fire management and fuels reduction activities would also operate under applicable guidelines, standards and protection measures as established in this document and incorporated into the land use plans through amendment.

Based on the mitigation and protection afforded by the guidance and direction contained in this assessment, the following determinations of effect to federally listed threatened, endangered, and proposed species, and proposed critical habitat are made for the area of influence of the proposed action.

No Effect

- Whooping Crane
- Pallid Sturgeon
- Ute Ladies'-tresses
- Water Howellia
- Western Prairie Fringed Orchid
- Critical Habitat for Piping Plover

May Affect but Is Not Likely to Adversely Affect

- Interior Least Tern
- Black-footed Ferret
- American Burying Beetle
- Piping Plover
- Mountain Plover

May Affect and Is Likely to Adversely Affect

- Gray Wolf
- Bald Eagle
- Canada Lynx
- Grizzly Bear
- Bull Trout
- Proposed Critical Habitat for Bull Trout

Not Likely to Jeopardize the Species

- Mountain Plover – (under the current proposed status); and

May Affect but Is Not Likely to Adversely Affect (under the Threatened status if the Mountain Plover is listed).

3.9 Cultural (BLM Critical Element) and Paleontological Resources

The BLM will comply with requirements in the National Historic Preservation Act (NHPA) and will ensure the identification of cultural resources that may be affected by a federal undertaking (e.g., fire restoration activities). Cultural resources considered eligible for or listed on the National Register of Historic Places should either be avoided or a plan for mitigating the effects of the proposed action should be formulated and implemented. BLM will consider effects to eligible cultural resources according to existing agreements developed for purposes of fulfilling responsibilities under the NHPA. If no agreements are in place, eligible cultural resources will be considered consistent with regulations at 36 CFR 800.

Environmental Consequences

The effect of wildland fire and prescribed burning on cultural resources depends on the location of the resource with respect to the ground surface, the proximity to fuels that could provide a source of heat, the material from which artifacts are made, and the temperature to which artifacts are exposed. Threshold temperatures for damage to cultural artifacts manufactured from different materials, such as ceramic or stone, vary significantly.

Surface or near-surface cultural materials may be damaged, destroyed, or remain essentially unaffected by fires, depending on the temperatures reached and the duration of exposure to that temperature. Wooden structures or wooden parts of stone structures are susceptible to fire. Combustible artifacts lying directly on the ground surface could be damaged or destroyed. The ability to date noncombustible surface artifacts may be adversely affected if exposed to specific high temperatures. Subsurface materials are usually affected by fire only if excessive amounts of soil heating occur (where dry accumulations of dead woody fuel or duff layers are consumed, as by wildland fire).

Prescribed fires in areas of cultural significance would not be ignited under conditions dry enough to cause significant subsurface heating. Subsurface cultural resources are generally more subject to harm from construction of fire lines around planned fire boundaries than from the fire itself.

The heat, smoke, and soot from fires can also damage cultural resources, especially prehistoric rock art, by causing spalling which physically destroys the resource or by obscuring the surface of the resource with smoke and soot. Smoke and soot can damage cultural resources by either increasing chemical deterioration or obscuring carvings and painted motifs.

Damage to cultural resources, prehistoric and historic, also results from fire suppression related activities. Cultural resources may be more at risk from activities such as blading fire lines, setting camps and staging areas, or using vehicles off road, than by the fire.

Impacts from smoke, heat, or soot are not believed to produce measurable effects on fossil resources unless those elements are in close proximity the resources.

The effect of fire on fossil resources is directly related to the location of the resource with respect to the ground surface, the proximity of the fuels which provide the source of heat, and the location and use of hand tools, motorized vehicles, fossil collecting activities, and heavy equipment. Fossils lying at or near the surface would likely be located in an area lacking vegetation or fuel.

Wildland fire and prescribed burns make sites more susceptible to the effects of erosion and it also results in a more visible resource. Illegal collecting may increase on burned areas, especially along access routes.

The greatest risk for these resources would likely come from the equipment and activities associated with fire management activities. This includes any surface disturbing activities such as camp preparation, fire line construction, motorized vehicle use, and heavy equipment operation. If these activities are isolated from the fossil producing formations, the impacts to these resources should be negligible.

For fuel reduction projects where mechanical treatments are proposed, a Class III inventory would be conducted. If prehistoric or historic resources are located, the mechanical treatment would be changed to avoid or provide treatment to the resource to eliminate harm to heritage resources. Given these procedures, impacts to significant cultural resources are not anticipated from mechanical treatments.

In areas where fossil resources are known or anticipated, mechanical treatments will include provisions to avoid areas containing sensitive fossil producing formations. If those areas cannot be avoided by the treatments or associated activities, a qualified paleontologist will be retained to recover specimens subject to direct impact.

Conclusion:

With Alternative A, wildland fires would be anticipated on over 47,000 acres over the next decade. Any or all of the impacts associated with wildland fire and fire suppression described above could also be anticipated.

Cultural resources that are listed or eligible for listing on the National Register of Historic Places (NRHP) would either be avoided, or a plan for mitigating the effects of the fuel treatments would be formulated and implemented. This would minimize the effects on cultural resources of treating an estimated 193,000 acres within a decade.

Alternative B would provide additional fire management guidance for wildland fire suppression and, in addition, continue with current survey guidelines for prescribed burns in Montana and sets guidelines for prescribed burns in North and South Dakota. The continuation of existing policy on prescribed burns for Montana, the implementation of new prescribed burn guidelines for North and South Dakota, and changes in the way cultural resources are considered in a wildland fire suppression environment are all aimed at the protection of cultural resources.

Little or no impact would be anticipated from fuels management activities on 457,000 acres per decade since sites would be examined for cultural and paleontological resources before any activity would occur. Impacts would be avoided or mitigated.

Under Alternative A, management of paleontological resources for prescribed burns or for wildfire management is generally absent. Alternative B does provide fire management objectives and guidance for wildland fire suppression and rehabilitation and also provides guidance for prescribed fire. These guidelines are intended to provide added protection to paleontological resources during wildfire suppression and prescribed fire activities.

3.10 Areas of Critical Environmental Concern (BLM Critical Element)

Over 40 areas within Montana and the Dakotas have been found suitable for designation as Areas of Critical Environmental Concern (ACECs). These areas have received special designations and ACEC management plans have been adopted to protect unique resources and values. Fire management zone categorizations for each ACEC are listed in Table 12. Neither alternative would result in negative effects to ACECs because ACEC status would be considered for both fire management actions and in site-specific implementation assessments for hazardous fuels reduction projects.

3.11 Prime or Unique Farm Lands (BLM Critical Element)

The Farmland Protection Policy Act of 1985 and 1995 requires that actions be identified if they would affect any lands classified as prime and unique farmlands. Neither the wildland fire suppression nor the fuels treatments anticipated with either alternative would contribute to the unnecessary and irreversible conversion of prime or unique farmland to non-agricultural uses.

Table 12 Areas of Critical Environmental Concern			
ACEC Name	**Acres**	**Reason for Designation**	**Category and Fire Management Zone (Alternative B)**
Billings Field Office			
Four Dances	765	Archaeology, cultural values, scenery, natural hazards, historic	B Billings Grasslands
East Pryor Mountains	29,500	Wildlife, wild horses, paleontology	C Pryor Mountains
Weatherman Draw	4,268	Cultural	B Billings Grasslands
Meeteetse Spires	960	Rare plant, hazardous cliffs, scenery	B Billings Grasslands
Bridger Fossil	575	Paleontology	B Billings Grasslands
Stark Site	800	Cultural	B Billings Grasslands
Petroglyph Canyon	240	Cultural	B Billings Grasslands
Pompey's Pillar	470	Historic, cultural, recreation	B Pompeys Pillar
Castle Butte	185	Cultural	B Billings Grasslands
Butte Field Office			
Sleeping Giant	11,609	Recreation, scenic, fish and wildlife	C Sleeping Giant/Sheep Creek
Lewistown Field Office			
Sweetgrass Hills	7,952	Cultural, T&E, wildlife, recreation	B Grass/Rangelands
Kevin Rim	4,657	Wildlife (raptors), cultural, recreation	B Grass/Rangelands
Acid Shale-Pine Forest	2,463	Endemic plant community	B Grass/Rangelands
Judith Mountains Scenic Area	3,702	Scenic, wildlife, recreation	B Timber/Mountain Ranges
Collar Gulch	1,618	Westslope cutthroat trout	B Timber/Mountain Ranges
Square Butte ONA	1,947	Natural endemic systems, cultural, scenic, geologic	B Grass/Rangelands
Cow Creek	14,000	Riparian, natural hazard, geology, scenic, natural system, Nez Perce trail	C Missouri Breaks
Malta Field Office			
Prairie Dog Towns	12,346	Black-footed ferret reintroduction habitat	B Grass/Range Lands
Big Bend of the Milk River	2,120	Archaeological resources	B Grass/Range Lands
Azure Cave	140	Cave resources, bats	B Timber/Mountain Range
Miles City Field Office			
Powder River Depot	1,386	Cultural	C Special Management Areas
Hell Creek	19,169	Paleontology	C Special Management Areas
Sand Arroyo	9,056	Paleontology	C Special Management Areas
Smoky Butte	80	Geology, recreation	C Special Management Areas
Black-Footed Ferret	11,166	Wildlife	C Special Management Areas
Piping Plover	16	Wildlife	C Special Management Areas
Jordan Bison Kill	160	Cultural	C Special Management Areas
Seline	80	Cultural	C Special Management Areas
Ash Creek Divide	7,931	Paleontology	C Special Management Areas
Hoe	144	Cultural	C Special Management Areas
Big Sheep Mountain	360	Cultural	C Special Management Areas
Bug Creek	3,840	Paleontology	C Special Management Areas
Finger Buttes	1,520	Scenery	C Special Management Areas
Howrey Island	321	T&E Wildlife	C Special Management Areas
Battle Butte	120	Cultural	C Special Management Areas
Reynolds Battlefield	336	Cultural	C Special Management Areas
Missoula Field Office			
Bear Creek Flats	564	Riparian, fish, old growth pine,	C Blackfoot
Rattler Gulch Limestone Cliffs	20	Geological	B Clark Fork Front
Squaw Rock	640	Scenic, wildlife, recreation, T&E fish (bull trout)	B Flintrock
South Dakota Field Office			
Fort Meade Recreation Area	6,700	Historic, cultural	B Ft. Meade Rec. Area ACEC
Fossil Cycad	321	Paleontology	B Remainder of SD Field Office

3.12 Floodplains (BLM Critical Element)

Executive Order 11988 was enacted to "avoid to the extent possible the long-term and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative." No developments or effects of development by the BLM would be anticipated in a floodplain with either alternative.

3.13 Invasive and Non-Native Species (BLM Critical Element)

Some of the activities and land uses would introduce and/or spread noxious weeds. Chemical treatments considered in this analysis are mostly related to weed treatments. Anticipated levels of treatments for each alternative are displayed in Tables 2 and 5. A brief description of these treatments is available in section 3.1.1.3.

3.14 Native American Religious Concerns (BLM Critical Element)

Contact was initiated with Native American groups. No concerns were submitted that either alternative would interfere with the inherent right of freedom to believe, express, and exercise traditional religions, including access to religious sites, use and possession of sacred objects, and freedom to worship through ceremonials and traditional rites as established in the American Indian Religious Freedom Act of 1978.

3.15 Wastes, Hazardous or Solid (BLM Critical Element)

Activities associated with either alternative would be conducted to be in compliance with the Resource Conservation and Recovery Act (RCRA),that provides "cradle to grave" control of hazardous waste and solid wastes by imposing management requirements on generators and transporters of the wastes. Spills of retardant, fuels, and other chemicals may be subject to the spill reporting requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Clean Water Act. These reporting requirements are contained in the National Contingency Plan (40 CFR Part 300). In general, with "proper housekeeping procedures," compliance with these environmental laws and regulations would not be a significant concern for any of the activities associated with the two alternatives.

3.16 Wetlands/Riparian Zones (BLM Critical Element)

Management considerations must comply with Executive Order 11990, Protection of Wetlands, which requires federal agencies to minimize the destruction, loss, or degradation of wetlands while preserving and enhancing their natural and beneficial values on federal property. The order restricts most activities that could affect wetlands administered by the federal government. Activities mentioned in the EO include federal activities and programs affecting land use.

See Aquatic Habitats in Section 3.6 for impact analysis.

3.17 Wild and Scenic Rivers (BLM Critical Element)

BLM currently manages one designated Wild and Scenic River segment. The Upper Missouri National Wild and Scenic River (UMNWSR) is located between Fort Benton and US Highway 191 in northcentral Montana. This 149-mile stretch of river flows generally west to east through Chouteau, Blaine, Fergus, and Phillips counties. Neither public input nor analysis identified issues/concerns on the relationship of fire and fuels management to the Upper Missouri Wild and Scenic River designation.

3.18 Recreational and Visual Resources

Environmental Consequences (Recreation and Visual)
Large severe wildland fires change the landscape in a way that degrades visual quality and recreation opportunities and recreation experiences, especially on fragile soils and forestlands where the duration of impacts is also longer. The use of heavy equipment to blade fire lines and the use of staging areas leaves lasting visual scars that degrade the visual quality and recreation experience. The landscape may be blackened until vegetation is reestablished.

Full suppression could change the landscape to clearly appear altered by man. For example, a bladed fire line may create a visual contrast that makes human intervention apparent.

Potential visual effects from a severe wildland fire may include loss of living timber, blackening the landscape, and blackened deadfall.

Smoke from fires degrades air quality, visual quality, and recreational experiences. Visitation to burned areas would decline or cease altogether until recovery. Visitation could increase fairly soon if the fire creates more "edge effect", i.e. the richness of flora and fauna occurring in a transition zone where two plant communities or successional stages meet and mix (USDA 1988).

During periods of high fire danger and extensive wildland fire activity, such as in the summer of 2000, recreation use may be restricted or prohibited on large areas of public lands to protect public safety

Prescribed burning creates contrasting blackened areas and releases smoke into the air that temporarily impairs visibility. Burning does lessen the amount of logging debris that is seen and darkens the color of stumps and snags that, if not burned, would become more noticeable as they bleached over time.

The recreation and visual impacts described above would be more common with Alternative A because wildland fires would be expected to burn hotter and be more severe than with Alternative B. Alternative A also provides less guidance to protect visual and recreation resources.

Short-term adverse visual impacts would be associated with mechanical and chemical treatments. For example, thinning hazardous forest fuels would change the visual character of the forest viewshed. Slash piles would create short-term visual impacts until piles are burned and the burned spots are seeded These treatments would reduce the potential for negative long-term visual impacts associated with a stand-replacement fire. Measures such as feathered fuel breaks and treating areas in a mosaic pattern would help reduce visual impact of reducing hazardous fuels by thinning forestlands or using prescribed burns. These impacts would be more likely with Alternative B since more areas would be treated.

Conclusion (Recreation and Visual)

With Alternative A, more severe wild fires would be expected especially near priority interface areas where visual quality is often a public concern of rural residents. Most of the wildfires on untreated forestlands would be stand replacement fires that change the visual quality and visual resource management (VRM) class for many years and the recreation experience for almost as long.

Prescribed fire and mechanical treatments on 50,000 acres of grasslands, 9,000 acres of shrublands, and 130,000 acres of forestlands over a 10-year period would also affect visual quality and recreation experiences.

Treatments anticipated with both alternatives would help reduce the risks of wildland fire impacts

With Alternative B, wildland fires would be expected to burn fewer acres and cause less severe visual impacts. The long-term potential for stand-replacement wildland fires would decrease, with a corresponding decrease in visual and recreation impacts.

Visual quality and recreation opportunities would be affected by prescribed fire and mechanical treatments applied to more areas (90,000 acres of grasslands, 77,000 acres of shrublands, and 283,000 acres of forestlands). New guidance for fuel treatments (see section 2.5.3.1) would help mitigate adverse impacts.

3.19 Wilderness (BLM Critical Element) and Wilderness Study Areas

Affected Environment (Wilderness and Special Areas)

One 6,000-acre BLM site in Montana/Dakotas is a designated Wilderness Area, and 40 BLM sites totaling 452,563 acres are Wilderness Study Areas (WSAs). The WSAs meet the criteria set forth for potential wilderness designation under the Wilderness Act of 1964. These criteria include size, influence of man, absence of human habitation, and opportunities for solitude of primitive and unconfined type of recreation. All Wilderness and WSAs are classified as VRM Class I unless specifically exempted from this classification in an RMP.

Fire is a natural component of many wilderness ecosystems and WSAs. Lightning caused fires should be allowed to play, as nearly as possible, their natural ecological role within wilderness and wilderness study areas.

Special consideration and restrictions must be applied in wildland fire suppression and hazardous fuel reduction efforts in wilderness and wilderness study areas. Actions in WSAs are guided by the Interim Management Policy (IMP) until Congress makes a final wilderness determination. The Interim Management Policy and BLM Handbook H-8560-1 provide for the management of designated Wilderness Areas, including objectives for fire management.

In conjunction with allowing naturally occurring fires to play their natural ecological role, fire plans for WSAs need to be developed. Fire suppression in designated wilderness and WSAs would use methods that are least damaging to wilderness values, including Light-on-the-land and MIST, and consider minimum tool requirements. Prescribed burning and other fuels management are not exceptions to the Nonimpairment Mandate. Any such activities proposed must not impair wilderness values and must be analyzed with pre-IMP screens, IMP screens, public notification and the Nonimpairment environmental analysis. Management-ignited fires should not be used to achieve wilderness objectives where lightning caused fires can achieve them.

Environmental Consequences (Wilderness and Special Areas)

There would be very little difference in impacts on wilderness and wilderness values anticipated between the

Table 13 BLM Wilderness and Wilderness Study Areas		
Name(Acres)	**WSA Catalog Number**	**Category and FMZ**
	Billings Field Office	
Burnt Timber Canyon (3,430)	MT-067-205	C Pryor Mountain
Pryor Mountain (13,397; 4,352 additional in WY)	MT-067-206	C Pryor Mountain
Big Horn Tack On (3,308; 353 additional in WY)	MT-067-207	C Pryor Mountain
Twin Coulee (6,870)	MT-067-212	B Twin Coulee WSA
	Butte Field Office	
Humburg Spires (11,175)	MT-ISA-003	C McCartney-Rochester
Sleeping Giant/Sheep Creek	MT-075-111	C Sleeping Giant-Sheep Creek
Black Sage (5,926)	MT-075-115	C Three Forks
Yellowstone River Island (53)	MT-074-133	A Bozeman-Livingston Scattered Tracts
Elk Horn MT Section 202 (3,585)	MT-075-114	C Elkhorn Mountains
	Dillon Field Office	
Bear Trap Canyon WILDERNESS (6,000)	MT-076-001	C East Madison
Ruby Mountains (26,611)	MT-076-002	D North Rubys
Blacktail Mountains (17,497)	MT-076-007	C Blacktail Mountains
East Fork, Blacktail Deer Creek (6,230)	MT-076-022	C Sweetwater-Ruby
Hidden Pasture Creek (15,509)	MT-076-026	C Tendoy Mountains
Bell/Limekiln Canyons (9,650)	MT-076-028	C Tendoy Mountains
Henneberry Ridge (9,806)	MT-076-034	C Tendoy Mountains
Farlin Creek (1,139) Section 202	MT-076-069	C Southeast Foothills-Pioneers
Axolotl Lakes (7,804)	MT-076-069	C Gravelly Mountains
Centennial Mountains (27,691)	MT-ISA-002	C Centennial
Tobacco Root Tack On	Section 202**	C Tobacco Root Mountains
	Lewistown Field Office	
Square Butte (1,947)	MT-ISA-004	B Range/Grasslands
Stafford (4,800)	MT-068-250	C Missouri Breaks
Ervin Ridge (10,200)	MT-068-253	C Missouri Breaks
*Cow Creek (34,050)	MT-066-256	C Missouri Breaks
Dog Creek South (5,150)	MT-068-244	C Missouri Breaks
Woodhawk (8,100)	MT-068-246	C Missouri Breaks
Beaver Meadows (595)	Section 202**	B Range/Grasslands
North Fork Sun River (196)	Section 202**	C Rocky Mountain Front
	Malta Field Office	
Burnt Lodge (13,730)	MT-065-278	B Range/Grasslands
Bitter Creek (59,600)	MT-064-356	B Range/Grasslands
Antelope Creek (12,350)	MT-065-266	C Missouri Breaks
	Miles City Field Office	
Billy Creek (3,450)	MT-024-633	C Special Management Areas
Seven Blackfoot (20,330)	MT-024-657	C Special Management Areas
Bridge Coulee (5,900)	MT-024-657	C Special Management Areas
Musselshell Breaks (8,650)	MT-024-677	C Special Management Areas
Terry Badlands (44,910)	MT-024-684	C Special Management Areas
Zook Creek (8,438)	MT-027-701	C Special Management Areas
Buffalo Creek (5,650)	MT-027-702	C Special Management Areas
	Missoula Field Office	
Wales Creek (11,580)	MT-074-151A	C Hoodoo
Hoodoo Mountain (11,380)	MT-074-155	B Flintrock
Quigg West (520)	MT-074-150	C Blackfoot

*Management responsibility is shared with Malta Field Office
**Section 202: Study not complete

two alternatives at this level of planning. The guidelines, regulations, and policies are established and must be followed. Analysis of the impacts would be determined in any project-level analysis. However, with Alternative B, there may be more of an awareness of the special considerations required for fire management of wilderness and WSAs and also a heightened awareness of their locations and boundaries.

3.20 Environmental Justice (BLM Critical Element)

Neither alternative would result in identifiable effects or issues specific to any minority or low-income population or community. BLM has considered all input from persons or groups regardless of age, race, income status, or other social or economic characteristic.

3.21 Social, Human Health, and Safety

Affected Environment (Social, human health and safety)
In 2002, the populations of Montana, North Dakota and South Dakota were each less than one million people, resulting in population densities of 6 people per square mile in Montana, 9 people per square mile in North Dakota and 10 people per square mile in South Dakota. Montana's 2000 population of 902,165 was a 13 percent increase over 1990. During the same time period South Dakota's population (754,844 in 2000) grew by nine percent and North Dakota's population (642,200 in 2000) grew by less than one percent. The populations of all three states are expected to grow in the next 25 years.

Populations projections for Montana in 2025 range between 1,121,000 and 1,187,000. Populations projections for North Dakota in 2025 range between 729,000 and 778,000. The same figures for South Dakota are between 866,000 and 962,000 in 2025.

The movement of people into some rural areas began in the 1970s and is expected to continue into the 21st century. In scenic areas, particularly those suited for recreation, lands are being developed for recreation uses or subdivided for homes and cabins. New rural subdivisions are appearing across Montana and the Dakotas.

In some cases, these subdivisions are adjacent to public lands. In 1999, BLM field office personnel completed a Wildland/Urban Interface Risk Questionnaire for areas adjacent to public lands. Of 79 priority communities identified as part of the 1999 survey, 67 had moderate to high escaped fire potential and/or moderate to high potential for loss of life or property; 11 were considered to have high level of community support for actions to reduce hazardous fuels; 16 were considered neutral or not to have an opinion; and seven were considered to be averse to hazardous fuels projects. The level of community support was unknown for the other communities. Since that survey was completed, wildland fire has occurred in or near six of the priority communities.

The extreme fire season of 2000 brought a surge of interest in attitudes toward wildfires and vegetative treatments that could address fire potential. A national level survey conducted in the summer of 2001 asked questions about attitudes toward vegetative treatment on public forests and rangelands (Schindler and Brunson, 2002). About 40 percent of the respondents supported the use of prescribed fires "whenever managers see fit," while an equal number of respondents indicated prescribed fires should be done "only infrequently, in carefully selected areas." Nearly half of the respondents indicated that mechanical vegetation removal on public lands is a legitimate tool that resource managers should be able to use whenever they see fit, with another quarter of the respondents indicating that it is something that should be done only infrequently in carefully selected areas. Concerns about prescribed fire include loss of wildlife and fish habitat (64 percent of respondents indicated that this was of great to moderate concern), damage to private property (59 percent), deteriorated public water supply (56 percent), increased levels of smoke (53 percent), economic loss of usable timber (44 percent), reduced scenic quality (42 percent), and effects on recreation opportunities (41 percent).

A survey of attitudes toward forest and fire management in the urban-wildland interface was conducted in Ravalli County after the severe fire season of 2000 (University of Montana (UM), Bureau of Business and Economic Research (BBER), 2001). Respondents indicated that the following were important or very important:

- Educating landowners about fire hazards (88 percent of respondents),
- Reducing fuels and fire hazards (84 percent of respondents),
- Thinning trees (83 percent of respondents),
- Using prescribed burning (66 percent of respondents), and
- Doing nothing in the urban-wildland interface (5 percent of respondents)

Protection of human life is the top priority established by the 2001 Review and Update of the Federal Wildland Fire Management Policy. During wildland fire management (suppression) activities, human safety will be considered above other values and response will be designed accordingly.

Environmental Consequences (Social, human health and safety)

Under Alternative A, in an average 10 year period, 158,000 acres would be treated with prescribed burns, 35,000 acres would be mechanically treated, and 3,500 acres of weed would be chemically treated. The existing fire trends concerning fire size, intensity, and severity would continue on untreated areas.

Smoke can have a short-term impact on air quality. Individuals may experience eye, throat, or lung irritation from these exposures. People with asthma, allergies, and other breathing difficulties are likely to be especially sensitive to smoke from both wildland fires and from prescribed fires.

Other potential effects of wildland fires include potential injury, loss of property, and reduced recreation potential (UM BBER, 2001).

Alternative A would be less responsive to the preference for active fire management as reported in the study by UM BBER. There would be more disruption of daily living patterns if wildfires were to occur and health and safety concerns could not be addressed. Visual impacts would not be mitigated under this alternative.

With Alternative A, fuels treatments and protection of communities near the Missouri River Breaks, Ingomar Village, and Masurve may be more costly, less effective, and implemented later because the Big Dry RMP limits the use of timber sale contracts as a tool to reduce hazardous fuels. Fuels treatment and protection of communities of Pine Hills, Moon Creek, Ekalaka Hills, Camp Needmore, Molstad Ranch, and West Pines would likely be more costly, less effective, and implemented later because the anticipated use of prescribed fire to reduce hazardous fuels in the Powder River RMP areas would proceed at 20 acres per year, based on existing analysis.

Under Alternative B, in an average 10-year period, 299,000 acres would be treated with prescribed burns, 158,000 acres would be mechanically treated, and 185,000 acres of weed would be chemically treated. The severity of wildfires should be lower, especially near communities at risk, resulting in lesser effects than under Alternative A. In addition, public lands near communities with high or moderate escaped fire potential/high or moderate potential for loss of life or property would likely be treated within 10 years.

Alternative B is more responsive to the preference voiced for active fire management. There would be disruption of daily living patterns for activities such as prescribed burns, mechanical and chemical treatments, but these activities would be scheduled to take health and safety concerns into consideration and would be conducted in a manner to avoid or minimize impacts to local residents.

Permitted public land users would be consulted when planning treatments. Some uses, e.g., livestock grazing, may have to be altered immediately after prescribed burns. However, affected users would generally be willing to accept temporary restrictions because the alternative could be greater risk of uncontrolled wildfire. The potential visual impacts of fuel treatments would be less than under Alternative A because timing and planning of treatments would be managed and effects would be mitigated. Local communities would benefit when local hires and use of local businesses occur.

With Alternative B, fuels treatments and protection of communities in the Big Dry and Powder River RMP areas would not be subject to the limitations noted for Alternative A. Human health and safety near the communities at risk would receive more protection.

Conclusion

Alternative B is more responsive to the preference voiced for active fire management and human health and safety would receive more protection in the communities at risk in the Big Dry and Powder River RMP areas. The effects would be preferable to those from Alternative A because activities would be mitigated to minimize health and safety concerns, visual impacts, etc. Local communities would benefit because local hires and use of local businesses would be emphasized.

3.22 Economics

A restoration/fuel-reduction program in Montana would reduce fire hazard, improve ecological conditions of forests, and result in economic benefits that exceed hazard reduction costs (Keegan, C.E, C. E. Fiedler, and T.A. Morgan, 2002). Keegan et al. 2001) concluded that the economic benefits of reducing wildland fire hazard and improving ecological condition would be protection of recreation opportunities and property values, reduced firefighting costs, and a sustainable supply of timber which could increase employment opportunities and revenues.

If fuel treatments result in the use of sawlog/veneer log-sized material, production would increase in the forest products industry that has 145 MMBF of unutilized capacity (Keegan et al. 2001a) and often struggles to find timber to fill orders. An indirect result of fuel reduction would be a long-term increase in timber supply. Mills and companies would likely use more of existing capacity and may bring additional capacity online (Adams 2002a). However, there would likely not be immediate or long-term increase in capacity to use pulpwood unless there was a substantial increase in worldwide demand for pulp and paper products (Keetgan et al. 2001).

Harvesting and processing sawtimber would generate about nine full-time jobs per MMBF, and moving pulpwood to a landing and burning it would employ about 12 full-time workers per MMCF (BBER 2001a, BBER 2002a, BBER 2002b).

Conclusion

Mechanical fuels reduction would positively impact BLM's forests and the forest products industry in Montana and South Dakota. The sawlogs generated as a byproduct of hazardous fuel reduction would increase employment, boost labor income, and provide additional government revenue. Alternative B would increase employment and labor income by about three times as much as with Alternative A. Maintaining timber stand conditions (e.g., density, structure, and species composition) for continued fire resistance would also help provide a sustainable timber supply (Keegan et al. 2002).

3.23 Relationship Between Short-term Uses and Long-term Productivity

Fire is a critical natural process that helps maintain healthy ecosystems and guards against natural disasters.

While the total number of acres burned by wildland fire under either alternative may be essentially the same in the short term, eventually the severity of wildland fires will be reduced by a greater amount with Alternative B as hazardous fuels are reduced.

In some instances, trade-offs are made with prescribed burning. Some short-term negative effects on preferred species would occur to have desired results on species that are targets for removal (BLM, 1991, F-5). For example, controlled fires on rangeland can promote seasonal growth of forage and a mosaic of wildlife habitats, although grazing may have to be deterred immediately following the burn. In combination with pre-treatment where necessary, low-intensity fires in forestlands clear understory ladder fuels that could otherwise carry fires into tree tops and cause crown (or canopy) fires. Prescribed fires conducted under specified conditions would improve the health of the natural landscape and reduce the hazardous build-up of vegetation. Prescribed fires and other hazardous fuel reduction projects would help reduce the risk and devastation of catastrophic wildland fire.