4.4.8 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

The action alternatives would result in irretrievable short-term losses to sagebrush steppe wildlife habitat during vegetation treatments as described above. However, these losses are not irreversible and would be restored through implementing a rehabilitation and restoration program as described in Chapter 2.

4.4.9 CUMULATIVE EFFECTS

Settlement of the Snake River Plain and Southeast Idaho resulted in significant fragmentation of the sagebrush ecosystem into two large blocks of habitat and several small isolated populations of Sagebrush Guild species. A large block of sagebrush steppe remained north of the Snake River, generally within the Bennett Hills-Big Desert region and extending to and beyond the St. Anthony Dunes region. These areas have been further fragmented by agricultural development. South of the Snake River, the sagebrush steppe ecosystem was somewhat fragmented due to the influences of the Basin and Range, mountain, and valley topography. Settlement of many of the valley areas further isolated the sagebrush steppe habitats to the mountains and foothills. Some of these areas are connected to sagebrush habitats to the south in Utah and Nevada. Other habitats were completely isolated from other sagebrush areas. There is no continuous sagebrush steppe habitat link crossing the Snake River north to south. This area has been converted to non-native annual and Perennial Grass.

As a result of habitat fragmentation, less mobile populations of wildlife have been isolated from other populations of the same species. Mobile species had access to large habitat areas until the large-scale wildland fires that began to regularly occur in the 1990s. In the planning area, there was a large Sagebrush Guild population in the Big Desert and adjacent areas north of the Snake River, and numerous, mostly fragmented, populations south and east of the river. The Big Desert area provided habitat for all Sagebrush Guild species except for the California bighorn sheep (*Ovis canadensis californiana)*. All of these populations were generally considered to be healthy and viable until the wildland fire proliferation began. As the result of these vast burned areas and the invasion of cheatgrass and noxious weeds, there is now significant concern for many wildlife populations, particularly sage grouse, pygmy rabbit (*Brachylagus idahoensis*), and others as well.

The wildlife populations in the fragmented habitats are all facing great risk to their prolonged viability due to genetic isolation and general inadequacy of habitat quality and quantity. Sedentary and wide-ranging species both face serious risk. Sedentary species are very sensitive to patch size and are at risk due to habitat loss and fragmentation and population isolation. Wide-ranging species, that need large landscape habitats, such as sage grouse and pronghorn (*Antilocapra americana*), may be able to use some remaining habitat fragments if they are not too isolated, but are still very significantly affected by the overall loss of habitat (U.S. Geological Survey [USGS] 2004).

All alternatives would treat existing and potential sagebrush steppe cover types and wildlife habitats. Alternative A, however, would be least effective in improving sagebrush habitat for the Sagebrush Guild. Alternative B would have a more beneficial effect, while Alternatives C, D, and E would have the greatest beneficial effects. Although the footprint-acreage of Alternative C

is large, there is no particular landscape strategy proposed to maximize the benefit of these treatments to the Sagebrush Guild. Only Alternatives D and E contain a landscape strategy that would not treat intact shrub canopy in sage grouse Source Habitats and would provide the greatest benefit to sage grouse and the Sagebrush Guild by providing the necessary vegetation composition, continuity, and structure for this habitat.

Environmental and non-environmental factors (e.g., weather, predation, disease, forage competition, hunter harvest, and loss of suitable habitat on private lands from urban expansion and agricultural development) may limit the productivity and viability of Sagebrush Guild species, including sage grouse, over the long term.

Habitat conditions on adjacent USFS lands (including management of roads and fuels treatments) may also affect the Sagebrush Guild species, which depends on both USFS and adjacent public lands. However, due to relatively low amounts of sagebrush habitat on USFS lands, actions there would have less affect to the Sagebrush Guild populations than the adjacent BLM-administered lands, which generally have much less resilient conditions and more significant acreages of sagebrush habitats.

Implementing management direction that improves vegetation conditions would contribute to improving habitat for the Sagebrush Guild, while maintaining and/or improving populations of Sagebrush Guild species. Emphasis on suppression of wildland fires on public, private, state, and USFS lands in the planning area would continue to be emphasized at present levels until a NEPA evaluation was performed for site-specific projects.

Due to the emphasis of treatments, some species of the Sagebrush Guild may decline or be displaced to adjacent sagebrush areas in the short term while the activity is occurring. FMDA stipulations on sagebrush steppe cover types, buffer zones around riparian areas, sensitive raptor nests, the maintenance of sage grouse Source Habitat, and other sagebrush steppe and fire management actions would assist in mitigating these declines.

4.5 ANALYSIS OF EFFECTS ON WILDLIFE RESOURCES AND T&E AND BLM-SENSITIVE SPECIES

To facilitate the analysis of existing wildlife resources at the planning area-wide level required for this EIS, it was decided to categorize wildlife species into guilds associated with the cover types described in Section 3.2, Vegetation Resources and Fire's Natural Role (Issue 1). This allows the analysis to focus impacts analysis on key wildlife species representative of the typical wildlife species that use each cover type. Impacts to special-status plant species within these cover types are also described in this section. A summary of the impacts to T&E and BLM-Sensitive Species is given in Table 4-38.

4.5.1 INVASIVE ANNUAL GRASS HABITAT

Representative species in the planning area that inhabit or use the Invasive Annual Grass cover type include the long-billed curlew (*Numenius americanus*) and burrowing owl (*Speotyto cunicularia*).

Burrowing owl would likely experience some positive impacts from fuels and vegetation treatments. These treatments would cause the short-term removal of vegetation, which would open areas for foraging. Open areas also benefit large areas with little cover for predators. However, mechanical and RxFire/WFU treatments also have the potential to cause some individual mortality. It should be noted that management restrictions that apply to all alternatives impose time constraints on fire management activities in habitat supporting nesting raptors. These restrictions include limited or no management treatments during nesting season in raptor and breeding and nesting areas. These management restrictions would minimize potential short-term impacts from all alternatives on burrowing owl reproductive success.

Although curlew typically inhabit areas near water sources and riparian habitats, they also use grasslands for nesting. Within the planning area, nesting habitat for curlew is primarily grasslands. Accordingly, it is possible that some nest mortality could occur from mechanical treatment or RxFire/WFU. Additionally, treatments in uplands occupied by curlew could have some impact on upland forage used by curlew. Adverse impacts to long-billed curlew can be minimized by avoiding treatments during the nesting season within favored nesting areas. Habitat would likely be poor the year following treatments, but should be productive curlew habitat in the following years. Because curlew do not require or prefer dense grassland vegetation for nesting, their use of treated habitats should quickly reestablish. However, it is possible that some nest mortality or bird displacement could occur from mechanical treatment, RxFire, or WFU.

Under Alternative A, approximately 22,600 acres of Invasive Annual Grass habitat would be treated. In contrast, Alternative B would treat approximately 127,300 acres, and Alternatives C, D and E would treat 330,500 acres each. Accordingly, Alternative A would provide the least short-term loss of habitat to burrowing owl, and curlew, followed by Alternative B, C, D, and E, respectively. Long-term alternative impacts on these species would be similar throughout the planning area as all alternatives provide similar percentages of the early seral stages that provide the low-ground cover with open areas that these species use. Additionally, all alternatives would result in FRCC 2 in this cover type, resulting in a moderate risk of long-term loss of ecosystem components that support these species. An exception would be in the PFO, where Alternatives C, D, and E provide almost twice as much early seral stage grassland than Alternative A and Alternative B. It should also be noted that effective restoration and rehabilitation would replace a large percentage of existing cheatgrass in Invasive Annual Grass habitat with Perennial Grass and forbs. These plants are typically of much more forage value for the rodents, small birds, and lizards, which are the potential prey of burrowing owl. Accordingly, Alternatives C, D, and E would have the greatest long-term benefit to burrowing owl, followed by Alternative B, and Alternative A, respectively.

4.5.2 PERENNIAL GRASS HABITAT

Representative wildlife species that inhabit the Perennial Grass cover type include Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*), Western meadowlark (*Sturnella neglecta*), short-eared owl (*Asio flammeus*), and Montane vole (*Microtus montanus*).

Vegetation treatments in Perennial Grass habitat occupied by sharp-tailed grouse can result in individual mortality and nest mortality. Removing cover vegetation during RxFire or mechanical

and chemical treatment would also likely increase predation risk on sharp-tailed grouse by decreasing refuge. Long-term benefits for vegetation treatment would include the restoration of cheatgrass-infested areas with forbs, native Perennial Grass species, and placeholder species with greater forage benefit.

Vegetation treatments in Perennial Grass habitat occupied by western meadowlark would have similar impacts to those described for sharp-tailed grouse. Meadowlarks typically are ground-foragers and nesters, and any large-scale disturbances, such as mechanical treatments or RxFire, can result in individual and nest mortality. As with the sharp-tailed grouse, long-term benefits of treatment would result from increased forage quality.

Short-eared owls appear to be negatively affected by the use of herbicides. Accordingly, chemical treatments under any of the alternatives have the potential to increase owl mortality. However, mechanical and RxFire treatments, while contributing to individual mortality, would also open up areas, allowing owls to hunt more effectively than they would in areas with a preponderance of late seral-stage shrub habitat.

Montane voles would be susceptible to mortality from mechanical treatments. Harrowing, disking, and drilling all have the potential to destroy vole burrows and runways, as well as causing individual mortality. RxFire would also contribute to vole mortality. Long-term benefits to voles would be similar to those described for the meadowlarks and grouse; an improvement in forage quality and quantity.

Alternatives C, D, and E would have the highest amount of treatment in Perennial Grass with 528,400 acres each. Alternative A would have the next highest with 155,900 acres of treatment, followed by Alternative B with 134,000 acres. Accordingly, Alternatives C, D, and E would have the greatest short-term risk to wildlife species inhabiting Perennial Grass habitat, followed by Alternative B and A, respectively. Conversely, Alternatives C, D, and E are likely to have the greatest long-term benefit to wildlife occupying this habitat by ensuring that large areas of Perennial Grass are treated as needed to halt the invasion of cheatgrass and by opening up areas previously dominated by decadent shrub stands. Long-term risk of loss of key ecosystem components supporting wildlife in this guild would be similar for all alternatives because all alternatives would result in FRCC 2.

It should be noted that management restrictions that apply to all alternatives impose time constraints on fire management activities in habitat supporting nesting raptors and sharp-tailed grouse. These restrictions include limited or no management treatments during nesting season in raptor and grouse breeding and nesting areas. Restrictions on winter and early spring vegetation treatments would also be implemented in sharp-tailed grouse wintering habitats. These management restrictions would further reduce potential short-term impacts from all alternatives on the population viability of sharp-tailed grouse and short-eared owls.

4.5.3 Low-elevation and Mid-elevation Shrub Habitat

The representative guild species for Low-elevation and Mid-elevation Shrub cover type in the planning area include California bighorn sheep, pronghorn, pygmy rabbit, greater sage grouse, sage sparrow, sagebrush lizard, and short-horned lizard. Please note that the potential impacts to

this guild are discussed at the field office level in Section 4.4, Analysis of the Effects on the Sagebrush Steppe Ecosystem (Issue 2).

Fire management activities can result in short-term disturbance to bighorn sheep, as well as the removal of Perennial Grass cover types, which bighorn sheep rely on for forage. However, these treatments typically would be concentrated in areas where cheatgrass invasion has occurred; therefore, the treatments would likely be removing a cover type with limited forage value for bighorn sheep and replacing it with a higher value forage in the form of native perennials or perennial placeholder species, such as crested wheatgrass. Bighorn sheep generally occur in steep, rocky habitat that has limited potential for treatments other than RxFire and WFU.

As with other big game, pronghorn may be displaced after fire and vegetation treatments while the activity is occuring due to the lack of forage and cover. However, once vegetation in treatment areas begins to regenerate, many wildlife species are often attracted to the area to take advantage of the newly sprouted forage. Similar to other treatment methods, short-term indirect impacts associated with vegetation treatments may include disturbance from increased traffic and noise from mechanical equipment, which may displace pronghorn from the treatment area.

As with other small mammals, short-term impacts from fuels and vegetation treatments include loss of habitat and individual mortality. Clearing would also decrease cover, potentially increasing predation on pygmy rabbit. However, restoration and rehabilitation of these cover types would increase forage quality by eliminating cheatgrass and replacing it with Perennial Grasses, forbs, and placeholder species with higher forage value, such as crested wheatgrass.

A large, high-intensity fire may be extremely detrimental to wildlife species such as mule deer, greater sage grouse, sage sparrow, and the pygmy rabbit, which rely largely on climax sagebrush cover types. Vegetation treatments have been shown to be an effective tool to enhance some greater sage grouse brooding habitat, particularly in areas where sagebrush is nearby and abundant, a *good* population of native forbs is present, and non-native plant species are limited (Miller and Eddleman 2000). However, sage grouse nesting, cover, and wintering habitats should be protected from wildland fire (Robertson 1991; Fischer 1994). Any wildland fire in Wyoming big sage, which is associated with the Low-elevation Shrub cover type, would likely negatively impact greater sage grouse populations across the planning area, especially during periods of drought (Miller and Eddleman 2000). Similar to other treatment methods, indirect impacts associated with vegetation treatments may include disturbance from increased traffic and noise from mechanical equipment, which may displace wildlife from the treatment area.

Both the sagebrush lizard and short-horned lizard would experience short-term habitat loss from vegetation treatments. Individual mortality from vegetation treatments could also occur due to the lizard's limited mobility and tendency to use low shrubs, rocks, and loose soil for refuge when threatened. Clearing associated with vegetation treatments would also decrease shrub cover for lizards, potentially increasing predation. Upon restoration, some cover would be restored.

Alternative C would have the greatest amount of treatment in Low-elevation and Mid-elevation Shrub with 716,800 footprint-acres over a 10-year period. Additionally, Alternative C would have the greatest amount of total RxFire with approximately 500,000 acres in Mid-elevation Shrub and approximately 60,000 acres in Low-elevation Shrub. Accordingly, Alternative C

would have the greatest short-term impact on the Low-elevation And Mid-elevation Shrub Guild. However, impacts to greater sage grouse would be reduced somewhat by management restrictions that limit treatments in habitats supporting sage grouse Key and Source Habitat. Alternatives D and E would have the next greatest amount of treatment with 607,800 acres of treatment over a 10-year period. Alternatives D and E would have much less RxFire in sagebrush habitat than Alternative C, with approximately 150,000 acres of total RxFire treatment in Mid-elevation Shrub and 120,000 acres of total RxFire treatment in Low-elevation Shrub. Additionally, Alternatives D and E would have no WFU treatments; therefore, they would have less risk to Low-elevation And Mid-elevation Shrub Guild species than Alternative C.

Alternative B would have 295,600 footprint-acres of total treatment in a 10-year period. Accordingly, it would have proportionally less short-term impacts to the Sagebrush Guild than Alternatives C, D, and E. Alternative A would have the least short-term impacts to the Sagebrush Guild with 58,100 total footprint-acres of treatment.

Within each alternative it is recognized that Low-elevation Shrub species are affected more under the No Action Alternative. Disturbance within each vegetation type would decrease with each action alternative compared to the No Action alternative. In the long term, Alternatives C, D, and E provide the greatest long-term benefits for the Sagebrush Guild. Although all alternatives provide similar percentages of early seral, mid-seral, and late seral vegetation stages, Alternatives C, D, and E provide from 17 percent to 41 percent of mature sagebrush at field offices across the planning area. In contrast, Alternative B provides 14 to 28 percent mature sagebrush, and Alternative A provides from 12 to 37 percent (see Section 4.4, Analysis of the Effects on the Sagebrush Steppe Ecosystem (Issue 2) for details on seral stage proportions by field office across the planning area.). Additionally, long-term risk to key ecosystem components supporting this guild would be lessened under Alternatives C, D, and E, which would result in a long-term FRCC in Mid-elevation Shrub of 1 and 2, respectively. In contrast, Alternative A would have an FRCC of 3 and Alternative B would have an FRCC of 2 to 3 for this cover type. Low-elevation Shrub FRCC would be 2 for all alternatives. Alternatives D and E would provide a greater benefit to the Sagebrush Guild than Alternative C by focusing vegetation treatments at the most appropriate locations on the landscape for maximum benefit to these species.

4.5.4 Salt Desert Shrub Habitat

The horned lark is the only guild species analyzed for the Salt Desert Shrub cover type. Potential impacts to horned lark would be confined to Alternative A, which would treat 1,000 footprint-acres of Salt Desert Shrub habitat over a 10-year period. Potential short-term impacts include individual and nest mortality as the horned-lark is a ground nester. Other potential impacts include the short-term removal of ground cover providing forage such as insects, spiders, and seeds. Long-term benefits would be a slight increase in early native seral stages for this cover type across the planning area, approximately 13 percent to 23 percent early seral stage native Perennial Grass versus existing conditions of 4 percent to 11 percent early-stage Perennial Grass and 14 percent cheatgrass and noxious weeds. It should be noted that these long-term benefits would be minimal due to the limited amount of acreage (less than 3 percent of the total Salt Desert Shrub habitat) that would be treated. Long-term risk to key ecosystem components supporting this guild would be low with all alternatives resulting in an FRCC of 1.

4.5.5 RIPARIAN HABITAT

Species analyzed as part of the Riparian Guild include white-tailed deer, bald eagle, western yellow-billed cuckoo, northern leopard frog, boreal toad, common garter snake, and Yellowstone cutthroat trout. Alternative A would treat approximately 400 acres of riparian habitat; however, none of the action alternatives have any treatment in riparian habitat. Accordingly, fire management activities would have little to no direct impact on species inhabiting riparian habitat. However, treatment in sagebrush steppe and wooded area areas surrounding riparian habitat would potentially have indirect impacts on these species. These impacts could include the loss of riparian habitat from RxFire or wildland fire that spreads into riparian areas. Sedimentation of streams and the subsequent loss of riparian habitat quality can also occur when upland areas around riparian zones are cleared as a result of RxFire or WFU.

White-tailed deer populations in the planning area are associated with riparian areas but often use sagebrush steppe and wooded areas near these riparian areas. Vegetation treatments in these areas could spread to riparian areas, causing individual mortality, removing cover essential to white tail deer, and decreasing available forage. However, these treatments would also remove shrub and wooded species, opening up areas and stimulating the growth of early seral stage species such as forbs and grasses, which would provide enhanced forage for white tail deer. However, in general, short-term impacts of fire management actions would be minimal for white-tail deer populations.

Bald eagle seasonal habitat occurs throughout the planning area with the majority of nesting, brood-rearing, and winter habitat occupations occur near major rivers. The western yellow-billed cuckoo is presently the only candidate species in the planning area. Candidate species are those for which the USFWS has enough information to warrant proposing them for listing as endangered or threatened, but the listing proposal is precluded by other species or listing actions that have higher priority. The present range and known habitat occupation include the South Fork of the Snake River where the associated cottonwood/Riparian cover type provides nesting and brood-rearing habitat. However, vegetation treatments would be planned and implemented to avoid impacts to these crucial bald eagle and western yellow-billed cuckoo habitats. Accordingly, none of the alternatives would adversely impact either species (Appendix Q, Management Restrictions).

Northern leopard frogs are found in all grasslands, shrublands, woodlands, and forest habitats in the planning area. They are associated with springs, slowly moving streams, marshes, bogs, ponds, canals, and reservoirs. The boreal toad, an Idaho state sensitive species, inhabits areas near springs, streams, meadows, and woodlands between 7,000 feet and 12,000 feet elevation. The common garter snake occurs throughout Idaho in many similar habitats, including grassland and wooded areas in or near water sources. Although care would be taken in treatments in and around riparian areas, these species could still be impacted by treatments in upland areas bordering riparian areas. Vegetation treatments could remove vegetation in upland areas near riparian habitat, increasing the potential for sedimentation to streams and wetland areas supporting habitat for these species. The use of chemical treatments, in particular, has the potential to impact boreal toad and leopard frogs. However, excluding vegetation treatments within the 300-foot buffer zones around riparian areas, combined with prompt rehabilitation and

restoration would minimize short-term adverse impacts to these species from fire management activities (Appendix Q, Management Restrictions).

Yellowstone cutthroat trout are found in various tributaries of the Snake River in the planning area. Fire management activities have the potential of impacting water quality, and consequently, habitat quality in these tributaries. However, management restrictions under all alternatives would require consultation with the USFWS for any vegetation treatments that could impact the water or habitat quality of these tributaries (Appendix Q, Management Restrictions) because they serve as habitat for endangered Snake River molluscs. This consultation would include appropriate mitigation and avoidance to ensure the maintenance of existing habitat. Accordingly, none of the alternatives are likely to have adverse impacts on Yellowstone cutthroat trout.

All alternatives would result in a long-term FRCC of 1 in this cover type. Accordingly, they would all result in low risk to key ecosystem components supporting this Wildlife Guild.

4.5.6 JUNIPER AND MOUNTAIN SHRUB HABITATS

Wildlife species representative of the Juniper and Mountain Shrub cover types include mule deer, mountain lion, ferruginous hawk, juniper titmouse, and gray flycatcher. Mountain Shrub can also be very important winter habitat for Columbian sharp-tailed grouse, a species that should also be considered during site-specific fire-management project design and development.

The use of RxFire and other vegetation management in the Juniper and Mountain Shrub cover types may result in a short-term decrease of both forage and cover habitat for wildlife species (Crouch 1974; Valentine 1980). However, Juniper and Mountain Shrub cover types generally provide more forage for wildlife like mule deer after recovering from a fire. An advantage of conducting RxFire or mechanical control in the Mountain Shrub and Juniper cover types is that land managers have greater control to preserve Juniper and Mountain Shrub as hiding and thermal cover habitats.

Similar to other treatment methods, indirect impacts associated with RxFire may include disturbance from increased traffic and noise from mechanical equipment, which may displace wildlife from the treatment area.

Because of the dependency of mountain lion on both white tail and mule deer populations for food, the previously described impacts to these deer populations would generally have similar impacts on mountain lion populations.

Fire management activities in juniper stands would potentially increase hawk nest mortality. Additionally, ferruginous hawks are highly sensitive to human disturbance; therefore, fire management activities involving heavy equipment or hand operated machinery would likely result in nest abandonment and/or the hawks not using areas where treatments occur for foraging. However, it should be noted that restrictions on fuels and vegetation treatment projects may be imposed in areas supporting nesting raptors. These restrictions would occur from February 1 through August 15 and would be designed to prevent adverse impacts to nesting raptors, including ferruginous hawks. Accordingly, alternative impacts would be confined to short-term losses of potential foraging habitat. Many non-game wildlife species, including small rodents and

wildlife species that use Juniper cover types on a transitory basis, may also be temporarily displaced while the activity is occurring. This, in turn may displace predators like ferruginous hawks that rely on these species for prey.

The juniper titmouse is a year-round resident of the pinyon-juniper and pine woodlands. Fire management activities that remove dead fuel have the potential to adversely impact the juniper titmouse by removing the snags or dying timber used for cavity nesting. Additionally, RxFire would result in nest and individual mortality. Human-created noise associated with fire management activities is unlikely to adversely affect the titmouse, which is highly tolerant of human disturbance.

The gray flycatcher could be adversely impacted by fire management activities that remove juniper from sagebrush stands. Flycatchers use juniper and sagebrush for nesting and these activities could result in nest mortality or loss of nesting habitat. Fire management activities are unlikely to impact flycatcher foraging as flycatchers forage exclusively on insects and fuels management projects. Removing encroaching juniper is unlikely to have a noticeable impact on available insect forage.

Alternative C would have the greatest short-term impact on habitat for the Juniper and Mountain Shrub Guild of wildlife species with 90,400 acres (29,900 Mountain Shrub, 60,500 Juniper) of total footprint treatment-acreage in these cover types over a 10-year period (approximately 13 percent of the total available habitat). The next greatest impact would be Alternatives D and E with 56,000 footprint-acres of treatment (26,800 Mountain Shrub, 29,200 Juniper), which is approximately 8 percent of the total available habitat. Alternative B would have similar impacts to Alternatives D and E with 52,600 footprint-acres of treatment (22,200 acres Mountain Shrub, 30,400 acres Juniper). Alternative A would have negligible short-term adverse impacts to the Juniper/Mountain Shrub Guild with 3,600 footprint-acres of treatment (2,800 acres Mountain Shrub, 800 acres of Juniper), which is less than 1 percent of the total available habitat.

Long-term impacts of fire management activities on the Juniper/Mountain Shrub Guild of wildlife species would be beneficial in many cases with lessened long-term risk of large wildland fires. This, in turn, would decrease long-term, fire-caused mortality. Additionally, fire management would help slow juniper encroachment and would increase early and mid-seral vegetation stages that provide forage for mule deer. In the long term (30 years), Alternatives C, D, and E provide the greatest percentage of early seral vegetation stages in the Juniper cover type over the long term with percentages being 10 percent to 20 percent of the total plant acreage throughout the planning area. This compares with Alternative A and Alternative B, whose percentages range from 3 percent to 10 percent. Similarly, Alternatives C, D, and E provide greater mid-seral vegetation stages with percentages ranging from 16 percent to 34 percent. In comparison, Alternative A and Alternative B range from 5 percent to 18 percent. Long-term cover for mule deer would be reduced somewhat under Alternatives C, D, and E as would nesting habitat for juniper titmouse and grey flycatcher. However the proportion of late seral stages of both Juniper and Mountain Shrub under these alternatives would still range from 35 percent to 94 percent, providing more than adequate cover and nesting habitat to support existing populations for this Wildlife Guild.

Long-term risk to key juniper ecosystem components supporting this guild would be lessened under Alternatives C, D, and E, which would result in a long-term FRCC in juniper of 1 and 2, respectively. In contrast, Alternative A would have an FRCC of 3, and Alternative B would have an FRCC of 2 to 3 for this cover type. Long-term risk to Mountain Shrub ecosystem components would be greatest for Alternative A with an FRCC of 3. Alternatives D and E would have the next greatest long-term risk to Mountain Shrub habitat with FRCC ranging from 2 to 3. Alternatives C and B would have the least long-term risk to Mountain Shrub habitat with FRCCs 1 to 2 and 1 to 3, respectively.

4.5.7 WET/COLD CONIFER, DRY CONIFER, AND ASPEN/CONIFER HABITATS

Wildlife species representative of the Wet/Cold Conifer, Dry Conifer, and Aspen/Conifer cover types include the Rocky Mountain elk, moose, snowshoe hare, northern goshawk, three-toed woodpecker, ruffed grouse, and red-naped sapsucker.

Short-term impacts from RxFire and WFU in the Aspen/Conifer and Dry Conifer vegetation are largely on the intensity and area of the fire. Low-intensity fires in these cover types typically improve wildlife habitat both spatially and temporally by clearing underbrush and encouraging the sprouting of new vegetation. Higher-intensity fires in these cover types typically improve wildlife habitat by creating clearings and movement corridors. Many wildlife species, including elk and moose, have been shown to benefit from the maintenance of small clearings and regeneration of forage vegetation following fires in the Aspen/Conifer and Dry Conifer cover types (Hansen et al. 1973; Kramp et al. 1983). Similar to other treatment methods, indirect impacts associated with RxFire may include disturbance from increased traffic and noise from mechanical equipment, which may cause short-term displacement of wildlife from the treatment area.

Fire management activities can displace both snowshoe hare and ruffed grouse from Conifer and Aspen habitat. However, these activities can also remove decadent timber stands and allow the growth of grasses, forbs, and young shrubs that snowshoe hare use for forage in the spring and summer. These early seral stages also provide herbaceous cover for ruffed-grouse brood-rearing, which directly impacts areas of use and brood survival (Harju 1974; Zwickel 1972). Ruffed grouse can also benefit from the additional forage these early seral stages provide in the form of berries and seeds. However, removing aspen and conifer stands can also deprive both species of winter forage such as tree bark, and spruce, fir, and cedar needles.

Fire management activities can cause a short-term loss of nesting habitat for northern goshawks, as well as create disturbances that would cause goshawks to seek out new habitat. However, as with the other raptors previously mentioned, restrictions on fuels and vegetation treatment projects may be imposed in areas supporting nesting raptors. Accordingly, alternative impacts would be confined to short-term losses of potential foraging habitat. Many non-game wildlife species, including small rodents as well as wildlife species that use conifer or aspen cover type types on at least a transitory basis, may also be temporarily displaced while the activity is occurring. This, in turn may displace predators like northern goshawk that rely on these species for prey.

Fire management activities would have a short-term adverse impact on three-toed woodpecker foraging and nesting habitat as it would remove decadent timber stands and dog-hair spruce thickets that provide potential nesting locations and habitat for wood-boring insects. However, these activities would also decrease the risk of large fires that would cause long-term loss of forested habitat. Short-term impacts to the red-naped sapsucker would be similar to those described for the three-toed woodpecker.

Alternative D would have no short-term adverse impacts on Aspen/Conifer wildlife species as it would have no treatments in these cover types. Alternative A would have the next least short-term adverse impact to wildlife species using the Aspen/Conifer cover types as it would treat a total footprint of 4,800 acres of these habitats (less than 3 percent of the total available habitat) over a 10-year period. Alternatives C and E would both treat a 15,800-acre footprint (9 percent of total available habitat). Alternative B would have the greatest short-term loss of habitat with a total treatment footprint of 30,700 acres (18 percent of total available habitat).

In the fire management activities, Alternatives A, C, D, and E would provide similar long-term impacts to Aspen and Dry Conifer habitat with each providing a relatively high percentage of late seral stages, which may include decadent aspen stands and older conifer stands with high-fuel loading. The percentages of these late seral stages under these alternatives would range from 56 percent to 78 percent of the total habitat. Alternative B would provide the highest percentage and the closest proportions of seral stage in relation to DFC, with late seral stages ranging from 44 percent to 63 percent, early seral stages ranging from 6 percent to 13 percent, and mid-seral stages ranging from 31 percent to 43 percent. Accordingly, Alternative B would have the greatest long-term benefit to Aspen/Conifer wildlife species inhabiting Aspen and Dry Conifer habitat by providing the most balanced proportion of forage and cover for these species.

Conversely, Alternatives C and E provide the greatest positive benefit to wildlife species inhabiting Wet/Cold Conifer cover types. Alternatives C and E provide the closest match to DFC with early seral stages ranging from 22 percent to 30 percent of total habitat, mid-seral stages at 17 percent, and late seral stages ranging from 53 percent to 71 percent. By contrast, Alternatives A, B, and D have early seral stages ranging from 0 percent to 7 percent, mid-seral stages ranging from 8 percent to 9 percent, and late seral stages ranging from 84 percent to 92 percent.

In terms of FRCC, Alternative B would result in moderate risk to key ecosystem components supporting this guild with a long-term FRCC of 2. Alternatives A, C, and E would result in moderate to high risk with FRCC of 2 to 3. Alternative D would result in high risk with an FRCC of 3 in this habitat type.

4.5.8 T&E AND BLM-SENSITIVE WILDLIFE SPECIES

Forty-one T&E and BLM-Sensitive animal taxa are known to occur in the planning area. Section 3.5.2, T&E and BLM-Sensitive Wildlife Species, outlines these T&E and BLM-Sensitive Species that are known to occur throughout the planning area and the cover types they are associated with. A list of these T&E and BLM-Sensitive Species and a life history discussion of the T&E and BLM-Sensitive Species are also included in Appendix K. A summary of potential impacts to these species is provided below in Table 4-38. A detailed description of the potential impacts of the proposed project on T&E Species in the planning area is provided in the Final

Biological Assessment for Fire, Fuels, and Related Vegetation Management Direction Draft Plan Amendment and EIS in Appendix O.

TABLE 4-38. IMPACTS TO T&E AND SENSITIVE SPECIES IN THE PLANNING AREA, BY VEGETATION COVER TYPE

Vegetation Cover Type	Sensitive Species List	Potential Impacts
Low-elevation and Mid-elevation Shrub Cover type	Type 2: Pygmy rabbit, greater sage grouse, St. Anthony Dunes tiger beetle, Idaho point-headed grasshopper. Type 3: Loggerhead shrike, Brewer's sparrow, Sage sparrow, Townsend's big-eared bat, California bighorn sheep, Piute ground squirrel. Type 4: Cliff chipmunk, Uintah chipmunk, Wyoming ground squirrel, Kit fox, Black-throated sparrow.	Impacts to sensitive species that are small mammals, birds, and big-game would be similar to those described above (Section 4.5.3) for similar species in the Low-elevation and Mid-elevation Shrub Guild of Wildlife Species. All treatments would likely result in positive impacts to St. Anthony Dunes tiger beetle by clearing sandy areas of cheatgrass and other invading weeds. Impacts to Idaho point-headed grasshopper would be similar to impacts described for Low-elevation and Mid-elevation Shrub wildlife species that depend on grasses and forbs. Townsend's big-eared bat has the potential for substantial short-term disturbance impacts from all alternatives due to their low tolerance for human disturbance. Long-term impacts to Townsend's big-eared bat would be identical to those described for Low-elevation and Mid-elevation Shrub Guild described above.
Perennial Grass	Type 3: Columbian sharp-tailed grouse.	Same as those described above (Section 4.5.2) for sharp-tailed grouse.
Juniper, Mountain Shrub, and Salt Desert Shrub	Type 3: California bighorn sheep, Prairie falcon, Ferruginous hawk, Piute ground squirrel. Type 4: Cliff chipmunk, Uintah chipmunk, Wyoming ground squirrel, Little pocket mouse, Virginia's warbler.	Impacts would be similar to those described above (Section 4.5.6) for small mammals, big game, and birds in the Juniper/Mountain Shrub and Salt Desert Shrub Guilds.
Riparian Areas	Type 1: Bald eagle[1], Western yellow-billed cuckoo, bull trout, Columbia spotted frog Type 2: Northern leopard frog, boreal toad, greater sage grouse, redband trout, Westslope cutthroat, Bonneville cutthroat, Yellowstone cutthroat, Shoshone sculpin, Wood River sculpin. Type 3: Columbian sharp-tailed grouse, Calliope hummingbird, Willow flycatcher, Common garter snake, Western toad, leatherside chub.	Impacts would be similar to those described above (Section 4.5.5) for the birds, amphibians, fish, and reptiles in the Riparian Guild.

TABLE 4-38. IMPACTS TO T&E AND SENSITIVE SPECIES IN THE PLANNING AREA, BY VEGETATION COVER TYPE

Vegetation Cover Type	Sensitive Species List	Potential Impacts
Dry Conifer, Aspen/Conifer cover types	Type 3: Fisher, Lewis woodpecker, flammulated owl, Northern goshawk, Williamson's sapsucker, Hammond's flycatcher, Olive-sided flycatcher.	Impacts would be similar to those described above (Section 4.5.7) for birds in the Aspen/Conifer and Dry Conifer Guild.
Wet/Cold Conifer cover types	Type 1: Gray wolf, Grizzly bear, Canada lynx. Type 3: Fisher, Northern goshawk, Williamson's sapsucker, Hammond's flycatcher, Olive-sided flycatcher.	Impacts would be similar to those described above (Section 4.5.7) for big game and birds in the Wet/Cold Conifer Guild. Management restrictions, which apply to all alternatives, require that all fuels management and vegetation treatments comply with the Draft Conservation Strategy for the Grizzly Bear in the Yellowstone Area, the 1997 Targhee National Forest Revised Forest Plan, and the Yellowstone Conservation Strategy. Additionally, presence or absence of Gray wolf would be determined before fuels and vegetation management projects are initiated on the planning area. Accordingly, impacts to gray wolf and grizzly bear populations would be minimal. Potential impacts to Canada lynx habitat would be identical to those described above for snowshoe hare because of the lynx's reliance on this prey.
Invasive Annual Grass cover type	None.	N/A.

[1] The Bald eagle was delisted as a Threatened species on June 28, 2007.

T-1. Federally Threatened, Endangered, Proposed and Candidate Species

Idaho Sensitive Species

T-2. Rangewide / Globally Imperiled Species

T-3. Regional / State Imperiled Species

T-4. Peripheral Species

T-5. Watch Species (not considered as sensitive species)

As stated in management common to all, the BLM is required to consult with the USFWS on potential impacts to listed and candidate plant and animal species. Sensitive species is a BLM classification equivalent to Idaho Department of Fish and Game's (IDFG's) species of special concern. An agreement between the BLM and IDFG makes these two lists identical. BLM sensitive species are designated by the State Director under 16 U.S. Code [USC] 1536 (a)(2). BLM policy includes a commitment to conserve federally-listed T&E and BLM-Sensitive species and the habitats on which they depend, and a commitment to manage other T&E and BLM-Sensitive species so that BLM actions do not contribute to a need to list these species. The Master MOU between the IDFG and BLM states that the BLM and IDFG agree to manage and/or conserve habitats and populations of the sensitive species listed in the MOU, to minimize the need for listing these animals as T&E and BLM-Sensitive Species. Accordingly, none of the fire management activities proposed under any of the alternatives would have a significant

adverse impact on T&E and BLM-Sensitive species in the planning area. As stated previously, a detailed description of the potential impacts of the proposed project on T&E and BLM-Sensitive species in the planning area is provided in the Final Biological Assessment for Fire, Fuels, and Related Vegetation Management Direction Draft Plan Amendment and EIS in Appendix O.

4.5.9 MITIGATION AND MONITORING

The management restrictions listed in Appendix Q, Management Restrictions are incorporated into management practices common to all alternatives. These practices would be implemented to avoid significant adverse impacts to wildlife resources. However, there would be short-term unmitigatable but reversible impacts to these resources. These impacts are noted below in Section 4.5.11.

4.5.10 UNAVOIDABLE ADVERSE IMPACTS

From 250,200 to 1,686,600 footprint acres of wildlife habitat would be temporarily unavailable to wildlife for the next 10-years, depending on which alternative is chosen. This would result in an unavoidable loss of this habitat. However, the unavoidable adverse impact from this habitat loss would not have a significant long-term impact on wildlife or T&E and BLM-Sensitive populations in the planning area if established wildlife management restrictions and recommendations are followed in the project-specific development of vegetation treatments. Short-term adverse impacts to ESA candidate, proposed, or listed species or to proposed or designated critical habitat will be avoided or minimized to the greatest extent possible.

4.5.11 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Irretrievable impacts to wildlife and T&E and BLM-Sensitive species habitat would include the short-term loss of habitat as described above. However, this short-term habitat loss would not be irreversible, as it would be restored through implementation of vegetation treatment.

4.5.12 CUMULATIVE EFFECTS

Wildlife associated with the planning area regularly transverse lands managed by other federal and state agencies as well as private lands. To ensure the continued viability of the wildlife populations associated with the planning area, efforts must be made between these groups to coordinate land use directions. There are several planning efforts for these lands currently underway which may, in conjunction with this planning effort, affect the wildlife associated with the planning area. The cumulative effects to wildlife are considered relative to the long-term effects of Alternatives A through E in relation to other similar plans developed or being developed by these other federal and state agencies. These plans include the Interior Columbia Basin Ecosystem Management Project, the Sawtooth and Caribou-Targhee National Forests management plans, and the Idaho Statewide Implementation Strategy for the National Fire Plan. The principal goal of these plans is to reduce the severity of wildland fires in the planning area. The means proposed to meet this goal is broadly similar to many actions proposed under the various alternatives in this EIS, and include RxFire, WFU, ESR, and restoration activities.

Impacts of wildland fire to wildlife populations and their habitats in the planning area predominantly relate to the severity and frequency of the fire. High intensity, large fires burning frequently through the sagebrush steppe, in general, result in more negative impacts to wildlife populations and their habitats. Thus, reducing the intensity, area, and frequency of wildland fires in the sagebrush steppe would, over the long run, reduce impacts to wildlife resources in the planning area. There would be short-term impacts relating to RxFire, WFU, ESR and restoration, or other fire management practices.

All vegetation treatments would occur in accordance with established management plans and guidelines for wildlife species associated with the habitats being treated. Cumulative impacts may vary, however, depending on each alternative; thus cumulative impacts must be examined relative to the alternatives in terms of their contribution to other plans for reducing the intensity and duration of fires.

In general, the cumulative effects on wildlife resources for each alternative action of the various fire management plans being developed would be related to the amount of acreage moving from FRCC 3 to FRCC 1. Because the general goals of the other fire management plans and regional strategies are to, in essence, reduce the amount of acreage in FRCC 3 and increase the amount in FRCC 1, these plans should have a positive long-term effect on wildlife resources by reducing wildland fire severities and frequencies. Consequently, the alternatives proposed in this EIS should also be considered in terms of their overall contribution to reducing the intensity and area of wildland fires. Alternatives that achieve a reduction in the area and frequency of fires would, in combination with the actions undertaken in other regional plans, have a greater positive effect than those that do not reduce, or reduce in lower amounts, the area and frequency of wildland fires.

Of the five alternatives described in this EIS, Alternative A results in the least long-term improvement in habitat quality because it moves the least amount of acreage to improved FRCC. Thus, Alternative A would have the least positive cumulative impact on the other plans and management strategies in the foreseeable future. Alternative B would result in the next most improved FRCC, and therefore, habitat quality relative to Alternative A. Relative to Alternative A, Alternative B would have a greater positive cumulative impact. Alternatives C, D, and E all result in substantially better FRCC and associated wildlife habitat conditions than Alternative A and Alternative B. Thus, these alternatives would have an additional positive cumulative impact on wildlife populations and their habitat when considered with the other fire management plans in the planning area. These impacts would be greater than either Alternative A or Alternative B. It should be noted that the project would have a much greater contribution to the positive cumulative impacts of fire management on wildlife habitat in the planning area and surrounding area than the previously described fire management activities that are or would be implemented by other agencies.

4.6 ANALYSIS OF EFFECTS ON AIR QUALITY

4.6.1 ANALYSIS ASSUMPTIONS AND METHODS

Impacts to air quality associated with fire, fuels, and related vegetation management over a 10-year period have been assessed for each BLM field office in the planning area. Fine particulates

with an aerodynamic diameter of 10μm or less (PM_{10}) and fine particulates with an aerodynamic diameter of 2.5 μm or less ($PM_{2.5}$) emissions associated with RxFire or WFU were estimated by multiplying the number of acres of each cover type to be treated under each alternative by emission factors specific to each of those types. The amount and type of vegetation to be treated within a Generalized Project Areas (GPA) differs by alternative; thus, associated emission levels would also vary. Regional geographic features and meteorological patterns at an airshed scale, as described in the airshed characterization report (Trinity 2003), were incorporated into the analysis to assess how these emissions would disperse across the planning area. This information, combined with known treatment area locations, predicted whether sensitive receptors would be affected, and whether National Ambient Air Quality Standards (NAAQS) would be met under each alternative scenario. Sensitive receptors included impact zones, PM_{10} non-attainment areas, Class I visibility areas, hospitals, airports, and transportation corridors. Decreases in PM_{10} and $PM_{2.5}$ emission levels over the long term (30 years into the future) were estimated for each alternative based on the assumption that treatment would result in a decrease in wildland fire acreage proportional to the percentage of treatment relative to total existing vegetation. The severity of these potential impacts under each alternative scenario is based on estimates of particulate matter emissions and their occurrences relative to sensitive receptors.

4.6.1.1 Locations of Sensitive Receptors

Impact assessments must consider where communities and other sensitive facilities lie with respect to emission sources and regional airflow. Smoke impacts to human health and safety are intensified near hospitals/medical centers. Visibility may be impaired near Class I areas, airports, and transportation corridors. Sensitive receptors included impact zones, PM_{10} non-attainment areas, Class I visibility areas, hospitals, airports, and transportation corridors.

4.6.1.2 Generalized Project Areas (GPA)

Treatment-acres were assigned to GPAs by alternative for planning purposes. Identifying treatment-acreage within these spatial boundaries allows for a more site-specific impact analysis that takes into account meteorological patterns and proximity of sensitive receptors.

4.6.1.3 Dispersion Characteristics

Regional wind patterns greatly influence air quality. Generally, wind across the planning area prevails from the southwest to the northeast. Winds are strongest in the summer, with April and July recording the highest wind speeds. With changes in seasons and localized conditions, wind direction can vary. Wind patterns and local mixing heights primarily determine whether air particulates disperse throughout the airshed or settle and concentrate in a valley.

4.6.1.4 Geography

Local topographic features influence smoke dispersion characteristics. For example, canyon gradients often produce diurnal wind fluctuations corresponding to warm and cold air exchange. Low-lying floodplains act as sinks for cold air, where it settles and may become stagnant. At a larger, landscape-scale, mountain ranges surrounding a valley may hinder air movement and contribute to the formation of inversions. Mountain barriers may also restrict airflow to a single direction out of a valley.

4.6.1.5 Mixing Heights

Smoke may concentrate at low elevations in the cooler hours of the day, before temperatures increase and heated air rises. Lower elevations and cooling temperatures (especially at night) result in lower mixing heights (below 1,640 feet), which can produce stagnate air conditions. Timing burns to avoid low mixing heights or inversions is crucial near population centers.

4.6.1.6 Additional Sources of Particulate Matter (PM_{10} and $PM_{2.5}$)

Smoke produced by fire and fuels management activities would combine with existing emissions from other sources. Some areas within the planning area already experience high emissions concentrations from fugitive dust, wood and waste burning, and agricultural/forestry activities (EPA 2003). Also, particulates produced from wildland fires in areas not burned under a prescribed management scenario would still occur in the absence of the proposed project. It is assumed that, by maintaining cover types in FRCC 1, less smoke would be produced.

4.6.2 EFFECTS COMMON TO ALL ALTERNATIVES

4.6.2.1 Treatments

RxFire and WFU: Management-ignited fires and WFU under prescribed conditions decrease fuel loads at specific times over pre-determined areas, thus reducing both instantaneous and long-term air quality impacts. Values would not necessarily be less than what would occur when these areas eventually burn naturally (e.g., wildland fire events without control), but under conditions, prescribed conditions smoke is produced in smaller amounts over a longer time period, thereby lessening fire intensity and instantaneous smoke production, and increasing the effectiveness of smoke dispersal. Controlling the time and duration of a burn also considers existing particulate levels. If PM_{10} and $PM_{2.5}$ concentrations are already high, burns would be postponed.

Chemical: Aerial applications of herbicides in the vicinity of sensitive receptors would pose a public health and safety risk. Chemical activities are subject to strict guidelines designed to reduce these impacts by considering the timing and location of applications.

Mechanical: Fugitive dust would be produced by ground-disturbing vegetation treatments such as mowing, chaining, and seed drilling. Mechanical treatments provide an alternative method to reduce fuel loads in areas where fire risk is too great to employ RxFire or WFU. Impacts from dust would be less than what would occur if these areas burned naturally.

Seeding: Aerial applications of seed would not impact air quality. However, some ground disturbance occurs with seeding activities, such as seed drilling and chaining, which help bury the seed. PM_{10} levels could increase due to entrained dust.

4.6.2.2 Sensitive Receptors by Airshed

Impacts to sensitive receptors could occur throughout the planning area depending on their locations relative to sources of smoke. Sensitive receptors are listed here by airshed, with reference to the field office in closest proximity.

Airsheds 17, 18, and 19 (USFO and *a small portion of PFO):* Teton Valley Hospital and Surgicenter, Northwestern Band of Shoshone Health Center, Pocatello Regional Medical Center, Portneuf Medical Center, Bingham Memorial Hospital, State Hospital South, Eastern Idaho Regional Medical Center, Lost Rivers planning area Hospital, Madison Memorial Hospital, Harms Memorial Hospital, and Craters of the Moon National Monument and Preserve.

Transportation facilities: Pocatello Regional Airport, Aberdeen Municipal Airport, McCarley Field, Fanning Field, Arco-Butte County Airport, Stanford Field, Rigby-Jefferson County Airport, Rexburg-Madison County Airport, American Falls Airport, Pocatello Regional Airport, and Dubois and Driggs Municipal airports. Transportation corridors include: I-15, I-86, I-84, U.S. 30, U.S. 39, U.S. 26, U.S. 20, U.S. 91, and U.S. 93.

Airshed 25 (BFO and SFO): Cassia Regional Medical Center, Gooding County Memorial Hospital, Hagerman, Jerome, Rupert, Magic Valley Regional Medical Center, Twin Falls Clinic and Hospital, Twin Falls, and Sun Valley.

Sensitive transportation-related facilities include: Carey Airfield, Burley Municipal Airport, Oakley Municipal Airport, Gooding Municipal Airport, Hazelton Municipal, Jerome County Airport, Buhl Municipal, Joslin Field, I-84, I-86, U.S. 30, U.S. 93, U.S. 20, U.S. 25, U.S. 26, and U.S. 74.

Airshed 20 (PFO): Bear Lake Regional Hospital, Caribou Memorial Hospital and Living Center, Franklin County Medical Center, and Oneida County Hospital. These health facilities are concentrated in the southeast corner of the field office.

Transportation-related facilities: Hyde Memorial Airport, Bear Lake County Airport, Allen H. Tigert Airport, Bancroft Municipal Airport, Preston Airport, Malad Airport, I-15, I-91, I-84, I-80, U.S. 40, U.S. 30, U.S. 89, U.S. 34, and U.S. 91.

Airshed 24 (SFO): Wood River Medical Center, Bellevue, and Sun Valley (hospitals). Transportation-related receptors include: U.S. 20, U.S. 75, Friedman Memorial Airport, and Camas County Airport.

4.6.2.3 Fire Regime Condition Class (FRCC)

Particulate estimates reported by alternative are those associated with the prescribed restoration of areas in FRCC 2 and 3 to FRCC 1. Cover types were assigned to a FRCC based on departure from the historical fire regime and existing vegetation composition and structure. Smoke production, measured as PM_{10} and $PM_{2.5}$ concentrations, varies among FRCC depending on the degree of departure from fire frequency and severity. It is assumed that areas classified as FRCC 2 or 3 would eventually burn naturally, but that these areas, characterized by high fine and/or woody fuel loads and vegetation that is greatly altered from historical composition and structure, would burn more intensely and/or severely. Under this scenario, smoke is produced in large volumes and does not disperse efficiently.

Smoke production is one of five key ecosystem attributes in the descriptions of each FRCC, and it is assumed that returning areas to FRCC 1 would decrease the chance of large smoke impacts

in the future. The relation between each FRCC and smoke production is described further in Section 3.6, Air Quality.

4.6.3 ALTERNATIVE A

4.6.3.1 Direct and Indirect Impacts

Table 4-39 shows estimated 10-year emissions associated with the fire, fuels, and related vegetation management objectives of Alternative A. Values reflect emissions that occur under existing management practices. They do not include additional emissions from naturally occurring wildland fire events. WFU is not currently a management tool in the planning area. Therefore, smoke production under Alternative A is attributed to RxFire practices. The majority of these RxFires occur within the Low-elevation Shrub, Invasive Annual Grass, and Mid-elevation Shrub cover types, with some also in the Perennial Grass and Dry Conifer.

TABLE 4-39. PARTICULATE MATTER (TONS) RESULTING FROM RXFIRE OVER 10 YEARS – ALTERNATIVE A

Field Office	PM_{10}	$PM_{2.5}$
Upper Snake	545	453
Pocatello	797	678
Burley/Shoshone	121	102
TOTAL	**1,463**	**1,233**

4.6.3.2 Contribution by Field Office

The majority of burn treatments would occur in the PFO and USFO under this alternative, resulting in more particulate emissions here than in the other areas of the planning area. Estimates of total PM_{10} and $PM_{2.5}$ emissions from non-project related sources over a 10-year period for this area range from 14,420 tons to 256,100 tons and 3,030 tons to 45,680 tons, respectively (based on annual average from 1995-1999 [Trinity 2003]).

Small amounts of PM_{10} and $PM_{2.5}$ emissions from RxFire would also generate from the BFO. Estimates of total PM_{10} and $PM_{2.5}$ emissions from non-project related sources over a 10-year period for this area range from 36,670 tons to 255,640 tons and 6,620 tons to 52,980 tons, respectively (based on an annual average from 1995-1999 [Trinity 2003]).

Overall, these contributions from RxFire to other particulate sources under Alternative A would not substantially change existing air quality in this area.

4.6.3.3 Affected Airsheds

Under Alternative A, smoke-producing activities would affect portions of Airsheds 17, 18, 19, 20, and 25 (see Figure 3-8). These airsheds connect over the low-lying Snake River Plain. Seasonal fluctuations in general wind patterns coincide with the orientation of this river valley, which traverses the USFO and BFO, and lies on the northwest border of the PFO. Airshed 18 lies

high in the northeast corner of the planning area, bounded by the Centennial Mountains and Yellowstone National Park whereas, Airshed 19 consists primarily of the low-elevation Snake River Plain. The small portion of airshed 17 included in this discussion is the mountainous region of the Lemhi and Lost River ranges.

Smoke produced in Airshed 25, which is bounded by hills to the north and southeast, would disperse toward Airsheds 19 and 18 in the summer and spring, as winds blow to the northeast. This pattern may reverse in the fall, and may blow smoke from activities in Airsheds 18 and 19. However, winds change direction in the fall and blow from to the southwest and are typically not as strong. Depending on the season and associated wind patterns, particulates from activities in the higher-elevational areas may blow into and settle in the Snake River Plain during the fall, potentially increasing effects to air quality such as impacts from particulate matter and haze.

Of the RxFire activities under Alternative A, the majority would occur in GPAs located in Airsheds 18, 19, and 20 (i.e., Sands, Medicine Lodge, Island Park, Blackfoot, Stump Creek, Bancroft GPAs). Potential adverse air quality impacts could occur to the sensitive receptors in the Idaho Falls area of Airshed 19. Prevailing winds from the northeast in the fall could blow smoke south toward the impact zone surrounding Idaho Falls, and the community of Rexburg. Effects could include inversions, increased haze, and decreased air quality. Particulates are relatively low under Alternative A; therefore, impacts would be less than with other alternatives.

Airshed 19 contains 15 PM_{10} ambient air quality monitors. The NAAQS 24-hour average limit (150 µg/m3) has been exceeded three times in Pocatello, which lies on the boundary of Airsheds 19 and 20 (Trinity 2003). Airshed 20 has three PM_{10} ambient air quality monitors (Inkom and Soda Springs). NAAQS 24-hour average limits have not been exceeded in Airshed 20.

Additional particulate emissions could increase the potential to exceed NAAQS standards. Sources to consider originate from agriculture/forestry activities, which currently contribute 11 percent of the PM_{10} and 10 percent of the $PM_{2.5}$ emissions in Bannock County where Pocatello is located. Analysis of adjacent Power County emission sources attributes 41 percent of PM_{10} and 22 percent of $PM_{2.5}$ to agriculture/forestry activities. Particulate levels from these other sources would be considered prior to planning treatment activities in the Pocatello or adjacent GPAs.

The planning area contains one federally designated PM_{10} non-attainment area, which is the Fort Hall Reservation, located in Airshed 20. Portneuf Valley had previously been considered non-attainment but recently reached attainment status. Two other federally designated PM_{10} non-attainment areas, Boise, Idaho and Ogden, Utah, are within the 100-km buffer zone surrounding the planning area. These areas would not likely experience adverse air quality impacts, as particulate emissions from Alternative A are relatively low and are not planned in the immediate proximity or are generally upwind from potential treatment areas.

Also within the 100-km buffer zone is the Class I visibility areas of Yellowstone and Grand Teton National Parks and the Bridger Wilderness. Smoke carried to the northeast by strong winds during the spring and summer, in particular smoke from activities in Airshed 18, could travel to nearby Yellowstone National Park. However, as emissions associated with Alternative A are relatively low, smoke would likely disperse and would not result in adverse air quality impacts to this or other FRCC 1 and sensitive areas within the 100-km buffer zone.

Burning in close proximity to sensitive receptors and impact zones would increase the potential for adverse impacts to air quality. However, emission totals from Alternative A are relatively low. The smoke sensitive impact zones of Twin Falls, Sun Valley, Idaho Falls, and Portneuf are not likely to be affected under Alternative A. Burning activities close to these population centers could affect air quality if wind carries smoke directly into cities or if particulates are trapped in the Snake River Valley by inversions. However, because of the relatively low amounts of emissions produced under Alternative A, impacts would be minimal and could be further alleviated by carefully planning timing and season of burn activities scheduled to occur in close proximity to these sensitive areas.

Overall, adverse air quality impacts associated with Alternative A would be minimal. Some negative impacts could occur if burning activities are located within close proximity of sensitive receptors (e.g., Idaho Falls, Rexburg, Craters of the Moon National Monument and Preserve); however, effects could be avoided with careful planning. Emissions are projected to be low and would likely disperse prior to reaching these areas of concern. No impacts would be expected to Class I visibility areas and areas within the 100-km buffer zone.

While fewer direct air quality impacts would occur under Alternative A due to the limited amount of planned vegetation management activities, adverse indirect air quality impacts over the long term would occur. The absence of management aimed at returning vegetation to FRCC 1 would increase the risk of large and/or large fires in areas now designated FRCC 3 or 2. Fires of this scale are unpredictable, often producing large quantities of smoke over large areas of land at times when ambient air quality is already poor. High, instantaneous volumes of smoke may settle and concentrate, or be blown into sensitive areas, producing adverse impacts to human health and safety.

Limited fire-related fuels management would continue under this alternative, producing the least amount of particulate emissions as compared to the other alternatives. However, Alternative A would result in a higher level of emissions from unplanned wildland fires. Based on existing wildland fire data for the last 32 years, it is estimated that approximately 767,474 acres of unplanned wildland fire would occur in the planning area over the next 10 years. Assuming this wildland fire would burn cover types in proportion to their abundance, this would produce approximately 153,495 tons of PM_{10} and 130,471 tons of $PM_{2.5}$ under Alternative A over the next 10 years.

Under Alternative A, FRCC of the primary cover types of the planning area proposed for treatment are predicted to be as follows:

- Low-elevation Shrub, Perennial and Invasive Annual Grass, and Aspen/Dry Conifer would be FRCC 2-3.
- Mid-elevation Shrub and Juniper, and Mountain Shrub would remain FRCC 3.

It is predicted that this remaining area would be highly susceptible to large wildland fire.

4.6.4 ALTERNATIVE B

4.6.4.1 Direct and Indirect Impacts

Table 4-40 shows estimated emissions over a 10-year period associated with the fire, fuels, and related vegetation management activities of Alternative B. Values include emissions from RxFire and WFU management activities only. Treatments are focused on the Invasive Annual Grass, Low-elevation Shrub, Mid-elevation Shrub, Perennial Grass, Dry Conifer, Aspen/Conifer, and Mountain Shrub cover types.

TABLE 4-40. PARTICULATE MATTER (TONS) RESULTING FROM WILDLAND FIRE USE (WFU) AND RXFIRE OVER 10 YEARS – ALTERNATIVE B

Field Office	PM_{10}	$PM_{2.5}$
Upper Snake	8,004	6,767
Pocatello	7,642	6,485
Shoshone	3,379	2,785
Burley	1,210	1,017
TOTAL	**20,235**	**17,054**

4.6.4.2 Contribution by Field Office

The majority of particulate emissions under this alternative would originate from fire activities within the USFO and PFO, which compose the eastern side of the planning area. With Alternative B, total PM_{10} and $PM_{2.5}$ emissions would increase 14 times over Alternative A (existing fire management scenario). However, it is assumed that these increases would be offset by decreases in PM_{10} and $PM_{2.5}$ emissions that would result from the associated reduction in wildland fire. Over the 10-year period, wildland fire could potentially occur on the remaining acreage in the planning area that is not proposed for treatment, causing additional impacts to air quality (see further discussion below).

Existing PM_{10} and $PM_{2.5}$ emissions from all other sources in the USFO range from 14,420 tons to 256,100 tons and 3,030 tons to 45,680 tons, respectively, over a 10-year period. In the PFO, PM_{10} and $PM_{2.5}$ emissions over 10 years range from 45,230 tons to 256,100 tons and 8,730 tons to 45,680 tons, respectively (based on the annual average from 1995-1999 [Trinity 2003]).

To a lesser degree, PM_{10} and $PM_{2.5}$ emissions would also increase in the SFO and BFO. Although less in absolute numbers, emissions from fuels management activities proposed in these field offices would substantially increase compared to Alternative A.

Existing 10-year totals of PM_{10} and $PM_{2.5}$ emissions from other sources in the BFO and the southern half of the SFO range from 36,670 tons to 255,640 tons and 6,620 tons to 52,980 tons, respectively. Estimates of total PM_{10} and $PM_{2.5}$ over a 10-year period range from 32,919 tons to 89,280 tons and 6,000 tons to 40,410 tons, respectively for the northern half of the SFO (based on the annual average from 1995-1999 [Trinity 2003]).

4.6.4.3 Affected Airsheds

Alternative B would affect all airsheds within the planning area. Particulate sources would be concentrated in Airsheds 18, 19, 20, and some of 17. Activities would also occur in Airsheds 24 and 25, which would also contribute to total emissions of this alternative.

During periods of stagnant air, particulates that settle in the low-lying Snake River Plain would concentrate and adversely impact air quality. Stream valleys and other topographic features of Airshed 20 drain toward the Snake River, creating elevational gradients that funnel winds northward into the Snake River Plain. These topographic features combined with characteristic northeast-trending winds across the planning area in the spring and summer would carry smoke from activities in Airshed 20 toward Airsheds 17, 18, and 19, and across the stateline into Wyoming. These seasonal winds could also blow smoke produced in Airshed 25 toward Airshed 19.

Mountains and hills on the northern and southern sides of Airshed 24 limit the horizontal smoke dispersion potential. Mixing heights must exceed these terrain features for successful dispersion; otherwise, inversions may occur in this airshed, which includes the Ketchum impact zone. Treatments are proposed in nearby generalized project areas of Fish Creek, Little Wood, and Sun Valley, which could directly impact the Ketchum impact zone.

Smoke that settles in the centrally located Snake River Plain may affect impact zones and other sensitive receptors in cover types along the I-15 corridor. Idaho Falls and Portneuf, two impact zones centrally located between Airsheds 19 and 20, and the town of Rexburg could be impacted by the increases in smoke associated with Alternative B. The Portneuf Valley (Airshed 20) and Fort Hall Indian Reservation (Airshed 19) are non-attainment (PM_{10}) areas in this vicinity as well.

Smoke originating from the Sands and Teton Basin GPAs could impact sensitive receptors in Idaho Falls in the fall, as winds blow from the northeast. Smoke from fire treatments within Airshed 18 (Island Park, Medicine Lodge GPAs) could also blow toward Idaho Falls and Rexburg in the fall.

Fires in the Pocatello GPA would affect sensitive receptors in the Portneuf urban impact zone. Pocatello could also experience indirect effects from smoke originating from Sands and Teton Basin GPAs in the fall. Smoke originating from the Deep Creek/Pleasantview, Curlew, and Lava/Downey GPAs could adversely impact air quality in Pocatello in the spring and summer. These areas would likely experience increases in particulates.

Although treatments are not concentrated in GPAs adjacent to Twin Falls (impact zone in Airshed 25), adverse air quality impacts could still occur in the form of increased haze. However, these impacts would be confined to the fall months of the year when relatively low-strength prevailing winds flow from the northeast. The Craters of the Moon National Monument and Preserve could also experience adverse air quality impacts in the fall from fires originating in the Big Lost and Little Lost generalized project areas. In general, adverse impacts would include reduced visibility from haze and decreases in air quality.

Few treatments would occur under Alternative B that could potentially affect visibility in the Class I area of Craters of the Moon National Monument and Preserve during the spring and summer. Haze accumulations could occur due to burning activities in Airsheds 18 and 19 in the fall. These particulates could also travel further into the Ketchum urban impact zone.

Airshed 19 contains 15 PM_{10} ambient air quality monitors. The NAAQS 24-hour average limit (150 µg/m3) has been exceeded three times in Pocatello (Trinity 2003). Additional particulate emissions in this area would contribute to the exceedences of NAAQS. Additional contributing sources originate from agriculture/forestry activities, which currently contribute 11 percent of the PM_{10} and 10 percent of the $PM_{2.5}$ emissions in Bannock County where Pocatello is located. Adjacent Power County attributes 41 percent of PM_{10} and 22 percent of $PM_{2.5}$ to agriculture/forestry activities. Particulate levels from these other sources would be considered prior to planning treatment activities near the Pocatello or adjacent GPAs.

Data from three ambient air quality monitors located within Airshed 20 show 24-hour PM_{10} average levels are below the NAAQS limit of 150 µg/m3. However, Pocatello is adjacent to this airshed and has exceeded the 24-hr PM_{10} average in the past. Additional smoke in this area would contribute to adverse air quality impacts. There are no federally designated PM_{10} non-attainment areas in Airshed 24 or 25. Data from one ambient air quality monitor, located in Ketchum (airshed 24), shows 24-hr PM_{10} average levels are below the NAAQS limit of 150 µg/m3. No exceedence has occurred between 1997 and 2002.

Within the 100-km buffer zone, federally mandated Class I visibility areas include Yellowstone and Grand Teton National Parks, and the Bridger and Sawtooth Wilderness areas. Impacts to these areas could occur in the spring and summer due to the prevailing wind patterns, evidenced primarily as haze accumulations. Other sensitive areas within the 100-km buffer zone include Boise, Idaho and population centers along the Wasatch Front in Utah. Smoke produced in Airsheds 24 and 25 would likely disperse, and therefore not adversely affect air quality in Boise, Idaho. However, the large volumes of smoke produced in Airshed 20 would potentially carry to the south and may accumulate as haze in areas such as Cache, Box Elder, and Davis counties, Utah. Adverse air quality impacts to these sensitive areas could result.

Overall, the additional particulates associated with Alternative B are not likely to adversely change existing air quality. The larger amounts of particulates produced in Airsheds 17,18,19, and 20 have a greater potential to adversely impact air quality during burning periods than do volumes produced in Airsheds 24 and 25. Site-specific impacts could occur across the planning area if burning is allowed in close proximity to sensitive receptors/impact zones. Large volumes of smoke could travel to low-lying areas or be trapped in terrain-restricted valleys, such as in Airshed 24, resulting in haze and decreases in air quality.

Reducing fuel loads and restoring areas to historical fire regimes would improve air quality in the future. Eventually returning vegetation to FRCC 1 would reduce the chance of large and/or large wildland fires; thus, air quality impacts from large, instantaneous volumes of smoke would be avoided. Based on predicted percentages of treatment, changes in FRCC under Alternative B would reduce potential wildland fire to 330,473 acres. Assuming cover types are burned in proportion to their areal coverage, this would produce an estimated 66,095 tons of PM_{10} and 56,180 tons of $PM_{2.5}$, approximately 43 percent less than Alternative A.

Under Alternative B, FRCC of the primary cover types of the planning area would be as follows:

- Low-elevation Shrub, Perennial and Invasive Annual Grass, Mid-elevation Shrub and Juniper, and Aspen/Dry Conifer would be FRCC 2-3.
- Mountain Shrub would become FRCC 1-2.

It is predicted that the areas not moved to FRCC 1 or 2 would be highly susceptible to large wildland fire.

4.6.5 ALTERNATIVE C

4.6.5.1 Direct and Indirect Impacts

Table 4-41 shows estimated emissions associated with the fire, fuels, and related vegetation management objectives of Alternative C. The Mid-elevation Shrub, Perennial Grass, and Mountain Shrub cover types would receive the greatest amount of RxFire and WFU under this alternative. Low-elevation Shrub, Invasive Annual Grass, and Juniper would also receive substantial treatment by RxFire and WFU.

TABLE 4-41. PARTICULATE MATTER (TONS) RESULTING FROM WILDLAND FIRE USE (WFU) AND RXFIRE OVER 10 YEARS – ALTERNATIVE C

Field Office	PM_{10}	$PM_{2.5}$
Upper Snake	3,284	2,694
Pocatello	9,122	7,686
Shoshone	5,025	4,082
Burley	8,741	7,335
TOTAL	**26,172**	**21,797**

Alternative C represents the most aggressive management to return areas to FRCC 1, and as such, would produce the highest particulate emissions of all fire management alternatives. Total PM_{10} and $PM_{2.5}$ emissions resulting from fire management activities would increase by 18 times over Alternative A. It is important to note that values are emissions from RxFire and WFU activities under prescribed conditions and do not reflect the difference between these values and what would occur solely by wildland fire events. It is assumed that smoke production of at least similar magnitude would occur if these areas were left to burn naturally, but timing, location, and size of fire events would be unpredictable, and impacts to air quality from existing unmanaged fires would likely be greater than those resulting from managed events (see further discussion below).

4.6.5.2 Contribution by Field Office

The highest particulate increases would occur from activities in the PFO and BFO. Impacts to air quality from fire-related management activities would be expected. Particulate emissions in the USFO and SFO would be similar to those described for Alternative B. However, the potential for

adverse impacts across the planning area overall would be greater due to the higher amounts of particulates originating from the BFO and PFO.

4.6.5.3 Affected Airsheds

All airsheds of the planning area would be affected under this alternative. Air quality in the vicinity of sensitive receptors would likely experience instantaneous adverse impacts. Prevailing winds from the southwest in the spring and summer would likely result in short-term air quality impacts to Airsheds 24, the northern half of 25, 17, 18, and 19. Sensitive receptors in the Portneuf urban impact zone would likely experience short-term spikes in pollution during burn spring/summer events that originate in Pocatello, Curlew, Deep Creek/Pleasantview, Lava/Downey, Conner, Cotterel, Samaria, and Goose Creek GPAs. Pocatello would be affected by activities planned for the fall in Blackfoot River and Bancroft GPAs.

Idaho Falls would be affected by spring/summer treatments originating in the Blackfoot River, Pocatello, and Bancroft GPAs. Sensitive receptors along the I-15 corridor would also be affected. Periods of haze and reduced air quality would result. As winds shift in the fall, Idaho Falls impact zone and sensitive receptors would be affected by burn activities originating in the Sands GPA.

The Ketchum urban impact zone would experience adverse air quality impacts and impaired visibility from burn treatments originating in the Sun Valley GPA.

The Craters of the Moon National Monument and Preserve would potentially experience increased haze from fires originating in the Big Lost GPA in the fall.

A concentrated area of treatments occurs south of Burley and Twin Falls (impact zone) in Cotterel, Conner, City of Rocks, Middle Mountain, Goose Creek, South Hills, and Shoshone Basin/ Backwaters GPAs. Sensitive receptors in local communities would experience adverse air quality impacts in the spring and summer, as prevailing winds blow smoke to the northeast. Particulates may settle in the Snake River Valley. Smoke originating from this localized concentration of treatments could also affect areas within the 100-km buffer zone to the south.

Sensitive areas within the 100-km buffer would be affected by the high amounts of smoke generated under this alternative. Visibility could be impacted in population centers of Cache Valley and along the Wasatch front in Utah.

Direct and indirect impacts to air quality from smoke would be greatly reduced in the long term. Based on percentage of treatment, changes in FRCC would reduce the area remaining susceptible to wildland fire to 160,026 acres. This would result in estimated wildland fire emissions of PM_{10} totaling 32,005 tons and $PM_{2.5}$ totaling 27,204 tons, approximately 21 percent less than Alternative A.

Under Alternative C, FRCC of the primary cover types of the planning area would be as follows:

- Low-elevation Shrub, Perennial, and Invasive Annual Grass would be FRCC 2, Mid-elevation Shrub and Juniper, and Mountain Shrub would be FRCC 1.
- Aspen/Dry Conifer would become FRCC 1–2.

It is predicted that the areas not moved to FRCC 1 or 2 would be more susceptible to large wildland fire. The risk of large wildland fire would be substantially reduced in the future under this alternative.

Reducing fuel loads and restoring areas to historical fire regimes would decrease future air quality impacts. Eventually returning vegetation to FRCC 1 would reduce the chance of large and/or large fires; thus, air quality impacts from large volumes of smoke would be avoided.

4.6.6 ALTERNATIVE D

4.6.6.1 Direct and Indirect Impacts

Table 4-42 shows estimated emissions associated with the fire, fuels, and related vegetation management objectives of Alternative D. Low-elevation and Mid-elevation Shrub cover types would receive the greatest amount of RxFire treatments, with treatments also occurring in the Juniper and Mountain Shrub cover types.

TABLE 4-42. PARTICULATE MATTER (TONS) RESULTING FROM WILDLAND FIRE USE (WFU) AND RXFIRE OVER 10 YEARS – ALTERNATIVE D

Field Office	PM_{10}	$PM_{2.5}$
Upper Snake	2,540	2,082
Pocatello	1,625	1,373
Shoshone	1,905	1,517
Burley	2,982	2,496
TOTAL	**9,052**	**7,468**

Relative to Alternative A, total PM_{10} and $PM_{2.5}$ would increase six times. It is important to note that values are emissions from RxFire activities under prescribed conditions and do not reflect the difference between these values and emissions that would occur with wildland fire events. It is assumed that smoke production of at least similar magnitude would occur in the absence of the proposed management activities, as susceptible areas would eventually burn naturally. However, timing and size of wildland fire events would be unpredictable, resulting in potentially greater impacts.

4.6.6.2 Affected Airsheds

Isolated areas in all airsheds in the planning area would experience instantaneous increases in particulates under Alternative D, but levels would be less than what would occur under the other action alternatives. In general, summer high winds would disperse smoke northward, reducing the potential of localized, adverse air quality impacts. As winds shift and slow in the fall, particulates could settle in low-lying areas such as the Snake River Plain.

Direct impacts to sensitive receptors could occur in Pocatello during spring/ summer burning in the Deep Creek/Pleasantview GPA.

Particulates would increase in the Idaho Falls impact zone from fires originating in Teton Basin, Sands, and Island Park GPAs during the fall.

Fires originating in Walcott and Wildhorse West GPAs could increase haze in the Snake River Plain in the spring and summer as winds blow smoke to the northeast. Air quality and visibility in Pocatello and along the interstate corridor could be affected.

Collectively, smoke from North Bliss, North Rim, and North Shoshone GPAs could affect air quality in and around Shoshone if burns occur in the spring and summer.

Fires proposed in Big Lost and Little Lost GPAs could affect visibility in the Craters of the Moon National Monument and Preserve Class I Area if burns occur in the fall.

Direct and indirect impacts to air quality from smoke would be greatly reduced in the long term. Based on predicted treatment-acreage, changes in FRCC would reduce wildland fire to 171,446 acres. This would reduce wildland fire emissions of PM_{10} to 34,289 tons and $PM_{2.5}$ to 29,146 tons, approximately 22 percent less than Alternative A.

Under Alternative D, FRCC of the primary cover types of the planning area would be as follows:

- Low-elevation Shrub, Perennial and Invasive Annual Grass, and Mid-elevation Shrub and Juniper would be FRCC 2.
- Mountain Shrub would be FRCC 1 to 3.
- Aspen/Dry Conifer would remain FRCC 3.

It is predicted that the areas not moved to FRCC 1 or 2 would be more susceptible to large wildland fire.

Reducing fuel loads and restoring areas to historical fire regimes would decrease air quality impacts in the long term. Eventually returning vegetation to FRCC 1 would reduce the chance of large fire events; thus, air quality impacts from large volumes of smoke would be avoided.

4.6.7 ALTERNATIVE E

4.6.7.1 Direct and Indirect Impacts

Table 4-43 shows estimated emissions associated with the fire, fuels, and related vegetation management objectives of Alternative E. Low-elevation and Mid-elevation Shrub cover types would receive the greatest amount of RxFire treatments, with treatments also occurring in the Juniper and Mountain Shrub cover types.

TABLE 4-43. PARTICULATE MATTER (TONS) RESULTING FROM WILDLAND FIRE USE (WFU) AND RXFIRE OVER 10 YEARS – ALTERNATIVE E		
Field Office	**PM_{10}**	**$PM_{2.5}$**
Upper Snake	3,315	2,739
Pocatello	3,326	2,817
Shoshone	2,818	2,292
Burley	3,014	2,523
TOTAL	**12,473**	**10,371**

4.6.7.2 Contribution by Field Office

Contributions of PM_{10} and $PM_{2.5}$ emissions would be relatively even amongst the USFO, SFO, and BFO. The PFO has less acreage in sagebrush steppe, resulting in less area to be treated and, therefore, less particulates emitted.

4.6.7.3 Affected Airsheds

Isolated areas in all airsheds in the planning area would experience instantaneous increases in particulates under Alternative E. Levels would be slightly higher than Alternative D due to treatments in Aspen, Dry Conifer, and Wet/Cold Conifer. However, levels would be less than what would occur under the Alternative C. In general, summer high winds would disperse smoke northward, reducing the potential of localized, adverse air quality impacts. As winds shift and slow in the fall, particulates could settle in low-lying areas such as the Snake River Plain. Impacts to airsheds within the Snake River Plain would be virtually identical to those described for Alternative D. Tables 4-44 and 4-45 summarize PM_{10} and $PM_{2.5}$ emissions, respectively, by alternative.

TABLE 4-44. PM_{10} EMISSIONS BY SOURCE FOR EACH ALTERNATIVE OVER 10 YEARS				
Alternative	**WFU**	**RxFire**	**Wildland fire[1]**	**Total**
Alternative A	0	1,463	153,495	154,958
Alternative B	4,579	15,656	66,095	86,330
Alternative C	3,818	22,354	32,005	58,177
Alternative D	2,213	6,839	34,289	43,341
Alternative E	2,959	9,481	34,289	46,729

[1] Wildland fire acreage was predicted based on the percentage of treatment over a 10-year period in relation to total vegetation acreage. Emission factors per acre of vegetation was averaged from the emission factors for all cover types across the planning area.

TABLE 4-45. $PM_{2.5}$ EMISSIONS BY SOURCE FOR EACH ALTERNATIVE OVER 10 YEARS

Alternative	WFU	RxFire	Wildland fire[1]	Total
Alternative A	0	1,233	130,471	131,704
Alternative B	3,858	13,166	56,180	73,204
Alternative C	3,190	18,607	27,204	49,001
Alternative D	1,873	5,595	29,146	36,614
Alternative E	2,506	7,837	29,146	39,489

[1] Wildland fire acreage was predicted based on the percentage of treatment over a 10-year period in relation to total vegetation acreage. Emission factors per acre of vegetation was averaged from the emission factors for all cover types across the planning area.

4.6.8 MITIGATION AND MONITORING

Management restrictions and air quality restrictions common to all alternatives would be incorporated into management practices (see Appendix Q, Management Restrictions). These guidelines would be implemented to avoid adverse impacts to air quality. All fire activities on BLM-administered land would be done in coordination with the Montana/Idaho Airshed Joint Smoke Management Program. RxFire and WFU would be restricted when regional or local air quality is compromised, or if the project would negatively affect visual quality at Craters of the Moon National Monument and Preserve or any of the Class I areas within the 100-km buffer zone surrounding the planning area.

Ambient air quality monitoring using existing measuring instruments would continue. Particulate emissions in areas known to have exceeded NAAQS in the past, such as Pocatello and Fort Hall Indian Reservation, would be checked prior to commencement of burns. If existing ambient air quality standards would be exceeded due to vegetation treatments, the burning activity would be postponed.

In addition, careful planning of RxFire management activities would greatly reduce the severity of air quality impacts. Planning burn times to coincide with favorable seasonal wind patterns, mixing heights, and time of day would alleviate the potential for adverse air quality impacts. Also, burning in close proximity to any known sensitive receptors/impact zones would be avoided to reduce the potential for direct impacts to these areas. Planning the size of burns in order to reduce smoke volumes would reduce the potential for smoke concentrations to reach sensitive receptors both inside and outside of the planning area, and reduce impacts to visibility from haze.

4.6.9 UNAVOIDABLE ADVERSE IMPACTS

Increasing particulate concentrations in the airsheds within the planning area would unavoidably decrease air quality. Unavoidable impacts would primarily occur as haze accumulations and a general decrease in air quality. However, implementing management practices that would produce smoke at less and more controlled levels, and do so at times when existing air conditions are favorable, would result in fewer air quality impacts than those that would occur under the existing landscape pattern of FRCCs. Whether through wildland fire or prescribed burn events,

air pollution results from fire. However, if areas eventually return to a natural fire regime, future fires would produce less instantaneous and total particulate emissions. The overall future benefit to ecosystem health would offset the potential effects of fire management activities.

4.6.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Localized irretrievable impacts to air quality would occur on a short-term basis due to implementing RxFire and WFU treatments. However, these impacts would not be significant due to the management restrictions described in Appendix Q, Management Restrictions. Additionally, they would be offset by the long-term benefits to air quality from reduced wildland fire risk. There would be no irreversible impacts to air quality.

4.6.11 CUMULATIVE EFFECTS

The spatial scale for cumulative impacts includes the planning area and immediately adjacent areas. For this analysis, past, present, and reasonably foreseeable future actions include fire management activities only. Other actions primarily consist of the following fire and land management plans.

DOE-ID has prepared a management plan for the SSER and recently (April 2003) DOE-ID completed the Final Idaho National Engineering and Environmental Laboratory Wildland Fire Management Environmental Assessment. Decisions arising from these planning efforts would be consistent with actions proposed in this EIS.

The Sawtooth National Forest Plan revision includes the designation of acres of land that would be treated with fire to reach forest management objectives. Smoke produced from these projects, when coupled with actions proposed in this planning document would result in additional impacts to air quality and particulate material content. Coordination of BLM prescribed fire activities with the Montana/Idaho Airshed Group Smoke Management Program to meet air quality standards would limit the extent and magnitude of any potential cumulative impact of these actions in combination.

Reasonably foreseeable fire management projects on the Targhee National Forest include approximately 2,000 acres per year of fuels reduction, as per the 1997 Forest Plan. These reductions would occur through both fire and mechanical treatments (Betz 2003). The scale of the fire activities compared to that of the action alternatives is relatively small. These projects combined are not likely to contribute much to air quality impacts.

The Caribou National Forest just completed its Forest Plan in February 2003. However, the amount of RxFire proposed is relatively small. Compared with any of the action alternatives, fire management activities planned for the Caribou National Forest would not contribute substantially to cumulative impacts.

IDL, in conjunction with the BLM and other federal agencies, signed the Idaho Statewide Implementation Strategy for the National Fire Plan. The strong focus on fire prevention, fuels reduction, restoration, and collaboration among interested parties would help avoid adverse cumulative impacts to air quality when combined with any of the action alternatives.

For air quality, the main issue for cumulative impacts concerns whether these other fire management actions would occur simultaneously with those of the action alternatives and result in exponential amounts of smoke. The other activities involve much smaller scales than the action alternatives. Also, many of the plans under consideration would incorporate decisions from this EIS; therefore, the effects would not be in addition to what is proposed in this plan. Thus, it is unlikely that significant adverse cumulative impacts to air quality (excedence of National Ambient Air Quality Standards) would occur when considering other past, present, and reasonably foreseeable future actions in conjunction with any of the action alternatives. And, as fire size, frequency, and severity is moved toward a naturally occurring regime, both instantaneous and long-term air quality would improve.

4.7 ANALYSIS OF EFFECTS ON SOILS

4.7.1 ANALYSIS ASSUMPTIONS AND METHODS

Impacts to soils associated with fire, fuels, and related vegetation management over a 10-year period have been assessed for the planning area using footprint-acres of various treatments. Impacts to soils include the potential for wind and water erosion. The erosion potential was assessed using STATSGO-level soils data. Soils were classified as water erodible if they occurred on greater than 10 percent slopes or had a K-factor of greater than or equal to 0.32. Additionally, soils were determined to be wind-erodible if the wind erodibility group value was five or less (BLM 2001a).

Due to the wide variety of soil types that occur over the landscape area, it was not possible to determine potential soil loss (in tons/acre/year) planning area-wide. However, it was possible to determine the footprint-acreage for each cover type by alternative. Additionally, acres of water erodible and wind erodible soil for each cover type were determined and expressed as percentage. The relative acreage of highly susceptible soils impacted by treatments was used to assess potential project impacts. The potential impacts are summarized below in Table 4-46.

Some critical assumptions and considerations were made for the soil impacts analysis. Most importantly, the wind and water erosion data presented herein were taken from the STATSGO database. These data are general and were used for this EIS to identify potential wind and water erodible soils. The actual acreage of disturbance to erodible soils could be less.

The acres reported reflect acres of BLM-administered land only. State and private lands and federal lands other than BLM-administered lands (USFS, INL, and Craters of the Moon National Monument and Preserve) were not included.

It was also assumed that the footprint-acreage would adequately represent the surface area disturbed by various treatments. Additionally, areas susceptible to water erosion may also be susceptible to wind erosion; therefore, the calculated acres of erodible soils may overlap.

TABLE 4-46. SUMMARY OF TREATMENT IMPACTS TO WIND- AND WATER-ERODIBLE SOILS UNDER EACH ALTERNATIVE (IN FOOTPRINT-ACRES)[1]

Vegetation Cover Type	Total BLM Acres	Acres of Wind Erodible Soils (%[2])	Acres of Water Erodible Soils (%[2])	Alternative A			Alternative B			Alternative C			Alternative D			Alternative E		
				Footprint Treatment Total (ac)	Wind	Water	Footprint Treatment Total (ac)	Wind	Water	Footprint Treatment Total (ac)	Wind	Water	Footprint Treatment Total (ac)	Wind	Water	Footprint Treatment Total (ac)	Wind	Water
Low-elevation Shrub, Perennial Grass, and Invasive Annual Grass	3,297,832	2,085,898 (63%)	436,444 (13%)	211,705	133,905	28,018	462,600	292,597	61,222	1,006,050	636,333	133,143	1,235,720	781,600	163,539	1,235,720	781,600	163,539
Mid-elevation Shrub, Juniper	939,748	448,546 (48%)	232,714 (25%)	25,725	12,279	6,370	124,790	59,563	30,902	630,292	300,841	156,082	259,770	123,989	64,328	259,770	123,989	64,328
Mountain Shrub	339,815	167,958 (49%)	83,916 (25%)	2,825	1,396	698	22,230	10,987	5,490	29,875	14,766	7,378	26,780	13,236	6,613	26,780	13,236	6,613
Dry Conifer and Aspen/Conifer	145,058	66,326 (46%)	47,134 (32%)	4,600	2,103	1,495	30,650	14,014	9,959	13,772	6,297	4,475	0	0	0	13,772	6,297	4,475
Salt Desert Shrub	37,792	11,168 (30%)	652 (2%)	975	288	17	0	0	0	0	0	0	0	0	0	0	0	0
Vegetated Rock/Lava	582,057	545,085 (94%)	10,734 (2%)	3,820	3,577	70	5,780	5,413	107	4,000	3,746	74	0	0	0	0	0	0
Wet/Cold Conifer	24,965	11,135 (45%)	4,693 (19%)	220	98	41	0	0	0	1,980	883	372	0	0	0	1,980	883	372
Riparian	30,903	19,728 (64%)	3,139 (10%)	370	236	38	0	0	0	559	357	57	0	0	0	0	0	0
TOTALS	**5,398,170[3]**	**3,337,844 (62%)**	**819,425 (15%)**	**250,240**	**154,731**	**37,986**	**646,050**	**399,471**	**98,068**	**1,686,528**	**1,042,829**	**256,010**	**1,522,270**	**941,263**	**231,076**	**1,538,022**	**951,003**	**233,467**

[1] The erodible soil calculations for each footprint in each alternative assume that erodible soils are uniformly distributed throughout each cover type. Water and wind erodible acreage for each alternative were calculated using the percentage of water or wind erodible soils in each cover type.

[2] Percentage of water or wind erodible acres per cover type.

[3] This number includes approximately 400,000 acres in the Craters of the Moon National Monument that have been transferred to the National Park Service.

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4.7.2 EFFECTS COMMON TO ALL ALTERNATIVES

Soil erosion by wind and water is the primary impact that would occur under all treatments, but the magnitude of impacts between treatments varies greatly (see the following subsections describing treatment effects). Erosion removes topsoil, resulting in lower site productivity. Many low-elevation sites are especially susceptible to wind erosion after wildland fire. Wildland fires consume vegetative cover and result in exposed soils with high surface temperatures. This can negatively affect seed germination and seedling establishment.

RxFire, WFU, and chemical treatments would be followed by seeding (aerial seeding, rangeland drill, transplants, etc). This follow-up treatment would reduce soil erosion by establishing vegetative cover. Under all treatments, biological soil crust disturbance would be inevitable.

Indirectly, wind erosion across denuded sites can negatively affect air quality, as well as reduce visibility, both of which are affected by airborne particulates. Also, soil erosion affects watersheds by contributing to sedimentation, which can negatively affect fish habitat, alter stream channels, and fill downstream reservoirs.

4.7.2.1 Direct and Indirect Impacts of Prescribed Burn (RxFire)

Impacts of RxFire would include loss of vegetative cover and subsequent soil erosion by wind and water. The benefit of RxFire is a controlled ignition, so that erosion-sensitive areas could be avoided. Burned woody debris would provide some protective cover in shrub and timber cover types, but partially burned Invasive Annual Grasses would be highly susceptible to soil erosion. Indirect impacts from RxFire could include sedimentation of streams and reservoirs from wind and water erosion.

4.7.2.2 Direct and Indirect Impacts of Wildland Fire Use (WFU)

Impacts caused by WFU are similar to those described for RxFire, assuming similar locations, times, and management goals. However, the location of the fire cannot be controlled, and erosion-sensitive areas could be burned, resulting in greater post-fire soil erosion than RxFire. As with RxFire, indirect impacts from WFU could include sedimentation of streams and reservoirs from wind and water erosion.

4.7.2.3 Direct and Indirect Impacts of Chemical Treatment

Impacts caused by chemical applications maintain part or all the plant cover, at least until revegetation efforts. Chemical treatments have little effect on soil erosion when compared to the ground disturbing effects of mechanical treatments. Indirect impacts could include movement of chemicals attached to runoff or blown soil particles and sedimentation of streams and reservoirs. The most-commonly used herbicide for chemical treatment is glyphosate, which has the active ingredient glyphosate. Glyphosate is a non-specific herbicide that is strongly adsorbed to the upper layers of soil and has a low propensity for leaching. Glyphosate residues dissipate with a half-life of 45 days to 60 days (Spectum 2005). Although glyphosate residues may be found in soil the year after a treatment, the levels are extremely low.

Additional effects to water quality that could occur from herbicide treatments include increased nutrient loads to surface water and groundwater. Soluble nutrients can enter surface water or groundwater. Nutrients adsorbed to particles may be moved to water bodies by wind and water erosion. Nutrient enrichment of aquatic systems can lead to algal blooms and eutrophication (mineral and organic nutrient loading and subsequent proliferation of plant life), resulting in decreased dissolved oxygen contents. The extent and duration of effects would be dependent on the geographic location, and on the extent of vegetation removal, as well as on revegetation management practices. The removal of large amounts of vegetation along streams could lead to higher water temperatures, to the detriment of fish and other aquatic organisms (BLM 2007).

4.7.2.4 Direct and Indirect Impacts of Mechanical Treatment

Various mechanical manipulations would disturb the soil surface and leave it open without a protective cover of intact, rooted plants. Erosion would likely be less than RxFire or WFU due to plant debris remaining after this treatment. Residual plant debris would cover the soil, protecting it from wind and water erosion. Indirect impacts from mechanical treatments could include sedimentation of streams and reservoirs from wind and water erosion, but would be less than RxFire and WFU due to the residual plant debris.

4.7.2.5 Direct and Indirect Impacts of Seeding Treatment

Seeding and other revegetation treatments would be used after other treatments are implemented (RxFire, WFU, chemical, and mechanical). Seeding by a rangeland drill would disturb the soil surface and lead to minor wind borne erosion. However, the revegetation resulting from seeding would eventually reduce erosion. Aerial seeding would have virtually no impact on soils. Indirect impacts from seeding could include sedimentation of streams and reservoirs from wind and water erosion, but would be less than RxFire and WFU due to the residual plant debris because seeding practices do not disturb surface soils as greatly as RxFire or WFU.

4.7.3 ALTERNATIVE A

Alternative A has the smallest total footprint (250,240 acres) and would have the least impact to soil resources. This alternative would disturb the least amount of wind and water erodible soils (i.e., 154,731 and 37,986 acres, respectively) (see Table 4-46). However, with treatments progressing at their relatively slow rate, large areas of land would accumulate abnormally high fuel loadings and have larger and more frequent fires. However, because treatments under Alternative A are intended to re-establish vegetation, it would be expected that soil erosion would decrease after successful vegetation treatments. Because Alternative A has the smallest total footprint, indirect sedimentation impacts to streams and reservoirs would be less than all other alternatives.

4.7.4 ALTERNATIVE B

Under Alternative B, increased area of vegetation treatments could increase erosion temporarily on sites that are being treated. Initial erosion impacts under Alternative B would be roughly twice as much as Alternative A. Alternative B footprint area would total 646,050 acres, and would disturb 399,471 acres of wind erodible soils and 98,068 acres of water erodible soils (see

Table 4-46). Short-term impacts to soil erosion in Alternative B are far outweighed by increased levels of revegetation across the planning area. Because treatments under Alternative B are intended to re-establish vegetation, it would be expected that soil erosion would decrease after successful vegetation treatments. In the short term, sedimentation would occur at roughly twice the rate as Alternative A. However, successful ESR and restoration would minimize the amount of sedimentation under this alternative.

4.7.5 ALTERNATIVE C

Under Alternative C, increased vegetation treatments would increase erosion temporarily on sites that are being treated through RxFire, mechanical, or chemical means. Footprint-acres would total 1,686,528 acres, and initial wind and water erosion impacts would be approximately 2.5 times greater than Alternative B at 1,042,829 and 256,010 acres, respectively (see Table 4-46). Because treatments under Alternative C are intended to re-establish vegetation, it would be expected that soil erosion would decrease after successful vegetation treatments. Sedimentation would occur at roughly 2.5 times the rate as Alternative B. However, successful ESR and restoration would minimize the amount of sedimentation under this alternative.

4.7.6 ALTERNATIVE D

Under Alternative D, increased vegetation treatments would increase erosion temporarily on sites that are being treated either through RxFire, mechanical, or chemical means. Approximately 1,522,270 footprint-acres would be treated under Alternative D and would impact 941,263 acres of wind erodible soils and 231,076 acres of water erodible soils (see Table 4-46). Alternative D differs from Alternative C in that Dry Conifer, Aspen/Conifer, Salt Desert Shrub, Vegetated Rock/Lava, Wet/Cold Conifer, and Riparian cover types would not receive treatment. Because treatments under Alternative D are intended to re-establish vegetation, it would be expected that soil erosion would decrease after successful vegetation treatments. Sedimentation would occur at roughly 2.5 times the rate as Alternative B, and sedimentation rates under Alternative D would be similar to Alternative C. However, successful ESR and restoration would reduce the amount of sedimentation under this alternative.

4.7.7 ALTERNATIVE E

Under Alternative E, increased vegetation treatments would increase erosion temporarily on sites that are being treated either through RxFire, mechanical, or chemical means. Approximately 1,538,022 footprint-acres would be treated under Alternative E and would impact 951,003 acres of wind erodible soils and 233,467 acres of water erodible soils (see Table 4-46). Alternative E is different from Alternative D in that it also treats Dry Conifer, Aspen/Conifer, and Wet/Cold Conifer cover types. Because treatments under Alternative E are intended to re-establish vegetation, it would be expected that soil erosion would decrease after successful vegetation treatments. Sedimentation would occur at roughly 2.5 times the rate as Alternative B, and would be similar to Alternatives C and D. However, successful ESR and restoration would reduce the amount of sedimentation under this alternative.

4.7.8 MITIGATION AND MONITORING

With the implementation of management restrictions discussed in Appendix Q, Management Restrictions, mitigation would not be necessary. Monitoring and adaptive management would occur as directed by individual field offices and fire plans. This monitoring and adaptive management would be determined through project-level planning and associated NEPA processes.

4.7.9 UNAVOIDABLE ADVERSE IMPACTS

Biological soil crusts would likely be unavoidably impacted under the action alternatives since active measures, including RxFire, WFU, and other vegetation treatments, would be needed to restore cover types to FRCC 1. Revegetating treated sites and restored ecosystem function would ensure the eventual re-establishment of biological soil crusts. However it could take a minimum of 50 years to establish a protective biological soil crust, depending on the presence of crust-forming organisms available to inoculate a treated site. Additionally, wildland fire and associated suppression efforts would damage or destroy biological soil crusts.

4.7.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Irretrievable impacts to biological soil crusts would occur as described above. These impacts would not be irreversible, however, as these biological crusts could re-establish with effective rehabilitation/restoration.

4.7.11 CUMULATIVE EFFECTS

Cumulative impacts to soils are considered relative to the long-term effects of the action alternatives in conjunction with other fire management activities in the planning area. These similar plans include the INL management plan, the Sawtooth, Caribou, and Targhee National Forests management plans, and the Idaho Statewide Implementation Strategy for the National Fire Plan.

Overall, most of the goals of these plans are to reduce the severity and duration of fires in the planning area. Of these plans, the INL management plans, the National Forest management plans, and the Idaho Statewide Implementation Strategy for the National Fire Plan would result in disturbance in addition to the acreages disclosed in Table 4-46. Treatment methods and acres for INL have not yet been determined (these plans were being written at the time this EIS was released), and these lands are entirely encompassed by the planning area boundary. The Sawtooth National Forest has revised its Forest Plan and would result in approximately 60,000 acres to 300,000 acres of the forest being treated over the long term. The Caribou and Targhee National Forests intend to treat 9,000 acres per year over the long-term. The Idaho Statewide Implementation Strategy for the National Fire Plan would focus on WUI lands. Relative to most of the planning area's project alternatives, these additional fire treatment impacts are minimal over the long-term.

As discussed above, reducing the severity and duration of fires would, over the long run, reduce soil erosion over the planning area. Erosion impacts relating to increased RxFire, WFU, ESR and

restoration, or other fire management practices would occur. However, as mentioned above, seeding and subsequent revegetation following treatments would mitigate many of these impacts. Cumulative impacts may vary, however, depending on which project alternative is implemented; thus, cumulative impacts must be examined relative to the action alternatives in terms of their contribution to other plans for reducing the severity and duration of fires.

In general, the cumulative effects on soil resources for each alternative are related to the amount of acreage moving from FRCC 3 or 2 to FRCC 1. Movement of cover types to FRCC 1 would ultimately result in reduction of fuels and fire frequency, leading to decreased soil erosion.

The project alternatives presented herein would have a much greater effect on soil resources than other reasonably foreseeable future actions would because the planning area encompasses a much larger area (5.0 million acres). Over a 30-year period, Alternative A would change the FRCC the least number of acres (250,240 acres) of the five alternatives. Thus, Alternative A would have the least positive contribution to the cumulative impacts of the other plans and management strategies in the foreseeable future. The Alternative B would result in an increased number of acres (646,050 acres) with an improved FRCC relative to Alternative A. However, under Alternatives C, D, or E at least 28 percent of the BLM-administered land area would be treated (1,687,000 acres, 1,522,000 acres, and 1,538,000 acres, respectively) over a 30-year period. Thus, in the long-term, the action alternatives would offset the cumulative non-projected related impacts to soil erosion by improving FRCC and consequently vegetative health.

4.8 ANALYSIS OF EFFECTS ON WATER RESOURCES

4.8.1 ANALYSIS ASSUMPTIONS AND METHODS

Water resources respond to changes in fire, fuels, and vegetation management because factors that influence hydrological functions depend on several factors. These include a fire's impact on vegetation, how a fire modifies the landscape, and the timing of subsequent precipitation events. Intense wildland fires create conditions that can reduce soil-water infiltration, promote surface runoff, and change water quality. The steepness of a hillside influences the risk of any site to overland flow and surface erosion and is also related to the rate at which the site is revegetated after a fire. Soil disturbance directly influences surface water resources.

Because proposed acreages (footprint) to be treated in Riparian cover types are 709 acres or less for any alternative, it was assumed treatments would have negligible impacts on water resources. Treatments occurring in non-riparian cover types would be the primary causes of impacts, if any, to water resources.

It was also assumed that the footprint-acreage would adequately represent the surface area disturbed by various treatments. Additionally, areas susceptible to water erosion may also be susceptible to wind erosion, and the acres calculated may overlap; although wind erosion does not impact water resources to the degree of water erosion.

4.8.2 EFFECTS COMMON TO ALL ALTERNATIVES

Water erosion is the primary impact that would occur under all treatments, but the magnitude of impacts between treatments varies greatly (see below). Some low-elevation sites are especially susceptible to wind erosion, as well as water erosion, after wildland fire. Wildland fires consume vegetative cover and result in exposed soils that are at risk for wind erosion, as well as water erosion, until regrowth occurs.

Soil erosion affects watersheds by contributing to sedimentation. Sedimentation can negatively affect fish habitat, alter stream channels, and fill downstream reservoirs.

4.8.2.1 Direct and Indirect Impacts of Prescribed Burn (RxFire)

Impacts to water resources from RxFire would include sedimentation of streams and reservoirs from water runoff as a result of post-burn erosion. However, the benefit of RxFire is that it is set in a controlled environment, and erosion-sensitive areas could be avoided and fire intensity and size can be controlled depending on GPA designation.

4.8.2.2 Direct and Indirect Impacts of Wildland Fire Use (WFU)

Impacts caused by WFU are similar to those described for RxFire, assuming similar locations, timing, and management objectives. However, the location of the fire cannot be controlled, and erosion-sensitive areas could be burned, resulting in greater post-fire risk of sedimentation than RxFire.

4.8.2.3 Direct and Indirect Impacts of Chemical Treatment

There should be no impacts to water resources from use of chemicals because they are applied according to label instructions. Any chemicals that move from treated areas to surface waters should degrade quickly. The most-commonly used herbicide or chemcal treatment would be glyphosate. Giesy et al. (2000) concluded:

> Field studies indicate that glyphosate typically dissipates rapidly from both simple ecosystems, such as agricultural, and more complex ecosystems, such as forestry, regardless of the diverse edaphic and climatic conditions.

The authors indicated an average half-life for glyphosate of 32 days from field studies at 47 different sites. When glyphosate enters water as runoff or inadvertent overspray or spray drift, it adsorbs strongly to sediment and particulate matter in the water column. It may also form insoluble complexes with metal ions and precipitate. Evidence from microcosm studies suggests that sediment adsorption and/or biodegradation represents the major dissipation process in aquatic systems (Spectrum 2005). Glyphosate levels in sediment rise at first and then fall to very low or undetectable levels. Chemical applications would conform to application criteria described in the Programmatic Environmental Impact Statement (PEIS) and ROD to address vegetation treatments using herbicides on BLM lands in 17 western states (BLM 2007). Additionally, use would conform to instructions from BLM Manual 9011 Chemical Pest Control, as well as label restrictions and current policies. (See Section 2.4.3.3.2).

4.8.2.4 Direct and Indirect Impacts of Mechanical Treatment

Various mechanical manipulations would disturb the soil surface and leave it open without a protective cover of intact, rooted plants. Water erosion would likely be less than RxFire or WFU due to plant debris remaining after this treatment (see Section 4.7.2.4).

As with other treatments, some sedimentation would occur, but to a lesser extent than RxFire and WFU.

4.8.2.5 Direct and Indirect Impacts of Seeding Treatment

Ground-seeding operations would cut furrows in the soil and lead to minor soil loss. Stream sedimentation caused by soil erosion from seeding would be negligible. Additionally, the revegetation resulting from seeding would reduce erosion. Aerial seeding would have no impact on water resources.

4.8.3 ALTERNATIVE A

Considering all cover types, Low-elevation Shrub, Perennial Grass, and Invasive Annual Grass would contain the largest acreage of water-erodible soils proposed for treatment under Alternative A, and thus have the potential to cause impacts to water resources as a result of treatments (see Table 4-46). However, the acreage of water-erodible soils that would be potentially treated under this alternative represent less than 1 percent of the planning area (see Table 4-46). Thus, overall, impacts to water resources would be negligible across the planning area.

4.8.4 ALTERNATIVE B

Low-elevation Shrub, Perennial Grass, Invasive Annual Grass, Mid-elevation Shrub, and Juniper cover types contain areas susceptible to wind and water erosion. The acreage of wind-erodible soils that would be potentially treated under this alternative represents approximately 7 percent of the planning area, while less than 2 percent would would be treated on water-erodible soils (see Table 4-46) under the Alternative B. Overall, the effective implementation of management restrictions would ensure that impacts to water resources described in Section 4.8.2 would be minimal across the planning area.

4.8.5 ALTERNATIVE C

The acreage of wind-erodible soils that would be potentially treated under this alternative represents approximately 19 percent of the planning area, while approximately 5 percent would would be treated on water-erodible soils (see Table 4-46) under Alternative C. With the effective implementation of management restrictions, impacts to water resources, described in Section 4.8.2, would be minimal across the planning area. Low-elevation Shrub, Perennial Grass, Invasive Annual Grass, Mid-elevation Shrub, and Juniper cover types would contain the majority of acreage susceptible to wind and water erosion.

4.8.6 ALTERNATIVE D

The acreage of wind-erodible soils that would be potentially treated under this alternative represents approximately 17 percent of the planning area, while approximately 4 percent would be treated on water-erodible soils (see Table 4-46) under Alternative D. With the effective implementation of management restrictions, impacts to water resources described in Section 4.8.2 would be minimal across the planning area. Low-elevation Shrub, Perennial Grass, Invasive Annual Grass, Mid-elevation Shrub, and Juniper cover types would contain the majority of acreage susceptible to wind and water erosion. No treatments are proposed in Dry Conifer, Aspen/Conifer, Salt Desert Shrub, Vegetated Rock/Lava, Wet/Cold Conifer, or Riparian cover types; therefore, treatment in these vegetation types would not be expected to contribute to impacts to water resources.

4.8.7 ALTERNATIVE E

The acreage of wind-erodible soils that would be potentially treated under this alternative represents approximately 18 percent of the planning area, while approximately 4 percent would would be treated on water-erodible soils (see Table 4-46) under Alternative E. Impacts under this Alternative would be similar to those described for Alternative D, with the exception that some treatments would occur in Dry Conifer, Aspen/Conifer, and Wet/Cold Conifer cover types. However, these cover types contain relatively small amounts of wind and water-erodible soils.

With the effective implementation of management restrictions, impacts to water resources described in Section 4.8.2 would be minimal across the planning area. Low-elevation Shrub, Perennial Grass, Invasive Annual Grass, Mid-elevation Shrub, and Juniper cover types would contain the majority of acreage susceptible to wind and water erosion.

4.8.8 MITIGATION AND MONITORING

With the implementation of management restrictions discussed in Appendix Q, Management Restrictions, mitigation would not be necessary. Monitoring and adaptive management would occur as directed by individual field offices and fire plans. This monitoring and adaptive management would be determined through project-level planning and associated NEPA processes.

4.8.9 UNAVOIDABLE ADVERSE IMPACTS

There would be no unavoidable adverse impacts to the water resources.

4.8.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

There would be no irretrievable or irreversible impacts to water resources.

4.8.11 CUMULATIVE EFFECTS

Cumulative impacts to water resources are considered relative to the long-term effects of the action alternatives in relation to other similar plans. These similar plans include the Interior

Columbia Basin Ecosystem Management Project MOU with the BLM, the INL management plan, and various other agency plans. The Sawtooth National Forest Plan intends to schedule and complete at least 40,000 acres of fuels management through prescribed fire and mechanical treatments over the next 10 years. The Caribou and Targhee National Forests intend to treat 9,000 acres per year over the long term. The Idaho Statewide Implementation Strategy for the National Fire Plan would focus on WUI lands. Relative to most of the planning area's project alternatives, these additional fire treatment impacts are negligible over the long term.

Overall, goals of these plans include reducing the occurrence of uncharacteristic wildland fires in the planning area. Over the long run, this would reduce water erosion and sedimentation, across the planning area. Water resource impacts that relate to increased RxFire, WFU, ESR and restoration, or other fire management practices would occur. However, as mentioned above, seeding and revegetation would mitigate many of these impacts. Cumulative impacts in the planning area may vary, however, depending on which alternative is implemented for this project. In general, the cumulative effects on water resources for each alternative are related to the amount of acreage moving from FRCC 3 or 2 to FRCC 1. Movement of cover types to FRCC 1 would ultimately result in reduction of fuels and fire frequency, leading to decreased soil erosion and subsequent impacts to water resources.

Project alternatives would have a much greater effect on water resources than other reasonably foreseeable future actions because the planning area would enact the largest amount of fire management over the largest area (5.0 million acres). Over a 30-year period, Alternative A would change the FRCC of the least number of acres (250,200 footprint-acres) of the five alternatives and have the least positive contribution to cumulative impacts when considered in conjunction with other plans and management strategies in the foreseeable future. The Alternative B would result in an increased number of acres (646,600 footprint-acres) in better FRCC relative to Alternative A. However, under either the Alternatives C, D, and E, at least 28 percent of the BLM-administered land area would be treated (1,687,00 footprint-acres, 1,522,000 footprint-acres, and 1,538,000 footprint-acres, respectively) over a 30-year period. Thus, these action alternatives would have a significant positive cumulative impact by reducing negative effects to water resources, when considered in conjunction with other actions in the planning area.

4.9 ANALYSIS OF EFFECTS ON LIVESTOCK GRAZING MANAGEMENT

4.9.1 ANALYSIS ASSUMPTIONS AND METHODS

Fire, whether RxFire or wild, may have direct positive and/or negative impacts on livestock grazing on BLM-administered lands in the planning area. It is predicted, however, that as the 12 cover types move toward FRCC 1, overall species composition and structure would improve. Additionally, improving the FRCC would generally reduce the risk of large, frequent fires and benefit vegetation. This would also allow areas to recover quicker from wildland fires and require less rehabilitation. All the action alternatives may reduce the number of long-term allotment closures and animal unit months (AUMs) temporarily unavailable, maintain and

improve the health of the rangelands, improve wildlife habitat/watershed conditions, and improve overall forage production.

Several assumptions were made in developing the analysis for impacts to livestock grazing. These assumptions include: (1) it requires 10 acres to produce 800 pounds of forage per month to maintain 1 AUM, (2) treatment areas would be rested from livestock grazing until monitoring results show resource objectives have been met, and (3) AUMs temporarily lost as a result of resting these treatment areas would generally become available as monitoring results show resource objectives have been met. Areas identified for RxFire may also be rested one or two years prior to a treatment. The price to purchase hay was set at $100 per ton. The cost to graze was set at $10.49 per AUM on private land and $1.37 per AUM on BLM-administered land. Both of these figures are average lease rates in Idaho from 1998 through 2002.

Prior to RxFire treatment, areas may need to be rested one year to accumulate sufficient fuel to carry RxFire treatment. During this pre-treatment period, AUMs would be temporarily unavailable for livestock grazing. Pre-treatment AUMs temporarily unavailable are not estimated as part of this EIS because footprint treatment acres are estimates of project level action that do not specify among RxFire, WFU, Chemical, and Mechanical treatments. Pre-treatment AUMs, temporarily unavailable, would be determined and analyzed on a project-by-project basis.

4.9.2 EFFECTS COMMON TO ALL ALTERNATIVES

Direct and indirect impacts for all vegetation treatment methods generally result in a short-term loss of AUMs while these treatment areas are being treated and/or being rested from livestock grazing preceding or following a treatment. Successful vegetation treatments involving the use of RxFire, WFU, mechanical, chemical, and/or seeding are often weather and site-dependent. Pre and post treatment resting may necessitate (1) adjusting seasons of use for livestock grazing, (2) adjusting grazing systems, (3) using pastures scheduled for rest or deferred grazing, (4) constructing temporary fencing around treatment areas, (5) reducing the number of livestock authorized to graze, or (6) totally removing livestock from the allotment. These allotment restrictions would be dealt with on a site-specific basis in the planning process for each vegetation treatment. These allotment restrictions may require permittees to lease additional private land, purchase additional feed, or reduce overall livestock numbers during this interim period. Additional disturbance to livestock could occur during vegetation treatment and fire fighting activities (i.e., increased noise, traffic, construction of fire breaks, etc).

Permittees with allotments that have grazing seasons beginning or extending into the summer and fall periods may also be affected by wildland fire activity and vegetation treatments. Large wildland fires generally occur across the planning area beginning in July and ending mid-September. Treatments for the reduction of fire hazards and rehabilitation of wildland fire burned areas are generally initiated in the fall and completed in the winter. As these treatments are initiated, temporary removal of livestock would be necessary to ensure success of the particular treatment and establishment of desired vegetation.

4.9.2.1 Direct and Indirect Impacts of Prescribed Burn (RxFire)

RxFire would be used in all cover types, except Salt Desert Shrub and Vegetated Rock/Lava, where conditions such as access, adjacent vegetation and terrain, and climatic conditions are sufficient to provide adequate control of the RxFire. Effects of RxFire on rangeland resources are predominantly negative to livestock grazing. Treatment areas may also need to be rested from grazing for one to two years prior to the RxFire to increase fine fuels enough to carry an RxFire.

4.9.2.2 Direct and Indirect Impacts of Wildland Fire Use (WFU)

WFU would be used in all cover types. WFU would primarily be in remote areas where the benefits of fire are greater than the risk and cost of putting it out. Effects of WFU on rangeland resources are also predominantly negative to livestock grazing. WFU would displace livestock during the management of fire. WFU would also displace livestock from the burned allotment following the fire to allow vegetation to regenerate.

The control of WFU burns could possibly be less than those ignited intentionally and could result in loss of range improvements (fences, livestock waters, etc). This could alter livestock use and distribution patterns on portions of the allotment(s) not affected by wildland fire. Natural starts would be suppressed if the fire posed a threat to the long-term stability of the rangeland resource.

4.9.2.3 Direct and Indirect Impacts of Chemical Treatment

Chemicals (herbicides) would be used in all cover types, except Salt Desert Shrub and Wet/Cold Conifer, for fuels reduction activities. These chemicals may be applied both aerially and from the ground depending on the area and cover type being treated. Only herbicides approved for use on BLM-administered lands would be used in these vegetation treatments. Short-term effects of most chemical treatments on rangeland resources are predominantly negative to livestock grazing. Most chemical treatments would be used in conjunction with other vegetation treatments in an effort to reduce the seedbed of Invasive Annual Grasses. All other spot application of chemicals would be limited to treatments of noxious weed infestations and would not impact livestock grazing.

4.9.2.4 Direct and Indirect Impacts of Mechanical Treatment

Mechanical treatments would be used in all cover types, except Salt Desert Shrub. These treatments would vary considerably between cover types and may include using hand-operated tools to thin conifer and juniper, chaining to thin juniper and sagebrush, drill seeding, and harrowing or chaining to cover grass and shrub seed. Short-term direct effects of mechanical treatments of rangeland resources would result in the temporary loss of AUMs available for livestock grazing while the treatment areas are rested from livestock grazing as vegetation in the treatment area becomes re-established.

4.9.2.5 Direct and Indirect Impacts of Seeding Treatment

Seeding would be used in all cover types, except Wet/Cold Conifer. Short-term direct effects would result in the temporary loss of AUMs available for livestock grazing while the treatment areas are rested from livestock grazing as the seeded vegetation becomes established.

4.9.3 ALTERNATIVE A

Alternative A would result in 47,500 AUMs being temporarily unavailable over the next 10-year period. This reduction of AUMs represents approximately 0.7 percent of the AUMs available in the planning area. The loss of revenue to the BLM in the form of grazing fees would be $65,075 over the next 10-year period. If permittees do not have sufficient private land for their livestock while public lands are rested following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees have sufficient private land of their own, additional feed may need to be purchased for those livestock temporarily removed from the public lands. The estimated cost of this alternative to livestock owners in the planning area to lease private land while the allotments are rested is estimated to be $519,650 and hay purchase cost is estimated to be $1,900,000 over the next 10-year period. Treatments associated with this alternative would produce the least amount of AUMs being temporarily unavailable, the least amount of loss of short-term revenue in the form of grazing fees, and result in the least amount of short-term cost to livestock owners in the form of leasing private land and purchasing additional feed over the short term.

4.9.4 ALTERNATIVE B

Alternative B would result in 122,783 AUMs being temporarily unavailable over the next 10-year period. This reduction of AUMs represents approximately 1.8 percent of the AUMs available in the planning area. The loss of revenue to the BLM in the form of grazing fees would be $168,213 over the next 10-year period. If permittees do not have sufficient private land for their livestock while public lands are rested following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees have sufficient private land of their own additional feed may need to be purchased for those livestock temporarily removed from the public lands. The estimated cost of this alternative to livestock owners in the planning area to lease private land while the allotments are rested was estimated to be $1,362,319 and hay purchase cost was estimated to be $4,987,040 over the next 10-year period. This alternative would increase the amount of AUMs being temporarily unavailable, the amount of loss of revenue in the form of grazing fees, and the cost to livestock owners in the form of leasing private land and purchasing additional feed by approximately 262 percent when compared to Alternative A.

4.9.5 ALTERNATIVE C

Alternative C would result in 320,467 AUMs being temporarily unavailable over the next 10-year period. This reduction of AUMs represents approximately 4.8 percent of the AUMs available in the planning area. The loss of revenue to the BLM in the form of grazing fees would be $439,040 over the next 10-year period. If permittees do not have sufficient private land for their livestock while public lands are rested following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees have sufficient private land of their own, additional feed may need to be purchased for those livestock temporarily removed from the public lands. The estimated cost of this alternative to livestock owners in the planning area to lease private land while the allotments are rested was estimated to be $3,491,212 and hay purchase cost was estimated to be $12,764,960 over the next 10-year period. This alternative would increase the amount of AUMs being temporarily unavailable, the amount of loss of

revenue in the form of grazing fees, and the cost to livestock owners in the form of leasing private land and purchasing additional feed by approximately 672 percent when compared to Alternative A.

4.9.6 ALTERNATIVE D

Alternative D would result in 289,268 AUMs being temporarily unavailable over the next 10-year period. This reduction of AUMs represents approximately 4.3 percent of the AUMs available in the planning area. The loss of revenue to the BLM in the form of grazing fees would be $396,297 over the next 10-year period. If permittees do not have sufficient private land for their livestock while public lands are rested following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees have sufficient private land of their own additional feed may need to be purchased for those livestock temporarily removed from the public lands. The estimated cost of this alternative to livestock owners in the planning area to lease private land while the allotments are rested was estimated to be $3,368,995 and hay purchase cost was estimated to be $12,318,080 over the next 10-year period. This alternative would increase the amount of AUMs being temporarily unavailable, the amount of loss of revenue in the form of grazing fees, and the cost to livestock owners in the form of leasing private land and purchasing additional feed by approximately 648 percent when compared to Alternative A.

4.9.7 ALTERNATIVE E

Alternative E would result in 292,242 AUMs being temporarily unavailable over the next 10-year period. This reduction of AUMs represents approximately 4.4 percent of the AUMs available in the planning area. The loss of revenue to the BLM in the form of grazing fees would be $400,371 over the next 10-year period. If permittees do not have sufficient private land for their livestock while public lands are rested for the two years following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees have sufficient private land of their own additional feed may need to be purchased for those livestock temporarily removed from the public lands. The estimated cost of this alternative to livestock owners in the planning area to lease private land while the allotments are rested was estimated to be $3,197,123 and hay purchase cost was estimated to be $11,689,663 over the next 10-year period. This alternative would increase the amount of AUMs being temporarily unavailable, the amount of loss of revenue in the form of grazing fees, and the cost to livestock owners in the form of leasing private land and purchasing additional feed by approximately 615 percent when compared to Alternative A.

4.9.8 MITIGATION AND MONITORING

The management restrictions listed in Appendix Q, Management Restrictions, are incorporated into management practices common to all alternatives. These practices would be implemented to avoid adverse impacts to resources related to livestock grazing. Because of this, no further mitigation would be required to protect these resources.

4.9.9 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts to livestock grazing due to this planning effort include the potential of short-term suspension, delay, or authorizing livestock grazing at lower than pre-treatment levels until the treatment area is adequately rehabilitated and/or restored. However, these short-term impacts are currently being experienced and would continue under Alternative A. These short-term impacts would be offset by the long-term improvements to overall range health resulting from increased fire, fuels, and vegetation management. This, in turn would reduce the potential for long-term suspension, delay, or reduction of livestock grazing in the treated allotments.

4.9.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Irretrievable impacts of treatments to livestock grazing would include the short-term loss of AUMs as described above. However, this short-term habitat loss would not be irreversible, as these AUMs would be returned to active grazing after rehabilitation/restoration.

4.9.11 CUMULATIVE EFFECTS

Cumulative impacts to livestock grazing include all past, present, and future fire management actions that may impact livestock grazing associated with the planning area. To reduce negative impacts livestock grazing, efforts must be made between other federal and state agencies as well as private landowners to coordinate land use. There are several planning efforts that incorporate fire use strategies currently underway, which may, in conjunction with this planning effort, affect the rangeland resources associated with the planning area. These plans include the Craters of Interior Columbia Basin Ecosystem Management Project, the INL management plan, the Sawtooth and Caribou-Targhee National Forests management plans, and the Idaho Statewide Implementation Strategy for the National Fire Plan. Overall, the primary goal of these plans is to reduce the intensity and area of wildland fires in the planning area. The means proposed to meet this goal is broadly similar to many actions proposed of the various alternatives in this EIS, and include RxFire, WFU, ESR, and restoration activities.

Additionally, the NPS and the BLM have prepared a joint monument management plan for Craters of the Moon National Monument and Preserve, which is located entirely within the administrative boundary of the FMDA planning area. This management plan includes fire management decisions for the Monument and Preserve that, when considered in conjunction with the action alternatives, would result in cumulatively positive long-term impacts on vegetation resources, and therefore forage availability.

As discussed above, impacts to livestock grazing from fire predominantly relates to the intensity and area of the fire. In general, large frequent fires result in increased negative impacts to rangeland resources. Thus, reducing the area and frequency of fires would, over the long run, reduce negative impacts to livestock grazing in the planning area. There could possibly be increased short-term impacts to livestock grazing relating to increased RxFire, WFU, ESR and restoration, or other fire management practices. As described above for each alternative, vegetation treatments have the potential to negatively affect livestock grazing. Thus, there is the potential for increased negative cumulative impacts in the short term from the actions proposed

in this EIS when considered in conjunction with other fire management activities in the planning area. Overall, cumulative impacts may vary, depending on which project alternative is implemented; cumulative impacts must be examined relative to the alternatives in terms of their contribution to the cumulative impacts of other plans for reducing the area and frequency of fires.

In general, the cumulative effects on livestock grazing for each alternative action of the various fire management plans being developed would be related to the amount of acreage moving from FRCC 3 to FRCC 1. Because the general goals of the other fire management plans and regional strategies are to, in essence, reduce the amount of acreage in FRCC 3 and increase the amount in FRCC 1, these plans should have a positive long-term effect on livestock grazing by reducing the potential for large-scale damage to rangeland resources. Consequently, the alternatives proposed in this EIS should also be considered in terms of their overall contribution to reducing the area and frequency of wildland fires. Alternatives that achieve a reduction in the area and frequency of wildland fires would, in combination with the actions undertaken in other regional plans, have a greater positive effect than those that do not reduce, or reduce in lower amounts, the area and frequency of wildland fires.

Of the five alternatives described in this EIS, Alternative A changes the FRCC the least number of acres. Thus, Alternative A would have the least positive cumulative impact on the other plans and management strategies in the foreseeable future. Alternative B would result in an increased number of acres with a changed FRCC relative to Alternative A. Relative to Alternative A, Alternative B would have a greater positive cumulative impact. However, Alternatives C, D, and E all result in substantial shifts of rangeland to FRCC 1. Thus, these alternatives would have an additional positive cumulative contribution on livestock grazing when considered with the other fire management plans in the planning area than either Alternative A or Alternative B.

4.10 ANALYSIS OF EFFECTS ON RECREATIONAL RESOURCES

4.10.1 ANALYSIS ASSUMPTIONS

The analysis assumptions for recreational resources were that: (1) RxFire would be considered for use in dispersed and developed recreational areas to protect them from or minimize the impacts of large wildland fire on these areas; (2) RxFire, chemical, seeding, and/or mechanical treatments would be used to improve FRCCs; and (3) wildland fire or RxFire would expose previously hidden recreational resources that could become subject to unmanaged use.

4.10.2 EFFECTS COMMON TO ALL ALTERNATIVES

The effects of fire management on recreational resources within the planning area are based on the impacts produced by modifying and maintaining vegetation in the various FRCCs. The impacts would include the following:

- The potential exposure after fire of livestock and game trails to off-highway vehicle (OHV) use;
- The potential exposure after fire of previously hidden lava tube and cave entrances to unmanaged exploration;

- Limited access to recreational areas during RxFire, mechanical, seeding, chemical treatments, and/or wildland fire;
- The temporary closing of dispersed and developed recreational areas during land restoration following treatments to maintain or change FRCCs; and
- The potential loss of facilities within developed recreational areas from large wildland fire.

In general, fire management in dispersed recreational areas would use RxFire, chemical, mechanical, and seeding treatments. The same treatments would be used in the vicinity of developed areas associated with high-density recreational opportunities or where recreational facilities have been constructed. RxFire would be used where appropriate. As cover types are moved toward improved FRCCs, the risk of large-scale wildland fire is also reduced. This, in turn, would reduce the potential magnitude of impacts to recreational resources for the impacts described above.

4.10.2.1 Direct and Indirect Impacts

For all of the treatments, indirect, adverse effects could be produced by fences or barriers used to exclude livestock from the treated areas, which could alter the scenic quality of the landscape and reduce the recreational expectations of solitude, remoteness, and an undeveloped landscape. The exposure after fire treatment of the planning area's generally fine, loess-type soil to typical summer convection winds could produce dust storms (particularly in lower elevation areas) that indirectly reduce visibility. This reduction in visibility could degrade scenic quality within the planning area and potentially reduce the recreational opportunities of sightseers.

The effects of fire suppression on recreational resources, for all of the alternatives, would vary, depending upon the methods used for suppression. Applying water and/or fire retardant in the vicinity of recreational areas would not affect recreational opportunities, but brightly colored fire retardant could produce short-term, adverse reductions in scenic quality. Access to burned areas and areas in the vicinity of dozer lines and firebreaks could be temporarily restricted, which would have short-term, adverse effects would be produced by excluding recreationists from these areas until seeding and/or vegetation recovery.

Over time, effects of fire suppression and containment would vary. The construction of firelines, firebreaks, and access roads for crews and equipment could produce beneficial impacts on recreational resources within the planning area by preserving recreational areas from large wildland fire. Fire suppression could also produce adverse effects on recreational opportunities in the loss of scenic quality or the loss of an expected sense of remoteness, loss of a sense of solitude, and the loss of an undisturbed recreational landscape through the creation of these landscape-disturbing features.

4.10.2.1.1 Prescribed Burn (RxFire)

RxFire in recreational areas could have adverse short term effects on recreational opportunities by limiting access to burned areas. Specifically, in dispersed recreational areas, hunting areas could be adversely affected, with higher elevation hunting areas receiving the greatest impacts. Other dispersed recreational activity areas, used for all-terrain vehicle (ATV) riding and/or

mountain biking, could also be adversely affected. These areas would be closed or have limited access until fire management treatment, seeding, and recovery were completed. Beneficial, long-term impacts could be produced by (1) the reduction in the potential for large wildfire in developed and dispersed recreational areas, with subsequent decreases in long-term risks to these areas and facilities (2) and the introduction of a diversity of cover types that could enhance the recreational opportunity through improved scenic quality and a greater diversity of wildlife.

4.10.2.1.2 Wildland Fire Use (WFU)

Impacts to recreational resources as a result of implementing WFU would be similar to those described under RxFire, assuming wildland fires occur at similar locations and times, and similar management objectives are met.

4.10.2.1.3 Chemical Treatment

For all the alternatives, the use of chemical treatments would have short-term adverse effects on recreational resources. Some scenic contrasts might be visible between treated and untreated areas in non-native Invasive Annual Grass cover types in the spring, but for most of the year, the effects of treatment would be visually consistent with normal grass curing. Recreational opportunities would be limited in the vicinity of these areas until they are reopened for public use.

4.10.2.1.4 Mechanical Treatment

Mechanical treatments, using a variety of mowing, chaining, chopping, or hand-operated cutting tools, could affect recreational resources, but the effects would depend upon the type of treatment. Mowing would have short-term adverse effects on recreational opportunities by temporarily altering scenic quality. Chopping and chainsaw treatments could degrade scenic quality if the effects of tree stumps and/or ground disturbances were not mitigated, but the effects would generally be minor, as existing vegetation would tend to screen the effects. Mechanical chaining treatments could produce adverse changes in recreational opportunities if the affected areas are highly visible, particularly in those areas where high scenic quality, a sense of remoteness, and/or an undisturbed landscape are expected by recreationists.

4.10.2.1.5 Seeding Treatment

The effects of seeding treated areas would vary. Aerial broadcast seeding, followed by harrowing or chaining, would tend to produce short-term, adverse soil surface disturbances that could create visual landscape contrasts. These contrasts could reduce the recreational expectation of solitude or an undeveloped, scenic landscape, but the effects would tend to dissipate after vegetation re-growth.

Drill seeding could produce adverse short-term and beneficial long-term effects similar to those for mechanical fire treatments. Adverse visual effects produced by drill-row surface soil disturbances could persist for decades on the landscape, possibly reducing the sense of remoteness and solitude, and the expectations of an undeveloped landscape. Beneficial long-term effects of drill-seeding would be produced by introducing vegetation that either contributes to cover type diversity or mimics the structure of the surrounding native cover type.

4.10.2.2 Fire Regime Condition Class (FRCC)

Long-term beneficial impacts of fire management would be produced by moving the planning area toward FRCC 1. This would maintain a diversity of cover types, which could enhance the recreational experience and expand the range of recreational opportunities within the planning area. Fire management would also reduce, in the long term, the potential for fire to impact existing recreational facilities and sites. Moving the planning area toward FRCC 2 would also produce long-term beneficial impacts similar to those under FRCC 1, but the range of cover type diversity would not be as great under FRCC 2. The moderate threat of large wildland fire would have a potentially adverse effect on recreational resources by reducing recreational opportunities in burned areas. Under FRCC 3, the potential for frequent and/or large wildland fire would remain high, with potential long-term adverse effects from a reduction in recreational opportunities in areas burned by fire.

4.10.3 ALTERNATIVE A

Alternative A would result in a relatively small number of annual vegetation treatments for all cover types (250,200 acres total). This alternative could have direct impacts on recreational resources by decreasing public access to these recreational areas during treatment and recovery periods. The short-term maintenance of FRCC at FRCC 2 and 3 could potentially threaten recreational areas and facilities within the planning area due to moderate to high risk of wildland fire. Beneficial effects would be similar to those described in Section 4.10.2.

Alternative A would maintain 26 percent of the planning area in FRCC 3, 62 percent of the planning area would be moved toward FRCC 2, and 12 percent would be moved toward FRCC 1 over a 30-year period. Maintaining these proportions would produce the least amount of area in the planning area at improved FRCCs. This alternative would tend to maintain the existing high potential for exposure and subsequent exploitation of game and livestock trails by OHV users, exposure and subsequent unmanaged exploration of exposed lava caves and tubes, limited access to recreational areas following wildland fire, and the greatest potential for short-term loss of recreation facilities during and following large wildland fires.

4.10.4 ALTERNATIVE B

Alternative B would result in more annual vegetation treatments in the Aspen/Conifer, Invasive Annual Grass, Dry Conifer, and Low-elevation Shrub, Mid-elevation Shrub, Juniper, and Mountain Shrub cover types (646,200 acres) than Alternative A. This alternative would have direct short-term impacts on recreation by decreasing access to more recreational areas in these cover types undergoing treatments during treatment and recovery periods than Alternative A. Dispersed recreational activities could be adversely affected over the short term through decreased access to treated areas. Beneficial long-term effects would be similar to those described in Section 4.10.2.

Alternative B would maintain 17 percent of the planning area in FRCC 3, 62 percent of the planning area would be moved toward FRCC 2, and 21 percent would be moved toward FRCC 1 over a 30-year period. Maintaining the planning area in these proportions would decrease the areas in FRCC 3 and increase the areas in FRCC 1 when compared to Alternative A. This

alternative would reduce the potential for exploitation of game and livestock trails by OHV users, unmanaged exploration of exposed lava caves and tubes, limited access to recreational areas, and the loss of recreational facilities to large, frequent, and large wildland fires when compared to Alternative A. The long-term, beneficial effects of this alternative would be to move these cover types toward improved FRCCs, thus lowering the potential for destruction of recreational resources by wildland fire.

4.10.5 ALTERNATIVE C

Alternative C would result in more total annual vegetation treatments in all cover types than any of the other alternatives (1,687,000 acres). This alternative would have direct impacts on recreational opportunities by decreasing access to more recreational areas in these cover types during treatment and recovery periods than for any of the other alternatives. Dispersed recreation, such as hunting and ATV riding, could be adversely affected over the short term through decreased access to treated areas. Beneficial effects would be similar to those described in Section 4.10.2.

Alternative C would move the most cover types in the planning area toward FRCC 1 or 2 over a 30-year period. This alternative would reduce the potential for exploitation of game and livestock trails by OHV users, unmanaged exploration of exposed lava caves and tubes, limited access to recreational areas, and the loss of recreational facilities to large wildland fires, when compared to Alternative B. Potential recreational opportunities would be produced through an increased diversity of cover types, greater scenic variety, and wildlife diversity.

4.10.6 ALTERNATIVE D

Alternative D would result in more total treatments of Invasive Annual Grass, Juniper, Low-elevation Shrub, Mid-elevation Shrub, Mountain Shrub, and Perennial Grass cover types (1,522,000 acres) than Alternative B. Dispersed recreation, such as hunting and ATV riding, could be adversely affected through decreased short-term access to treated areas. Beneficial long-term effects would be similar to those described in Section 4.10.2.

Alternative D would have similar impacts on planning area-wide FRCC as Alternative C. Impacts to game trails and livestock trails by OHV users, the exposure of hidden lava cave and tube entrances, and the loss of recreational facilities would be less than Alternative B, but still subject to a moderate potential for wildland fire (at FRCC 2). Mountain Shrub cover types would be moved toward FRCC 1, and would have a low potential for frequent wildland fire (and exposure) of game trails, livestock trails, and lava tubes and caves. Juniper cover types, moved toward FRCC 2, would be more susceptible to wildland fire (and exposure of hidden trails and recreational resources) than Alternative B because of the long-term maintenance of this cover type at a higher FRCC (FRCC 2). The high potential for wildland fires in other cover types could cause additional exploitation of exposed game trails and livestock trails by OHV users, exposure of previously hidden lava caves and tubes to unmanaged exploration, limit access to recreational areas, and cause the loss of recreational facilities in these other cover types. Beneficial, long-term effects would be to move cover types toward improved FRCCs, thus lowering the potential for destruction of recreational resources by wildland fire.

4.10.7 ALTERNATIVE E

Alternative E would be similar to Alternative D in that it would result in more total treatments of Invasive Annual Grass, Juniper, Low-elevation Shrub, Mid-elevation Shrub, Mountain Shrub, and Perennial Grass cover types (1,538,000 acres) than Alternative B. Dispersed recreation, such as hunting and ATV riding, could be adversely affected through decreased short-term access to treated areas. Beneficial long-term effects would be similar to those described in Section 4.10.2.

Alternative E would have similar impacts on planning area-wide FRCC as Alternatives C and D. Impacts to game trails and livestock trails by OHV users, the exposure of hidden lava cave and tube entrances, and the loss of recreational facilities would be less than Alternative B, but still subject to a moderate potential for wildland fire (at FRCC 2). Mountain Shrub cover types would be moved toward FRCC 1, and would have a low potential for frequent wildland fire (and exposure) of game trails, livestock trails, and lava tubes and caves. Juniper cover types, moved toward FRCC 2, would be more susceptible to wildland fire (and exposure of hidden trails and recreational resources) than Alternative B because of the long-term maintenance of this cover type at a higher FRCC (FRCC 2). The high potential for wildland fires in other cover types could cause additional exploitation of exposed game trails and livestock trails by OHV users, exposure of previously hidden lava caves and tubes to unmanaged exploration, limit access to recreational areas, and cause the loss of recreational facilities in these other cover types. Beneficial, long-term effects would be to move cover types toward improved FRCCs, thus lowering the potential for destruction of recreational resources by wildland fire.

4.10.8 MITIGATION AND MONITORING

Refer to Appendix Q, Management Restrictions for management restrictions common to all alternatives. These restrictions would be implemented to avoid adverse impacts to recreation resources.

4.10.9 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts to recreational resources would include the short-term loss of recreational opportunities after vegetation treatments and wildland fire.

4.10.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

There would be and irretrievable loss of recreational opportunities after vegetation management treatments. However, these impacts would not be irreversible as impacted vegetation would eventually be restored.

4.10.11 CUMULATIVE EFFECTS

The cumulative impacts of other fire management efforts on recreational resources within the planning area and on lands adjacent to the planning area would be beneficial. The additional reduction in wildland fire potential from these efforts would further reduce the potential for wildland fire-caused impacts on recreational resources within the planning area, particularly in the vicinity of WUI areas. These efforts would also create additional improvements in habitat

that would enhance recreational opportunities within the planning area by reducing areas infested with noxious weeds, by creating cover type diversity, and improving scenic quality.

4.11 ANALYSIS OF EFFECTS ON WILDERNESS RESOURCES

4.11.1 ANALYSIS ASSUMPTIONS AND METHODS

Wilderness study areas (WSAs) are managed to preserve their wilderness values according to the Interim Management Policy for Lands Under Wilderness Review (BLM Handbook 8550-1). In general, WSAs must be managed in a manner so as not to impair their suitability for preservation as wilderness. With regard to this EIS, there are two objectives for fire management in WSAs: (1) permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness, and (2) reduce, to an acceptable level, the risks and consequences of wildland fire within wilderness or escaping from wilderness.

The indicator used for the analysis is whether treatments would result in enhancing or preserving wilderness values. An assumption made for this analysis is that treatments would occur within or in the vicinity of WSAs for effects to be positive for WSAs, and occur on days when climatic conditions favor the application of a given treatment type. It is assumed the Appropriate Management Response would be used to safely manage and or suppress wildland fires under the action alternatives in WSAs because a goal is to restore fire to its natural role. Restrictions applied to Areas of Critical Environmental Concern (ACECs) would be based on management plans, depending on the resources or hazards present within specific areas. Coordination with interested publics is required as part of the NEPA process for all subsequent fire management plans and projects affecting WSAs.

4.11.2 EFFECTS COMMON TO ALL ALTERNATIVES

4.11.2.1 Indirect and Direct Impacts of Prescribed Burn (RxFire)

RxFire could be used in WSAs. Thus, for all alternatives, burning to reduce fuel loads, restore more natural vegetation conditions, and prepare a WSA for additional treatment(s) would result in positive impacts by restoring cover types to better functioning ecosystems.

4.11.2.2 Indirect and Direct Impacts of Wildland Fire Use (WFU)

Effects as a result of implementing WFU would be similar to those described under RxFire, assuming similar burn locations, timing, and management objectives because WFU meets one of the objectives for managing WSAs.

4.11.2.3 Indirect and Direct Impacts of Chemical Treatment

The use of chemicals within WSAs would be allowed; although, the method of application and equipment used would be carefully planned. Chemical use would be carried out on a site-specific level according to manufactures labels and in conjunction with equipment allowed for use in WSAs so as to minimize impacts to WSA values such as more natural-looking landscapes.

4.11.2.4 Indirect and Direct Impacts of Mechanical Treatment

The use of earth-moving equipment within WSAs requires the approval of the field office manager. Approved mechanical treatments in WSAs would likely be done using non-motorized tools such as hand saws, axes, carts, shovels, wheelbarrows, etc. The use of motorized equipment would likely only be authorized in those cases where suppression is necessary. In these cases, methods may include use of power tools, aircraft, motorboats, and motorized fire-fighting equipment. Use of this equipment would be be minimized as much as possible to suppress the wildland fire while retaining wilderness suitability.

4.11.2.5 Indirect and Direct Impacts of Seeding Treatment

Impacts from equipment used for seeding must be carefully planned to be the least intrusive necessary to obtain a successful seeding. The use of native species is required in WSAs. Seed could also be applied aerially, with or without a follow-up soil coverage treatment such as harrowing.

4.11.3 ALTERNATIVE A

Effects of continuation under current direction of full wildland fire suppression would have no discernible change from current conditions. WSAs that have Vegetated Rock/Lava cover types would receive chemical treatments primarily. The remaining WSAs have a predominance of Low-elevation Shrub, Perennial Grass, and Invasive Annual Grass. Thus, in WSAs where chemical, mechanical, and seeding treatments would be approved for use, public perception of wilderness values may also be temporarily displaced because it is generally thought that wilderness requires little or no management.

4.11.4 ALTERNATIVE B

Impacts to WSAs would depend upon which type(s) of treatments would be used for a cover type. Under Alternative B, treatments in Vegetated Rock/Lava (approximately 50 percent of the WSAs) would only include WFU. The remaining cover types that are within WSAs would receive, in general, 2.5 times more treatment than proposed for Alternative A. Wildland fire would probably leave visible areas of charring and alter the perceived wilderness conditions and values for the public, depending on the size and intensity of the fire. In WSAs where chemical, mechanical, and seeding treatments would be approved for use, public perception of wilderness values may also be temporarily displaced because it is generally thought that wilderness requires little or no management.

4.11.5 ALTERNATIVE C

Assuming that WSAs would be targeted for fuels reduction under this alternative, impacts anticipated under this alternative would be similar to those under Alternative B for Vegetated Rock/Lava cover types. The remaining cover types that are within WSAs would receive, in general, 6.7 times more treatment than proposed for Alternative A and also have impacts similar to those discussed in Section 4.11.2.

4.11.6 ALTERNATIVE D

There are no treatment proposed in Vegetated Rock/Lava under this alternative; thus, there would be no impacts to WSAs with this cover type. Fire suppression, which would be technically used because there is no proposed WFU in Vegetated Rock/Lava, is usually logistically difficult in this cover type. Impacts in Low-elevation Shrub, Perennial Grass, and Invasive Annual Grass would be approximately 6.7 times greater than those described under Alternative A.

4.11.7 ALTERNATIVE E

Impacts to WSAs would be the same as those described for Alternative C and D.

4.11.8 MITIGATION AND MONITORING

Monitoring would be done in conjunction with the management restrictions common to all alternatives discussed in Appendix Q, Management Restrictions. These restrictions would be implemented to avoid adverse impacts to WSAs.

4.11.9 UNAVOIDABLE ADVERSE IMPACTS

Under Alternative A, FRCC could worsen for some WSAs where no treatments occur. In these areas, wildland fire intensity, size, and duration would result in the deterioration of some of the values for which WSAs are managed. Under the action alternatives, there would be no unavoidable adverse impacts.

There is also the potential that restrictions on tools that are normally available for vegetation and fire treatments may not be at the disposal of BLM managers for use in WSAs. As a consequence, FRCC may move toward 2 or 3 because permittable treatments may not be able to keep up with needed WSA vegetation and fire treatments.

4.11.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Irretrievable impacts to WSAs would include the short-term loss of wilderness values due to mechanical noise and/or smoke during fire management activies. However, this short-term habitat loss would not be irreversible, as it would cease upon cessation of these activities. Additionally, the long-term values associated with WSAs in the planning area would benefit from the proposed increased fire management activities.

4.11.11 CUMULATIVE EFFECTS

Cumulative impacts to WSAs and wilderness would be related to management activities of other agency planning efforts where there are WSAs or wilderness are adjacent to areas targeted by the agencies.

Additionally, the NPS and the BLM have prepared a joint monument management plan for Craters of the Moon National Monument and Preserve, which is located entirely within the administrative boundary of the FMDA planning area. This management plan includes fire

management decisions for the Monument and Preserve that, when considered in conjunction with the action alternatives, would result in cumulatively positive long-term impacts on vegetation resources, and therefore wilderness values.

The Caribou-Targhee National Forest Plan includes treating a total of 90,000 acres over the next 10-years (approximately three times the current and past treatment rates). These future fire management activities would likely have a cumulatively positive impact on the existing cover types in the planning area and in southeastern Idaho, and therefore on WSAs that are located in the vicinity of these forests.

As cumulative effects relate to this EIS, Alternatives A and D treat less acreage in the Vegetated Rock/Lava cover type as opposed Alternatives B and C. Nonetheless, it would be expected that overall cumulative impacts resulting from the implementation of one of the action alternatives would have positive impacts on WSAs.

4.12 ANALYSIS OF EFFECTS ON VISUAL RESOURCES

4.12.1 ANALYSIS ASSUMPTIONS AND METHODS

The following were the analysis assumptions for visual resources: (1) remote areas in the planning area would not be areas of high visibility to the general public, (2) steep-sloped areas along major roadways in the planning area would be areas that are highly visible to the public, (3) vegetation treatment in the vicinity of recreational and/or highly urbanized areas would be highly visible to the public, and (4) standard BLM visual analysis methods of contrast analysis from representative points of view within the planning area would be the most effective way to analyze the effects of fire treatment on the planning area's visual resources.

As described in Section 3.12, Visual Resources, the BLM uses the Visual Resource Management (VRM) system and the four VRM classes to analyze and to determine the visual impacts of proposed activities on the land and to gauge the level of disturbance an area can tolerate before it exceeds the visual objectives of each VRM class. The method that the BLM uses to determine whether proposed projects conform to an area's VRM class objectives is a contrast rating system that evaluates the effects of proposed projects on visual resources.

Contrast rating is done from critical viewpoints, known as Key Observation Points (KOPs), which are usually along commonly traveled routes or other points of view visible to people. A KOP can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a KOP can be a linear view along a roadway, trail, or river corridor. Factors considered in selecting KOPs are:

- the angle of observation or slope of the proposed planning area,
- the number of viewers of the planning area,
- the length of time that the project is in view, the relative size of the project,
- the season of use, and
- light conditions.

A contrast rating can then be performed to determine whether the level of disturbance associated with the proposed project would exceed the VRM objectives for that area.

The primary views of fire suppression, RxFires, and prescribed vegetation treatments described in the alternatives would be from major travel routes, urban/public land boundary areas, and recreational use areas within the planning area. KOPs were selected to represent the effects of vegetation treatment on these areas. These areas were chosen using the selection criteria described above. Each of the KOPs is described in detail in Section 3.12, Visual Resources.

4.12.2 EFFECTS COMMON TO ALL ALTERNATIVES

The effects that fire management would have on visual resources within the planning area are based on the impacts produced by: (1) maintaining cover types in FRCC 3, 2, and 1; and (2) moving cover types from FRCC 3 toward FRCC 2 or FRCC 1. The methods by which these cover types would be shifted are:

- WFU (naturally occurring, yet planned or controlled, wildland fires);
- RxFire;
- Chemical treatments using herbicides to control cheatgrass or noxious weeds;
- Mechanical treatments, using a variety of mowing, chaining, chopping, or chainsaw techniques, to control undesirable plant species and reduce vegetation fuel levels; and
- Seeding (drill-seeding or broadcast seeding).

These various methods for improving cover types and reducing fuel levels would be expected to have two primary effects on visual resources. First, smoke produced by planned wildland burning and RxFire would increase atmospheric particulate matter (measured as PM_{10}), which could produce regional haze and reduce local visibility. After fire treatment, the exposure of the planning area's generally fine, loess-type soil, to typical summer convection winds could produce dust storms (particularly in the planning area's lower elevation areas) that reduce visibility. This reduction in visibility could degrade scenic quality within the planning area. Second, the mechanical, chemical, burning, and seeding treatments would have direct and indirect effects on the existing visual contrasts of the landscape. Burning and/or chemically and mechanically removing vegetation, along with seeding could produce direct effects that would alter the color, textural form, and linear attributes of the existing landscape. Indirect effects could be produced by fences or barriers used to exclude livestock from the treated areas, which could also alter the color, line, form, and texture of the landscape.

In general, the concentration of fire-produced PM_{10} would depend upon the type of vegetation being burned and the size of the burn area. Per pound, wood burning produces more particulate matter than burning leaves and grass. Wood fires also emit nitrous oxides and volatile organic compounds that are the precursors to ozone and smog. The quantity of smoke produced by RxFires also depends upon the number of acres burned (i.e., large fires would produce more smoke than small fires). The type of fire produced also affects the quantity of particulates (i.e., RxFire typically produces fewer emissions than wildland fires, and surface fires typically produce fewer emissions that crown fires [U.S. Department of Agriculture (USDA) Forest Service 2002g]).

4.12.2.1 Direct and Indirect Impacts

4.12.2.1.1 Prescribed Burn (RxFire)

For all of the alternatives, when RxFires are used to move cover types toward FRCC 2 and FRCC 1, the smoke and burned areas would produce some visual quality degradation. This degradation from particulates and from landscape visual contrasts would have minor effects because of the relatively small size and low intensity of the RxFires. Particulates would dissipate and vegetation in burned areas would eventually reestablish.

4.12.2.1.2 Wildland Fire Use (WFU)

Impacts to visual resources as a result of implementing WFU would be similar to those described under RxFire, assuming the timing and location of wildland fire is similar to where an RxFire would meet the same objectives.

4.12.2.1.3 Chemical Treatment

For all the alternatives, the use of chemical treatments would have minor effects on visual quality. Color contrasts could be visible between treated and untreated areas in non-native Invasive Annual Grass cover types in the spring, but for most of the year the effects of treatment would be visually consistent with normal grass curing.

4.12.2.1.4 Mechanical Treatment

Mechanical treatments, using a variety of mowing, chaining, chopping, or hand-tool techniques, could affect visual quality, but the effects would depend upon the type of treatment. Mowing would tend to have minor effects on visual quality by producing some contrast between treated and untreated areas. Chopping and hand-tool treatments could produce color, texture, and linear contrasts between treated and untreated areas, but the effects would generally be minor when viewed within the middleground or background, where existing vegetation would screen the effects. Chaining treatments in juniper encroachment cover types could produce adverse changes in visual quality if conducted in highly visible areas (e.g., along roadways, within the viewshed of recreation areas, or on steep slopes). Chaining-treated areas would tend to produce strong textural, linear, and form contrasts with surrounding untreated areas when viewed in the foreground and middleground, but these contrasts would tend to diminish when viewed from a distance.

The effects of fire suppression on visual resources, for all of the alternatives, would vary, depending upon the methods used for suppression. Applying fire retardant on the landscape could produce minor adverse visual contrasts because of its bright color, but these effects would dissipate relatively quickly. Public access to burned areas and areas in the vicinity of dozer lines and firebreaks would be restricted by use of physical barriers, which would result in minor, beneficial effects by reducing further impacts.

Fire suppression-related construction of firelines, firebreaks, dozer lines, and access roads for fire crews and equipment could produce both beneficial and adverse impacts on visual resources within the planning area. Positive effects on visual resources would be produced by the

preservation of islands of vegetation during supression activities. Negative effects would be the potentially strong linear, color, textural, and form contrasts produced by creating highly disturbed strips of land denuded of vegetation. If not effectively rehabilitated, these fire-suppression features could remain as visual impacts into the future.

4.12.2.1.5 Seeding Treatment

The effects of seeding treated areas would vary. Aerial broadcast seeding, followed by harrowing or chaining, would tend to produce minor soil surface disturbances that could create texture and color contrasts. These contrasts would tend to dissipate after vegetation re-growth.

Drill reseeding could produce minor adverse and beneficial effects. Adverse, textural and linear visual effects could be produced by drill row surface soil disturbances. Beneficial effects of drill seeding would be produced by introducing vegetation that either contributes to cover type diversity or mimics the structure of the surrounding native cover type. If resource objectives are not met, these soil surface disturbances could remain as minor adverse impacts on visual quality into the future.

4.12.2.2 Fire Regime Condition Class (FRCC)

Under FRCC 1, historical fire patterns have been restored to cover types. Vegetation composition and structure, and vegetation fuel loads have been restored to historical levels and are within historical ranges of variability. Thus, fuel loads are relatively light and the risk of frequent, large-scale wildland fires is low. Smoke production would be low in volume and would have minor impacts on visual quality. Visual contrasts within the landscape, produced by fires, would be minor because the severity of wildland fire would be low and native plant species (adapted to historical fire patterns) would quickly recover.

FRCC 3 describes the condition at which much of the cover types within the planning area are presently classified. Under this FRCC, vegetation composition, structure, and fuel loads have been greatly altered from historical fire patterns and cycles. The potential for the production of instantaneous high volumes of smoke from large-scale wildland fires is high. FRCC 3 also describes cover types that could produce major visual contrasts within the landscape from large-scale scorching of the landscape. Scorching would create highly visible contrasts within the landscape by altering the natural *elements* of the landscape (i.e., line, form, color, and texture).

FRCC 2 describes cover types that have been moderately removed from historical fire patterns and cycles. Vegetation composition, structure, and fuel loads have a moderate potential for producing large wildland fires. Smoke production and landscape scorching would be moderate because fuel loads, vegetation density, and vegetation composition would be at a moderate variance from historical fire conditions. Thus, with lower fuel loads and smaller, less frequent wildland fires, the effects on visual quality from atmospheric particulate matter and landscape scorching would be moderate.

For all of the alternatives, moving areas toward FRCC 2 and FRCC 1 cover types would produce positive visual effects. In general, "areas with the most scenic variety and harmonious composition have the most scenic value" (BLM 1986). By restoring a diversity of cover types at different stages of succession, scenic variety would be enhanced.

4.12.3 ALTERNATIVE A

4.12.3.1 KOP 1: Pocatello Creek Urban Boundary

Under Alternative A, there would be 0 acres for WFU treatment and 36,590 acres within the planning area treated as RxFire. The estimated PM_{10} combined concentrations, produced by RxFire under this alternative would be approximately 1,158 lbs/acre burned for Dry Conifer, Juniper/Pinyon Mixed Conifer, Mid-elevation Shrub, and Mountain Shrub cover types (Trinity 2003). An indirect effect of this fire management regime would be to increase the risk of visual degradation from fires burning across public land boundaries onto private lands within the Pocatello Creek drainage.

The estimated PM_{10} concentration from Low-elevation Shrub would be approximately 14 lbs/acre burned. There would be a potential for the moderate, indirect, negative effect of RxFire burning onto private lands within the Pocatello Creek drainage. The contrast effects of burned and unburned areas would be similar to those described above. Under Alternative A, this KOP is not likely to have seeding treatments or chemical treatments other than noxious weed control.

The impacts of Alternative A would be to maintain the Mid-elevation Shrub cover types under conditions that allow frequent, large-scale wildland fires to burn, with the continued expansion of non-native species. Under FRCC 3, the potential for long-duration smoke production and the potential for frequent, high-intensity, large-scale fires would remain high. This would result in the potential for major visual quality degradation from atmospheric particulates and large-scale landscape scorching as seen from this viewpoint. Scorching would create highly visible landscape contrasts by altering the visual elements of the landscape (i.e., line, color, and texture). Burning would produce distinct linear contrasts at the boundaries between burned and unburned areas. Textural and color contrasts would be visible between burned and unburned areas; unburned areas would maintain their present diversity of textures and colors, while burned areas would present a relatively uniform dark color and fine texture.

FRCC 3 would be maintained for all cover types in the area with the exception of Riparian and Salt Desert Shrub, producing fire conditions that could result in frequent, large-scale wildland fires. There would be the potential for major, degradation of visual quality caused by atmospheric particulates, and burned-landscape contrasts that would affect linear, textural, and color attributes.

4.12.3.2 KOP 2: Appendicitis Hill Wilderness Study Area (WSA)

As described for Pocatello Creek KOP, the estimated treatment-acres for this alternative would include 0 acres for WFU treatment and 36,590 acres for RxFire. Similarly, the Low-elevation Shrub cover types would have the potential for producing moderate visual quality-degrading atmospheric particulates and burnt-landscape contrasts. Textural contrasts produced by fire would be minimal, but color and linear contrasts between burned and unburned areas would be distinct. If untreated, the Mid-elevation Shrub cover types would have the potential for producing less-frequent, but higher intensity fires with a corresponding higher risk of burning large acreages. This, in turn, would have major, negative effects on visual quality from smoke and landscape contrasts within large burned areas. Under Alternative A, this KOP is not likely to

have seeding treatments or chemical treatments other than noxious weed control, so the effects to visual quality from these activities would be minimal.

Effects of Alternative A would be similar to those for the KOP 1 Pocatello Creek Urban Boundary. Effects would be to maintain Mid-elevation Shrub at FRCC 3 and restore the Low-elevation Shrub cover types to FRCC 2. Similarly, the Low-elevation Shrub cover types under FRCC 2 would have the potential for producing moderate visual quality-degrading atmospheric particulates and burnt-landscape contrasts. Textural contrasts produced by fire would be minimal, but color and linear contrasts between burned and unburned areas would be distinct. The Mid-elevation Shrub cover types, maintained at FRCC 3, would have the potential for producing frequent, high-intensity, large-scale wildland fires, with a corresponding production of major, negative effects on visual quality from smoke and landscape contrasts within burned areas. These conditions would degrade visual quality caused by atmospheric particulates, and a burned landscape with linear and color contrasts. Under Alternative A, this KOP is not likely to have seeding treatments or chemical treatments, other than noxious weed control.

4.12.3.3 KOP 3: Ohio Gulch

The estimated treatment-acres for this alternative would include 0 acres for WFU treatment and 36,590 acres for RxFire. The effects of treating the Mid-elevation Shrub cover types in Ohio Gulch would be similar to the effects for the KOP 1 Pocatello Creek Urban Boundary. RxFire would create highly visible contrasts within the landscape by altering the natural visual elements of the landscape, particularly the linear, color, and textural attributes of the landscape. Distinct lines would be visible at the boundaries between unburned and burned areas, color contrasts would be obvious between burned and unburned vegetation, and the diversity of textures within vegetated areas would be clearly contrasted with the relatively homogeneous texture produced by burning. Under Alternative A, this KOP is not likely to have seeding treatments or chemical treatments other than noxious weed control.

The effects of maintaining the current fire management regime of FRCC 3 for the Mid-elevation Shrub cover types in Ohio Gulch would be similar to the effects for the KOP1 Pocatello Creek Urban Boundary. Under FRCC 3, there would be the potential for frequent, long-duration smoke production and the potential for high-intensity, large-scale fires would remain high. This would result in the potential for major negative visual quality degradation effects from atmospheric particulates and landscape scorching. Scorching would create highly visible contrasts within the landscape by altering the natural visual elements of the landscape, particularly the linear, color, and textural attributes of the landscape. Distinct lines would be visible at the boundaries between unburned and burned areas, color contrasts would be obvious between burned and unburned vegetation, and the diversity of textures within vegetated areas would be clearly contrasted with the relatively homogeneous texture produced by burning. Under Alternative A, this KOP is not likely to have seeding treatments or chemical treatments, other than noxious weed control.

4.12.4 ALTERNATIVE B

4.12.4.1 KOP 1: Pocatello Creek Urban Boundary

Under this alternative, WFU treatments would total 112,180 acres and RxFire treatments would total 356,000 acres. The combined PM_{10} concentrations produced by RxFire and WFU within these cover types would be approximately 289 lbs/acre. Mountain Shrub cover types would have the potential for producing moderately visual-quality degrading smoke; however, the effects on color, texture, and line would be similar to those for Alternative A.

There would be some adverse changes in landscape color and texture landscape contrasts if fire was used as a treatment, but these would be minor. Mechanical treatments would produce similar minor changes in landscape contrasts. Under this alternative, no chemical treatments are likely except noxious weed control.

Under Alternative B, FRCC 2 and 3 would be maintained for Low-elevation and Mid-elevation Shrub. Similar to Alternative A, this would maintain fire conditions that have a potential for frequent, large-scale wildland fire, resulting in the potential for major visual quality degradation from atmospheric particulates and large-scale landscape scorching. Landscape scorching would produce linear, textural, and color effects similar to those described previously.

Mountain Shrub, Dry Conifer, and Juniper cover types would be moved toward FRCC 1. This would create fire conditions by which there would be the potential for minor visual degradation from atmospheric particulates and landscape burns. Some color, line, and texture contrasts would be visible in the shrub cover type, but the effects of burning in the Juniper and Dry Conifer cover types would be minor and not obvious to the casual viewer. The effects of chemical treatments in the Mountain Shrub, Dry Conifer, and Juniper cover types would also be minor, and not obvious to the casual viewer. The effects of mechanical treatment would vary, depending upon the methods used. The potential for the indirect negative effects of large wildland fires moving onto private lands would also be reduced.

4.12.4.2 KOP 2: Appendicitis Hill Wilderness Study Area (WSA)

The RxFire and WFU treatment-acres would be the same as described for KOP 1. The estimated PM_{10} concentration would be approximately 28 lbs/acre from RxFire and WFU treatments for these two cover types, producing the potential for scenic-quality reducing haze. The effects of fire on line, color, and texture would be apparent from the distinct contrasts between burned and unburned areas. The boundaries between burned and unburned areas would form highly visible lines on the slopes of the WSA, easily seen from the highway. The color contrast between burned and unburned areas would be distinct, and some minor contrasts in texture would be visible. Under this alternative, chemical treatments are unlikely. Any seeding, if done, would be aerial broadcast, producing minimal impacts on visual quality.

Under Alternative B, RxFire acres would total 356,000 acres and WFU-treated acres would total 112,180 within the planning area. Low-elevation and Mid-elevation Shrub would remain at FRCC 3, with the corresponding risks of frequent, large-scale wildland fire. The impacts would be similar to those given for the impacts under Alternative A.

4.12.4.3 KOP 3: Ohio Gulch

The estimated PM_{10} concentration produced by this vegetation would be approximately 14 lbs/acre from RxFire and WFU, with the same RxFire and WFU acreages as described above. The effects would be similar to those described in Section 4.12.3.3 for Mid-elevation Shrub. Smoke particulates produced by RxFire and WFU fire treatments would create the potential for haze, and areas of burned vegetation would create distinct contrasts in color, line, and texture with unburned vegetation. Under this alternative, chemical treatments are unlikely except for some noxious weed control.

With the same WFU and prescribe treatment-acres as described above, the effects of Alternative B would be that Mid-elevation Shrub cover types would remain at FRCC 3. The impacts would be similar to Alternative A impacts (see Section 4.12.3.3).

4.12.5 ALTERNATIVE C

4.12.5.1 KOP 1: Pocatello Creek Urban Boundary

Under this alternative, the planning area would treat 1,034,603 acres under RxFire and 129,518 acres under WFU. Compared to both Alternative A and Alternative B, more acres would be treated with RxFire and WFU. Chemical treatments would produce minor changes in visual elements between treated and untreated areas. The effects of mechanical treatments would vary, depending upon the types of treatments used. This alternative would create the potential for moderate visual quality degradation from wildland fire, as seen from this KOP, because the potential for smoke production would be greater and the number of treatment-acres is greater when compared to Alternatives A and B. Some adverse landscape contrasts in color, line, and texture could be visible.

Alternative C would reduce the future potential for visual quality degradation from all cover types to a minimal or very limited level (at FRCC 1). The behavior, severity, and patterns of FRCC 1 would create the potential for producing only minor or limited visual quality degradation effects from fire-produced atmospheric particulates. Landscape contrasts from visibly burned areas would not be apparent. The indirect impacts of wildland fire crossing into urban areas would also be minor or limited.

4.12.5.2 KOP 2: Appendicitis Hill Wilderness Study Area (WSA)

The impacts under this alternative would be similar to those impacts described for Low-elevation Shrub cover types under Alternative A. The relatively large number of treatment-acres under this alternative could reduce visual quality. Some adverse landscape contrasts in color, line, and texture could be visible, but impacts from mechanical treatments would be minimal within the WSA.

Overall impacts of this alternative, resulting from moving the Mid-elevation Shrub cover types toward FRCC 1, would be similar to the impacts for the KOP1 Pocatello Creek Urban Boundary described above. By recreating historical fire patterns, characteristics, and levels of severity there would be only minor or very limited visual quality degradation from fire-produced atmospheric particulates and landscape line, color, and texture contrasts between burned and unburned areas.

4.12.5.3 KOP 3: Ohio Gulch

The impacts of this alternative would be similar to those described for KOP2 Appendicitis Hill WSA under Alternative A.

The impacts of moving Mid-elevation Shrub cover types toward FRCC 1 would be similar to those described for KOP2 Appendicitis Hill WSA under Alternative A.

4.12.6 ALTERNATIVE D

4.12.6.1 KOP 1: Pocatello Creek Urban Boundary

Under this alternative, RxFire acres would total 676,515 acres and WFU-treated acres would total 14,800 acres. Alternative D would treat approximately 639,925 more acres by RxFire and 14,800 more acres for WFU compared to Alternative A. Alternative D would treat more acres by RxFire, but less by WFU as compared to Alternative B. The effects on visual resources would be similar to those described for this area under Alternative C above.

Alternative D would maintain the potential for visual quality degradation from smoke and landscape contrasts at a moderate to major level for all cover types, except Mountain Shrub and Vegetated Rock/Lava cover types. This alternative would maintain Dry Conifer cover types at FRCC 3, move Juniper and Mid-elevation Shrub toward FRCC 2, and move Mountain Shrub cover types toward FRCC 1.

Dry Conifer cover types would continue to have the potential to produce major negative effects on visual quality from high concentrations of fire-produced PM_{10} and strong visual contrasts in color, texture, and line within the landscape between burned and unburned areas. Juniper and Mid-elevation Shrub cover types would have the potential for moderate degradation of visual quality by smoke particulates from wildland fire, but the effects on visual quality between burned and unburned areas would not be obvious to the casual viewer. Mountain Shrub cover types, moved toward FRCC 1, would have the potential for minor or limited effects on visual quality.

4.12.6.2 KOP 2: Appendicitis Hill Wilderness Study Area (WSA)

The effects of this alternative would be similar to those described for this area under Alternative C, above (see Section 4.12.5.2).

Maintenance of the Low-elevation Shrub cover type in FRCC 2 would have the potential for major, negative effects on visual quality, similar to the effects described for Alternative A. The effects of moving Mid-elevation Shrub cover types toward FRCC 2 would be similar to those described for the Pocatello Creek Urban Boundary above.

4.12.6.3 KOP 3: Ohio Gulch

The effects of this alternative would be similar to those described for this area under Alternative C, above (see Section 4.12.5.3).

The effects of this alternative, by moving Mid-elevation Shrub cover types toward FRCC 2, would be to reduce the potential for visual quality degradation from smoke-produced particulates and landscape visual contrasts to a moderate level. The effects of burn-produced contrasts in line, color, and texture on the landscape would not be obvious to the casual viewer.

4.12.7 ALTERNATIVE E

4.12.7.1 KOP 1: Pocatello Creek Urban Boundary

Under this alternative, RxFire acres would total 692,348 acres and WFU-treated acres would total 19,281 acres. Alternative E would treat approximately 655,758 more acres by RxFire and 19,281 more acres for WFU compared to Alternative A. Alternative E would treat more acres by RxFire, but less by WFU as compared to Alternative B. The effects on visual resources would be similar to those described for this area under Alternatives C and D above.

Alternative E would maintain the potential for visual quality degradation from smoke and landscape contrasts at a moderate to major level for all cover types, except Mountain Shrub and Vegetated Rock/Lava cover types. This alternative would move the Dry Conifer cover types to FRCC 2, move Juniper and Mid-elevation Shrub toward FRCC 2, and move Mountain Shrub cover types toward FRCC 1.

Dry Conifer cover types would have the potential to produce major negative effects on visual quality from high concentrations of fire-produced PM_{10} and strong visual contrasts in color, texture, and line within the landscape between burned and unburned areas. However, in the long-term, this alternative would have positive impacts on visual quality in the Dry Conifer cover type by moving it toward FRCC 1. This would result in generally smaller fires at a higher frequency, thereby resulting in less short-term pollutants and smaller areas of visual contrast. Juniper and Mid-elevation Shrub cover types would have the potential for moderate degradation of visual quality by smoke particulates from wildland fire, but the effects on visual quality between burned and unburned areas would not be obvious to the casual viewer. Mountain Shrub cover types, moved toward FRCC 1, would have the potential for minor or limited effects on visual quality.

4.12.7.2 KOP 2: Appendicitis Hill Wilderness Study Area (WSA)

The effects of this alternative would be similar to those described for this area under Alternative C, above (see Section 4.12.5.2).

Maintenance of the Low-elevation Shrub cover type in FRCC 2 would have the potential for major, negative effects on visual quality, similar to the effects described for Alternative A. The effects of moving Mid-elevation Shrub cover types toward FRCC 2 would be similar to those described for the Pocatello Creek Urban Boundary above.

4.12.7.3 KOP 3: Ohio Gulch

The effects of this alternative would be similar to those described for this area under Alternative C, above (see Section 4.12.5.3).

The effects of this alternative, by moving Mid-elevation Shrub cover types toward FRCC 2, would be to reduce the potential for visual quality degradation from smoke-produced particulates and landscape visual contrasts to a moderate level. The effects of burn-produced contrasts in line, color, and texture on the landscape would not be obvious to the casual viewer.

4.12.8 Mitigation and Monitoring

Refer to Appendix Q, Management Restrictions for management restrictions common to all alternatives intended to prevent significant impacts to visual resources. Additionally, design features that include creating irregular lines would be used to help soften the contrast between treated and non-treated areas.

4.12.9 Unavoidable Adverse Impacts

There would be unavoidably adverse impacts to visual resources associated with RxFire, chemical, and mechanical fire treatments. The unavoidable adverse impacts would include (1) atmospheric pollution from smoke particulates (PM_{10}) and indirect impacts from wind-blown soil, (2) heightened visual contrasts between burned and unburned areas, and (3) visual contrasts caused by the loss of vegetation or by disturbed soil from mechanical and chemical treatments and drill seeding.

4.12.10 Irretrievable and Irreversible Commitment of Resources

Irretrievable impacts to visual resources would include the short-term impacts from smoke particulates and wind blown soil, visual contrasts between burned and unburned areas, and visual contrasts associated with the loss of vegetation and disturbed soil. However, this short-term loss in visual resources would not be irreversible, as it would be restored through implementing a rehabilitation and restoration program as described in Chapter 2.

4.12.11 Cumulative Effects

Other fire management efforts, both within the planning area and beyond its boundaries, would produce beneficial cumulative impacts on visual resources. Reasonably foreseeable future actions, including planning efforts to control noxious weeds, OHV use, fire treatments, and habitat improvement projects, would contribute to improvements in visual quality.

Specific actions that could potentially have beneficial cumulative effects include (1) USFS RxFires to reduce fuel loads and improve habitat in the Caribou-Targhee and Sawtooth National Forests, (2) INL management plan changes, and (3) the Idaho statewide implementation plan that focuses on fire management and fuel load reductions. These efforts, in addition to the planning area effort to manage wildland fire, are expected to reduce the impacts on visual resources by reducing the potential for wildland fire, recreating historical fire conditions, and creating scenic diversity.

4.13 ANALYSIS OF EFFECTS ON CULTURAL RESOURCES

4.13.1 ANALYSIS ASSUMPTIONS AND METHODS

Approximately 9,100 archaeological sites and historical properties have been documented in the planning area, and many more have not yet been documented through formal inventory and recordation. In general, the effect of fire on cultural resources is directly correlated with the nature of the resource and the severity and intensity of the fire. Consequently, the specific effects of implementing one of the action alternatives on all individual sites are, to some degree, unknown at this time. This analysis is based on estimates of the number, type, and significance of archaeological and historical sites provided by cultural resource inventories for approximately 5 percent of the planning area. Furthermore, all specific federally funded or licensed projects on BLM-administered land are subject to review under Section 106 of the National Historic Preservation Act (NHPA) (36 Code of Federal Regulations [CFR] 800). As part of this review process, cultural resources are identified on the ground prior to any action, and mitigation strategies are developed. Overall, certain generalities exist as to the impacts of wildland fire and fire management on given types of cultural resources, and as such, this information can be used to predict how implementing this EIS is likely to affect resources in the planning area.

The various impacts mentioned above consist of a wide range of possible effects of RxFire, WFU, and other vegetation treatments. For the purpose of this analysis, it is assumed that the worse impacts to cultural resources would occur in cover types that are presently in or moving toward FRCC 2 or 3. This is because higher severity fires, larger fires, and loss of ecosystem components are assumed to create detrimental effects on cultural resources presently in the natural environment.

4.13.2 EFFECTS COMMON TO ALL ALTERNATIVES

4.13.2.1 Direct and Indirect Impacts of Prescribed Burn (RxFire)

Cover types treated with RxFire provide several opportunities for cultural resources management. While fire can have a substantial negative impact on some cultural resources, it can have a positive effect on others. For example, removing ground cover or thick stands of vegetation can expose previously unknown archaeological sites for identification, documentation, and study, providing land managers an opportunity to expand their understanding of the locations and types of cultural resources within their jurisdiction. However, depending on the stability of the soils in which a cultural site is located, loss of vegetative ground cover can also result in increased levels of erosion through wind scouring and runoff. This erosion can deflate sites, causing the movement of artifacts away from their original locations and altering the accuracy of the information that can be obtained from studying artifacts in the primary context. Erosion can also scour features or cause standing structures to be undermined and collapse. Erosion, however, can be controlled by replacing vegetation through seeding. Effects of seeding are discussed in Section 4.10.2.1.5.

Increased unauthorized collection of artifacts from archaeological sites (commonly called looting) is also a negative consequence of fire. Looting by the general public (the land users) may occur if they become aware of sites that are exposed to view by fires that reduce vegetative

cover. Most looting on the small scale is undertaken by people who are unaware that their activities are illegal. Professional looters however know what they are going after and sometimes return to a site if it paid off before. Looting can often be controlled by educating the public about the various laws protecting cultural resource sites and the penalties for violating these laws.

Furthermore, the effects of fire on cultural resources are related to the severity of the fire. High temperature, slow burning fires cause far more damage to cultural materials than do cooler, faster burning fires. While RxFire would be conducted under controlled circumstances, and the BLM would have an opportunity through Section 106 to identify sites in the planning area, there remains some risk to cultural resources. This risk is related to the possibility of RxFire not behaving within its planned prescription. If that occurs, historic structures could be directly affected by RxFire and buried undiscovered sites could be impacted by the construction of fire control lines.

4.13.2.2 Direct and Indirect Impacts of Wildland Fire Use (WFU)

As described above for RxFire, the effect of fire on cultural resources is directly correlated with the nature of the resource and the severity and duration of the fire. The location and timing of wildland fires are generally unpredictable. Finally, activities specifically-geared to controlling and/or suppressing wild fire can affect cultural resources more so than activities to control an RxFire.

It is also important to discuss the effects of fire suppression that may be related to aspects of fire use. Fire management and suppression activities can involve ground disturbances such as creating firebreaks, roads, and staging areas with mechanical and hand operated equipment. These activities can break artifacts or damage features. Perhaps more importantly, they can move artifacts, architecture, and features out of their original spatial location, thus disturbing the information that archaeologists could gain from the spatial organization of archaeological sites.

Furthermore, there are ancillary effects of fire management that have been documented by recent studies. Two primary negative impacts associated with burning of any type, as discussed above, are erosion and looting (Hanes 2001). These impacts are discussed in more detail below.

Archaeological sites consist of a collection of artifacts. Surface artifacts are more susceptible to damage from fire suppression and revegetation activities than subsurface artifacts. The Wildland Fire Suppression Restrictions (2.4.3.3.1), Fire and Non-Fire Vegetation Treatment Restrictions (2.4.3.3.2), and ESR Restrictions (2.4.3.3.3) are followed as standard operating procedures to minimize impacts to surface and subsurface cultural artifacts.

4.13.2.3 Direct and Indirect Impacts of Chemical Treatment

The chemical application of herbicides to control invasive species/noxious weeds during ESR and restoration may affect cultural resources. Herbicides could harm traditional use plants, or threaten the health of the people gathering, handling, or ingesting recently treated plants, fish, or wildlife that are contaminated with herbicides (BLM 2007). Applying chemicals, as discussed in previous sections, has the potential to introduce corrosive effects to artifact classes and change the soil chemistry of cultural resource sites in ways that may reduce their potential to address

certain research questions and provide certain classes of data. Currently, however, there are no studies that provide data on the effects of herbicides on archaeological sites and artifacts.

4.13.2.4 Direct and Indirect Impacts of Mechanical Treatment

Mechanical activities can include, mowing, chaining, chopping, and cutting of surface vegetation, and applying seeds via rangeland drill. In general, the impacts from mechanical treatments on cultural resources are related to the physical disturbance of artifacts and features by the mechanical activities. During any ground disturbing activities, intact segments of linear sites such as historic trails and wagon roads, several of which are known to exist in the planning area, can be significantly altered or completely destroyed. Ground disturbance on non-linear archaeological sites can result in breaking or displacing artifacts from their original context. Subsurface features such as storage pits, burials, hearths, and the foundations of dwellings can be exposed and destroyed depending on the depth to which they are buried and the depth of ground disturbance by the heavy machinery. Even hand-operated tools such as picks and shovels can cause physical damage to cultural resource sites. These activities move artifacts, architecture, and features out of their original spatial locations. Pre-treatment inventories for archaeological resources and consultation with tribal governments can help to identify cultural resource sites in a proposed treatment area. Once such resources have been identified, treatment plans can be tailored to include avoidance measures, such as those outlined in Appendix Q, Management Restrictions for historic trails.

4.13.2.5 Direct and Indirect Impacts of Seeding Treatment

Impacts to cultural resource sites from mechanical seeding (drilling) can include such things as altering or destroying historic trails and roads. Because of these potential impacts, the BLM conducts pre-treatment inventories for archaeological resources to identify cultural resource sites in a proposed treatment area. Consultation with Tribal Governments is also undertaken to identify resources of importance to tribal governments is also undertaken to identify resources of importance to the tribal governments. Once such archaeological or tribal resources have been identified, treatment plans can be tailored to include avoidance measures, such as those outlined in Appendix Q, Management Restrictions, for historic trails.

4.13.3 ALTERNATIVE A

Under this alternative, impacts could occur as described above to different types of cultural resources. An estimated 250,200 footprint-acres could be subject to WFU, mechanical treatment, chemical treatment, RxFire, or seeding. Fires (either RxFire or WFU) would have a variety of effects on archaeological and historical sites and artifacts. Cultural resources on the untreated acres could be destroyed, damaged, or altered under this alternative. ESR and restoration activities could also result in impacts to sites by either directly disturbing artifacts through ground disturbing activities or through the effects of chemicals on artifacts. However, as is discussed below under mitigation, standard BLM practice entails measures such as pre-action inventory and avoidance that would be likely to mitigate many of these impacts.

4.13.4 ALTERNATIVE B

Under Alternative B, it is estimated that approximately 646,000 footprint-acres in most cover types would be treated through RxFire, WFU, and/or other vegetation treatments. Although the location of many cultural resources is not known, it is likely that some resources could be impacted by treatment. Because it is generally the case that the likelihood of a site being present increases with the acreage under consideration, the larger footprint-acreage for Alternative B (relative to Alternative A) would likely result in a greater risk of encountering a site. However, the relationship is not necessarily one to one; site distribution is related to many factors and not directly related to acres. Therefore, it is not possible to accurately estimate how many more sites would be affected. Fires (either RxFire or WFU) would have a variety of effects on archaeological and historical sites and artifacts. Restoration and ESR activities could also result in risks to sites by either directly disturbing artifacts through ground disturbing activities or through the effects of chemicals on artifacts. Resources could be uncovered through mechanical treatment, burned through the use of fire, or possibly damaged through the application of chemicals as discussed above. However, as is discussed below under mitigation, standard BLM practice entails measures such as pre-action inventory and avoidance that would be likely to mitigate many of these impacts.

4.13.5 ALTERNATIVE C

Under this alternative, it is estimated that approximately 1,687,000 footprint-acres would be treated through RxFire, WFU, and/or other vegetation treatments. Although the location of many cultural resources is not known, it is likely that some resources could be impacted by treatment. Because it is generally the case that the likelihood of a site being present increases with the acreage under consideration, the increased footprint-acreage for Alternative C (relative to Alternatives A or B) would be likely to result in an increased number of sites impacted. However, standard BLM practice entails measures such as pre-action inventory and avoidance that would be likely to mitigate many of these impacts.

4.13.6 ALTERNATIVE D

Under this alternative, it is estimated that approximately 1,522,000 footprint-acres in Low-elevation Shrub, Perennial Grass, and Invasive Annual Grass would be treated through RxFire, WFU, and/or other vegetation treatments. Similar to Alternative B, cultural resources could be uncovered through mechanical treatment, burned through the use of fire, or damaged through the application of chemicals. Because it is generally the case that the likelihood of a site being present increases with the acreage under consideration, the increased footprint-acreage for this alternative (relative to Alternatives A or B) would be likely to result in an increased number of sites impacted. The acreage is similar to that proposed for Alternative C, and it is probable that the effects of this alternative would be similar to that of Alternative C. BLM standards for pre-treatment inventories and consultation under Section 106 of the NHPA apply and are effective in identifying resources and mitigating potential negative impacts under any given treatment alternative.

4.13.7 ALTERNATIVE E

Under this alternative, it is estimated that approximately 1,538,000 footprint-acres would be treated through RxFire, WFU, and/or other vegetation treatments. Similar to Alternative B, cultural resources could be uncovered through mechanical treatment, burned through the use of fire, or damaged through the application of chemicals. Generally, because the likelihood of a site being present increases with the acreage under consideration, the increased footprint-acreage for this alternative (relative to Alternatives A or B) would likely result in an increased number of sites impacted. The acreage proposed under Alternative E is similar to Alternatives C and D, and it is probable that the effects would be similar to these alternatives. BLM standards for pre-treatment inventories and consultation under Section 106 of the NHPA apply and are effective in identifying resources and mitigating potential negative impacts under any given treatment alternative.

4.13.8 MITIGATION AND MONITORING

The BLM has formulated management restrictions to protect cultural resources during fire management activities. In addition to these guidelines, the BLM as a federal agency is required to comply with with all relevant cultural resource laws including Section 106 of the NHPA to identify archaeological and historical properties eligible for or listed on the National Register of Historic Places (NRHP) and to determine if these properties would be affected by a specific action. Standard BLM policy prior to planned actions, such as RxFires, is to conduct a reconnaissance or judgmental survey within portions of proposed burn areas where existing data reviews suggest that flammable properties or resources that might be vulnerable to damage by planned RxFires. These areas would then be avoided if possible. Standard policy prior to ESR or restoration activities is to have a comprehensive field surface inventory of the area in question conducted by a qualified professional. Following the identification of archaeological and historical sites visible on the surface, the sites are protected from looting and then avoided if possible during ground disturbing or other ESR/restoration activities. Similarly, whether a site is eligible for the NRHP is irrelevant to the tribes. A site could have very little left on the surface and still be a very significant site to the tribes and the BLM must also determine if these properties would be affected by a specific action.

The site identification and avoidance procedure would mitigate many of the potential impacts described above for all of the alternatives. By identifying resources that may be affected by fire and then avoiding them during RxFires and ESR/restoration activities, many of the negative effects from these activities would be mitigated. Additionally, the consultation process with tribal governments would help identify opportunities to use proposed treatments to benefit cover types of importance to these groups.

However, because it is not possible to identify every potential cultural resource, particularly subsurface resources or resources obscured by vegetation during field inventories, it is not possible to completely avoid all cultural resources or guarantee that no impacts would occur. Fire suppression activities under wildland fire situations would also occur in a situation that does not easily allow for the identification of resources prior to conducting ground disturbing or other suppression activities. Currently there is no technology that could efficiently and confidently identify all cultural resources on all acres of the land in question. Notably, however, wildland

fires have been impacting these sites for thousands of years, and would continue to do so. The mitigation measures developed here have been established to provide the best feasible protection from the negative effects of wildland fire, fire suppression, ESR, and restoration activities to cultural resources. Following the identification of archaeological and historical sites on the surface, the sites would be avoided if possible during ground disturbing and other ESR/restoration activities.

4.13.9 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts to cultural resources from implementing any given alternative are predominantly related to the largely unpredictable effects of fire management actions. Section 106 of the NHPA and BLM guidelines require the identification of cultural resources prior to all undertakings, as well as avoidance of known cultural resource sites. As such, for all components of the five alternatives that involve preventative treatments, pre-treatment inventories and consultation would be implemented to reduce to the greatest extent possible any adverse impacts on significant cultural resources. However, in cases of wildland fire, pre-treatment inventories and consultation are not likely to be possible. As a result, cultural resources located in areas subject to wildland fire may be adversely impacted by either the fire itself or the means of controlling it.

Additional unavoidable adverse impacts are related to the nature of many archaeological sites. Although pre-treatment field inventory can often reveal many archaeological sites, and can often adequately characterize the sites once identified, because many archaeological sites are buried, and many parts of sites are buried, no inventory can identify 100 percent of all archaeological sites or other cultural resources in an area. Thus, for any fire situation or ESR and restoration activity that is ground disturbing, it is possible that previously unidentified resources may be adversely impacted. Furthermore, it is possible that previously buried or otherwise unseen aspects of known resources could be inadvertently damaged during intense fire or ESR and restoration activities.

4.13.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Some irretrievable impacts to cultural resources could occur if all archaeological sites are not located during pre-treatment inventories. These impacts could also be irreversible, particularly if RxFire, WFU, or mechanical treatments are used. These treatments all have the potential to completely destroy undetected cultural sites and associated objects. However, irreversible impacts to cultural resources would be minimized by pre-treatment surveys and full compliance with the Section 106 consultation process.

4.13.11 CUMULATIVE EFFECTS

Cumulative impacts to cultural resources are considered relative to the effects of the alternatives in relation to other similar plans. These similar plans include the Interior Columbia Basin Ecosystem Management Project; the INL management plan; the Sawtooth, Caribou, and Targhee National Forests management plans; and the Idaho Statewide Implementation Strategy for the National Fire Plan. Overall, the primary goals of these plans are to reduce the severity and duration of fires in the planning area. The means proposed to meet these goals are broadly

similar to many proposed under various alternatives in this EIS, and include RxFires, WFU, ESR and restoration activities.

As discussed above, damage to archaeological sites from fire predominantly relates to the severity and duration of the fire. High severity, stand-depleting burns would, in general, result in increased damage to artifacts, features, and architecture of archaeological sites as well as increase the chance of erosion also damaging these sites. Thus, reducing the severity and duration of fires would, over the long run, reduce impacts to cultural resources in the area. There could possibly be increased short-term impacts relating to increased RxFire, WFU, ESR and restoration, or other fire management practices. As described above, RxFire, rangeland drill, and seeding all have the potential to affect artifacts on archaeological and historical sites, features and architecture on sites, as well as the spatial relationships between artifacts and features. Thus, there is the potential for increased contribution of negative cumulative impacts from the actions proposed in this EIS when considered in conjunction with other fire management activities in the area as they may increase the frequency of occurrence in the planning area of the types of activities that can affect cultural resource sites. However, as mentioned above, pre-treatment inventory and avoidance procedures following Section 106 of the NHPA would mitigate many of these cumulative impacts. Indeed, the identification procedures are likely to assist in the management and preservation of cultural resources as they add to the body of knowledge regarding cultural resources. The contribution of this project to cumulative impacts may vary, however, depending on each alternative. Thus, cumulative impacts must be examined relative to the alternatives in terms of their contribution to other plans for reducing the severity and duration of fires.

In general, the cumulative effects on cultural resources for each alternative would be related to the amount of acreage moving from FRCC 3 to FRCC 1. Because the general goals of the other fire management plans and regional strategies are to, in essence, reduce the amount of acreage in FRCC 3 and increase the amount in FRCC 1, these plans should have a positive effect on cultural resources by reducing the amount of damage to cultural resource sites over the long term. Consequently, the alternatives proposed in this EIS should also be considered in terms of their overall contribution to reducing the severity and duration of fires. Alternatives that achieve a reduction in the severity and duration of fires under this EIS would, in combination with the actions undertaken in other regional plans, have a greater positive effect than those that do not reduce, or reduce in lower amounts, the severity and duration of fires.

Although there is not a direct relationship between the number of acres affected by fire of various intensities and the number of sites affected, it is the case that in general, as more acres are subject to fewer fires or fires of lower severity, fewer archaeological and historical sites would be affected. Of the five alternatives, Alternative A changes the FRCC the least number of acres. Under Alternative A, unwanted wildland fire would likely continue to trend toward large, high-severity fires, and potentially increasing numbers of cultural resources would be impacted as more acreage is burned or subjected to control and suppression activities. This could result in increasing impacts to cultural resource sites. Thus, Alternative A would have the least positive contribution to cumulative impacts when considered in conjunction with fire management plans and activities in the foreseeable future.

Under Alternatives B, C, D, and E, the number, size, and severity of unwanted wildland fire is expected to decrease over time as fuel loads decrease. As the number and severity of unwanted wildland fires decreases, it would be expected that the overall frequency of damage to culturally important resources and sacred sites would then decrease. Further, as the number of acres treated through mechanical and/or chemical means or through RxFire increases, larger numbers of cultural resources and sites would be identified through pre-treatment inventories and consultation. As these sites and areas are identified, the proposed fuels treatment can be designed to avoid or limit adverse impacts. Indeed any of these alternatives would result in changing the FRCC of a vastly greater number of acres than all of the other regional foreseeable future actions combined.

There are, however, variations in the amount of acres that would have FRCC among the actions other than Alternative A. Alternative B would result in an increased number of acres with a changed FRCC relative to Alternative A. Relative to Alternative A, Alternative B would have a greater positive cumulative contribution. However, Alternatives C, D, and E all result in proportionately much greater long-term change in FRCC in the planning area and adjacent areas than Alternative B, A, or the previously described reasonably foreseeable future actions. Thus, these alternatives would have a significant positive cumulative impact on cultural resources when considered with other actions in the planning area. This positive contribution to cumulative impacts in the area would be much greater than either Alternative A or B.

4.14 ANALYSIS OF EFFECTS ON NATIVE AMERICAN TRIBAL CONCERNS

4.14.1 ANALYSIS ASSUMPTIONS AND METHODS

Native American people perceive the natural enviornment with its constituent landscapes, ecosystems, and organisms, the earth and waters, the sky and universe, and the entire existence as sacred manifestations of the Creator. Therefore, management actions on public lands should be performed in a sense of reverent awareness for these values. Several sites, natural resources, and areas of cultural concern to tribal groups within the planning area are known to the BLM. Identifying such resources has come through archaeological inventories of approximately 5 percent of the planning area and through related consultation with tribal governments. Given that such a small percentage of the planning area has been subject to intensive cultural resource inventories and that regional tribal governments have undoubtedly not disclosed the location and nature of all resources of cultural interest, it is reasonable to assume that many additional sites, resources, and areas of concern exist but are not yet known to the BLM. Consequently, the specific effects of implementing Alternative B or one of the other action alternatives on all individual sites, resources, and areas is, to some degree, unknown at this time.

Consultation with tribal governments would be performed as government-to-government interactions, as a normal part of the NEPA process; technical review under Section 106 of the NHPA (36 CFR 800); and other federal legislation prior to an undertaking. Overall, certain generalities exist as to the impacts of WFU and fire management on given types of sites and resources important to tribal governments, and as such, this information can be used to predict how implementing this EIS is likely to affect such resources in the planning area.

The various potential impacts to cultural resources and sites of cultural patrimony consist of a wide range of possible effects from wildland fire, RxFire, and other fuels treatments. For the purpose of this analysis, it is assumed that the worse impacts to cultural resources would occur in cover types that are presently in or moving toward FRCC 2 or 3. This is because higher severity fires, larger fires, and loss of ecosystem components are assumed to create detrimental effects on cultural resources presently in the natural environment. Similar effects are assumed for natural resources (i.e., cover types such as juniper woodlands and camas prairies and wildlife species such as deer, grouse, rabbits, etc.) of concern to tribal governments; although, as discussed in more detail below, implementing some treatments may benefit these natural resources.

Because archaeological resources are often identified as culturally important by tribal governments, and because a discussion of predicted impacts on cultural resource sites (prehistoric and historical archaeological and structural sites) is included in Section 4.13 of this document, these impacts are not discussed here. It must be recognized, however, that tribal governments may have concerns about impacts to specific archaeological sites from implementation of the proposed alternative or any other alternative and that these concerns must be identified and addressed through the aforementioned Section 106 process. This section addresses impacts to non-site resources of known importance to the tribal governments within the planning area.

4.14.2 Effects Common to All Alternatives

Native American tribal governments subsisted on the lands within the planning area boundaries for thousands of years. Existing ethnographic information generally suggests that aboriginal populations constantly traversed the Snake River Plain during their seasonal subsistence rounds, moving to the Camas Prairie in the spring to gather camas roots and then further into the mountains for the summer. In the fall, they would return to the Snake River for the winter (Steward 1938). Tribal governments from the planning area procured deer, elk, mountain sheep, and moose from the mountains of the Sawtooth, Teton, and northern Wasatch Ranges and harvested salmon from rivers in south-central and southwestern Idaho (Hultkrantz 1974). The Shoshone-Bannock and Shoshone-Paiute tribal governments still hunt game and gather on BLM-administered lands today and continue to ascribe cultural value to the Snake River corridor and the Camas Prairie. Some traditional cultural sites identified as important by modern Native American tribal governments may consist entirely of plant resources (a traditional gathering place). All of these resources could experience short-term impacts from implementing fire management vegetation treatments. These would include the potential loss of some wildife and fish, damage or loss of cultural sites, and loss of plant resources. However, all of these resources would also experience long-term benefits from these fire management activities as vegetation and associated wildlife habitat improves (See Sections 4.2, 4.4, and 4.5). Detailed descriptions of these impacts are given below.

Note that there are no treatments proposed in pinyon pine stands in any of the five alternatives. Accordingly, there would be no impacts to tribal gathering of pinyon pine nuts.

4.14.2.1 Direct and Indirect Impacts of Burn (RxFire)

RxFire provides several opportunities for managing tribal concerns. Even though fire can have an impact on some cultural/tribal resources, it can have a positive effect on others. For example, removing ground cover or thick stands of vegetation can expose previously unknown traditional properties or sites that were unknown to tribal governments but are considered culturally or religiously important to those groups. Similarly, some traditional cultural sites identified as important by modern tribal groups consist entirely of plant resources (a traditional gathering place) such as juniper woodlands or of traditional hunting areas for deer, elk, pronghorn, grouse, and other wildlife species. These cover types and wildlife populations may indeed benefit from periodic burning or other treatment, developing into healthier stands of the given plant or better habitat for wildlife. This, in turn, promotes better returns for the tribal governments under their treaty hunting rights.

Under Section 106, consultation would take place with the tribal governments prior to RxFire. The consultation would strive to identify specific sites and resources, such as traditional plant resource collection areas and hunting areas, of importance to the tribal governments. If such sites or resources are identified, the RxFire plan would be tailored to avoid adverse impacts to the sites or resources, and the tribal governments' right of access to hunting and gathering would be maintained. For a detailed discussion of the effects of RxFire on wildlife resources, some of which are important to the tribal governments as part of their subsistence practices and under their treaty hunting rights, see Section 4.5 of this document.

For a detailed discussion of the effects of RxFire on archaeological resources, some of which may be identified by the tribal governments as culturally important, please see Section 4.13 of this document. The physical effects of fire on archaeological resources as described in Section 4.13.2. may render a resource unable to fulfill its function in or to be used by a tribal government for perpetuating cultural ideology or identity.

4.14.2.2 Direct and Indirect Impacts of Wildland Fire Use (WFU)

The effects of WFU on resources of concern to tribal groups are similar to those described for RxFire, assuming wildland fire timing and location would be similar to that of an RxFire and would meet the same management objectives. For a discussion of the effect of WFU on archaeological resources, some of which may be deemed sacred or culturally important by the tribal governments, see Section 4.13.2 of this document.

Impacts to cultural resources from RxFire and WFU would be minimized with site-specific NEPA analysis and cultural resource inventories completed as appropriate before any fire treatments would be applied on the ground. Particular natural resources such as certain cover types and the habitat of wildlife species of concern to tribal governments may be readily identifiable in a wildland fire situation and may be able to be protected or benefited through effective control of the fire. Archaeological resources of concern, on the other hand, are not likely to be so readily identifiable, and given that only 5 percent of planning area lands have been inventoried for such resources, their presence in any given area is not likely to be known prior to the outbreak of wildland fire. As such, these unidentified archaeological sites would be subject to those wildland fire impacts described in Section 4.13.2 of this document. Such impacts could

adversely affect the ability of an archaeological site to function properly in its role within the tribal culture. Post-fire rehabilitation of archaeological sites may be able to mitigate some of these adverse impacts.

As part of ongoing consultation with the tribal governments under Section 106, traditional hunting and gathering areas that remain in active use by tribal members and/or areas by the tribal governments as important for traditional or ideological reasons would be identified within the planning area. To the extent that such resources are known to exist within an area subject to treatment by WFU, they would be avoided unless consultation results in an agreement between the BLM and the tribal governments that treatment by WFU would benefit the resources of importance to the tribal governments and is acceptable to the tribal governments. Plans for treatment by WFU would be tailored to ensure the maintenance of tribal access rights and would include measures to protect the nesting and wintering habitat of critical wildlife species.

4.14.2.3 Direct and Indirect Impacts of Chemical Treatment

The chemical application of herbicides to control invasive species/noxious weeds during ESR and restoration can also affect cultural resources. Although no studies have examined the specific effects of these types of activities on cultural resource sites, due to the straightforward nature of the activities, it is possible to confidently postulate potential effects of these actions. Herbicides may contribute to the erosion of some types of artifacts and features that may be identified by tribal governments as culturally important or sacred. In cases other than than emergency suppression of wildland fire, the impacts from chemical treatment to archaeological sites and/or cover types of concern to tribal governments can be minimized through pre-treatment inventories and consultation as mandated by Section 106 of the NHPA. In emergency situations, post-treatment rehabilitation and restoration may help mitigate adverse impacts to artifacts, sites, or natural resources of importance to tribal governments.

Impacts from chemical treatment to cover types and wildlife resources of traditional importance to the tribal governments is expected to be minimal. Chemical treatments target invasive plant species and have little to no effect on the types of native plants having cultural value for the tribal governments. Indeed, the effect of chemical treatment on native cover types will, in most cases, be to enhance the quality of the native cover types through reducing competing invasive plants. Impacts on wildlife are expected to be similarly minimal and primarily short-term in duration as they are related to increased noise and activity directly associated with the chemical treatment. Only BLM-approved chemicals would be used, and they would only be applied when climatic conditions were conducive to minimal airborne drift, thereby reducing even further the potential for adverse impacts to wildlife.

4.14.2.4 Direct and Indirect Impacts of Mechanical Treatment

Mechanical activities can include, mowing, chaining, disking, chopping, and cutting surface vegetation and applying seeds via rangeland drill. In general, the impacts from mechanical treatments on cultural resources are related to the physical disturbance of artifacts and features by the mechanical activities. For a discussion of potential impacts to archaeological resources, some of which may be deemed important by the tribal governments for traditional or ideological reasons, please see Section 4.13.2 of this document.

In general, potential adverse impacts to resources of importance to tribal governments can be significantly reduced through carrying out the Section 106 process as mandated by the NHPA and BLM guidelines. Pre-treatment inventories or other means of identifying archaeological sites in a proposed treatment area prior to ground disturbance combined with consultation with regional tribal governments can aid in the avoidance of culturally important or sacred sites and natural resources. Opportunities to use mechanical treatments to improve important resources such as juniper woodlands or camas prairies (not currently slated for fuels treatments) can also be identified through this process. If archaeological resources or hunting and gathering areas of importance to the tribal governments are identified during pre-treatment consultation and/or inventory, the plans for specific mechanical treatment of the given area would be tailored to avoid physical impacts to such resources. Consultation with the tribal governments may, however, result in an agreement between the BLM and the tribal governments to allow mechanical treatment in traditional hunting and gathering areas with an acceptance of potential short-term impacts to wildlife that that may be displaced by seeding activities or to cover types that may be temporarily thinned but would recover in healthier forms. Mechanical treatment would be tailored to ensure tribal treaty rights for access to public lands are maintained.

4.14.2.5 Direct and Indirect Impacts of Seeding Treatment

Introducing seed through drilling has the greatest potential to directly disturb archaeological sites as described above for mechanical treatments. These impacts can be significantly reduced, however, by undertaking pre-treatment inventories to identify cultural resources within the proposed treatment area and designing seeding programs to avoid important or sacred sites. Aerial seeding has less potential for direct impacts to archaeological sites, as there is no specific ground disturbance (unless the ground surface is disturbed by mechanical means to prepare for aerial seeding).

Particular species may be of importance to the tribal governments and could be affected by a change in cover type. In some cases, seeding may improve the condition of rangelands, increase plant cover, improve the diversity and quality of these cover types, and improve habitat for wildlife important to the tribal governments.

Wildlife may, however, be temporarily displaced by seeding activities while the activity is occurring, and cover types of importance to the tribal governments may experience temporary decreases in productivity as new plants grow to productive sizes.

4.14.3 ALTERNATIVE A

Under this alternative, impacts to archaeological sites of importance to the tribal governments could occur as described in Section 4.13.2 of this document. An estimated 250,200 footprint-acres could be subject to WFU, mechanical treatment, chemical treatment, RxFire, or seeding. Fires (either RxFire or WFU) would have a variety of effects on sites and resources deemed important to tribal groups. ESR and restoration activities could also result in impacts to such resources by either directly disturbing the archaeological sites through ground disturbing activities or through the effects of chemicals on artifacts or through temporary reductions in the productiveness of particular cover types or the temporary displacement of wildlife. In general, critical habitat for wildlife such as sage grouse, would continue to degrade, though existing

levels of treatment for such habitat would continue and would provide some improvement to smaller geographic areas than would be the case under other alternatives. Additionally, some wildlife would be temporarily displaced by activities surrounding existing levels of RxFire, seeding, and mechanical and chemical treatments while the activity was occurring.

Treatments proposed under this alternative and potentially affecting important cultural resources or traditional cultural use areas would be coordinated with tribal staffs as necessary. Consultation with tribal governments would be conducted on a case by case basis as appropriate to fulfill Indian Trust responsibilities related to traditional/cultural uses, as well as the health of the land and water resources.

Please note that there are no treatments proposed in pinyon pine stands in Alternative A. Accordingly, there would be no impacts to tribal gathering of pinyon pine nuts.

4.14.4 ALTERNATIVE B

Under Alternative B, it is estimated that approximately 646,000 footprint-acres in most cover types would be treated through RxFire, WFU, and/or other vegetation treatments. As the location of many cultural resource sites and important tribal resources is not known, it is likely that some resources could be impacted by treatment. Because it is generally the case that the likelihood of an archaeological site or culturally important resource being present increases with the acreage under consideration, the increased footprint-acreage for Alternative B (approximately three times the acreage of Alternative A), would be likely to result in an increased number of sites and resources impacted. However, the relationship is not necessarily one to one; site and resource distribution is related to many factors and not directly related to acres. Fires (either RxFire or WFU) would have a variety of effects on archaeological and traditional sites and resources. ESR and restoration activities could also result in impacts to such sites and resources by either directly disturbing artifacts or cover types through ground-disturbing activities or through the effects of chemicals on artifacts. Resources could be uncovered through mechanical treatment, burned through the use of fire, or possibly damaged through the application of chemicals as discussed above.

It is important to note that implementing this alternative may benefit resources of tribal concern. As noted above, some important tribal resources/sites consist entirely of cover types or of wildlife species targeted for hunting. Under this alternative, the quality of some cover types of cultural concern, such as the juniper woodlands, could be improved through reducing invasive plants and other competing cover types. In particular, removing encroaching juniper in these woodlands would benefit the more mature juniper, which are of higher cultural value to the tribal governments because of their increased size and productivity. Under Alternative B, 30,400 footprint-acres within Juniper cover types would be treated through RxFire, WFU, and chemical and mechanical means.

The improvement of the quality of cover types this alternative generally provides better habitat for wildlife species of traditional importance to the tribal governments; although, some temporary displacement of wildlife may occur during both treatment activities and the regeneration of cover types following treatment. Please see Section 4.5 of this document for

more specific information on the short-term impacts of this alternative on wildlife in the planning area.

Treatments proposed under this alternative and potentially affecting important cultural resources or traditional cultural use areas would be coordinated with tribal staffs as necessary. Consultation with tribal governments would be conducted on a case by case basis as appropriate to fulfill Indian Trust responsibilities related to traditional/cultural uses, as well as the health of the land and water resources.

Please note that there are no treatments proposed in pinyon pine stands in Alternative B. Accordingly, there would be no impacts to tribal gathering of pinyon pine nuts.

4.14.5 ALTERNATIVE C

Under this alternative, it is estimated that 1,687,000 footprint-acres would be treated through RxFire, WFU, and/or other vegetation treatments. As the location of many cultural resource sites and important tribal resources is not known, it is likely that some resources could be impacted by treatment. Because it is generally the case that the likelihood of an archaeological site or culturally important resource being present increases with the acreage under consideration, the increased footprint-acreage for this alternative (approximately seven times the treatment-acreage of Alternative A), would be likely to result in an increased number of sites and resources impacted. However, as discussed under the short-term and indirect impacts of Alternative B, the relationship of numbers of sites to acres treated is not necessarily one to one and is influenced by a number of environmental factors. Therefore, it is not possible to provide an exact estimate of how many more sites or culturally important resources would be affected under this alternative.

As with Alternative B, implementing this alternative may benefit resources of tribal concern. Under this alternative, the quality of some cover types of cultural concern, such as the juniper woodlands, could be improved through reducing invasive plants and other competing cover types. In particular, removing encroaching juniper in juniper woodlands would benefit the more mature juniper, which are of higher cultural value to the tribal governments because of their increased size and productivity. Nearly 60,500 footprint-acres of Juniper cover types would be treated to reduce encroaching juniper through various means under this alternative.

Under this alternative, portions of the total footprint-acres would in part be unavailable to wildlife for varying periods over the short term. However, areas being rehabilitated or restored subsequent to treatments would continue to provide habitat value to certain species, particularly those that use early to mid-seral stages of those cover types. The majority of the treatment area under this alternative would be seeded following the vegetation treatments, which would result in a secondary short-term disturbance to wildlife attempting to re-inhabit these areas. All vegetation treatments would occur in accordance with established management plans and guidelines for wildlife species associated with the habitats being treated, which would reduce adverse impacts to wildlife to less than significant levels.

Treatments proposed under this alternative and potentially affecting important cultural resources or traditional cultural use areas would be coordinated with tribal staffs as necessary. Consultation with tribal governments would be conducted on a case by case basis as appropriate to fulfill

Indian Trust responsibilities related to traditional/cultural uses, as well as the health of the land and water resources.

Please note that there are no treatments proposed in pinyon pine stands in Alternative C. Accordingly, there would be no impacts to Tribal gathering of pinyon pine nuts.

4.14.6 ALTERNATIVE D

Under this alternative, it is estimated that approximately 1,522,000 footprint-acres in Low-elevation Shrub, Perennial Grass, and Invasive Annual Grass would be treated through RxFire, WFU, and/or other vegetation treatments. Similar to Alternative B, archaeological and traditional resources could be uncovered through mechanical treatment, burned through the use of fire, or damaged through the application of chemicals. Specific potential impacts to archaeological resources under this alternative are described in greater detail in Section 4.13.6 of this document.

Under this alternative, fewer footprint-acres of known cover types of concern to tribal governments would be treated than under other alternatives. In particular, fewer acres of juniper woodland (29,200 footprint-acres under this alternative) would be treated through various means, thus reducing the overall level of benefit to this resource of importance to tribal governments within the planning area. Impacts would be similar to those described under Alternative B with the exception that they would be concomitantly higher in the sagebrush habitats due to the increased treatments. However, these impacts would be small-scale and short-term and, therefore, would be unlikely to impact wildlife population viability for any species of importance to the tribal governments under their treaty hunting rights. Portions of the treated areas would in part be unavailable to wildlife over the short term, but areas being rehabilitated or restored subsequent to treatments would continue to provide habitat value to certain species, particularly those that use early to mid-seral stages of those cover types.

Treatments proposed under this alternative and potentially affecting important cultural resources or traditional cultural use areas would be coordinated with tribal staffs as necessary. Consultation with tribal governments would be conducted on a case by case basis as appropriate to fulfill Indian Trust responsibilities related to traditional/cultural uses, as well as the health of the land and water resources.

Please note that there are no treatments proposed in pinyon pine stands in Alternative D. Accordingly, there would be no impacts to tribal gathering of pinyon pine nuts.

4.14.7 ALTERNATIVE E

Under this alternative, it is estimated that approximately 1,538,000 footprint-acres would be treated through RxFire, WFU, and/or other vegetation treatments. Similar to Alternative B, archaeological and traditional resources could be uncovered through mechanical treatment, burned through the use of fire, or damaged through the application of chemicals. Specific potential impacts to archaeological resources under this alternative are described in greater detail in Section 4.13.6 of this document.

Under this alternative, fewer footprint-acres of known cover types of concern to tribal governments would be treated than under other alternatives. In particular, fewer acres of juniper woodland (29,200 footprint-acres under this alternative) would be treated through various means, thus reducing the overall level of benefit to this resource of importance to tribal governments within the planning area. Impacts would be similar to those described under Alternative B with the exception that they would be concomitantly higher in the sagebrush habitats due to the increased treatments. However, these impacts would be small-scale and short-term and, therefore, would be unlikely to impact wildlife population viability for any species of importance to the tribal governments under their treaty hunting rights. Portions of the treated areas would in part be unavailable to wildlife over the short term, but areas being rehabilitated or restored subsequent to treatments would continue to provide habitat value to certain species, particularly those that use early to mid-seral stages of those cover types.

Treatments proposed under this alternative and potentially affecting important cultural resources or traditional cultural use areas would be coordinated with tribal staffs as necessary. Consultation with tribal governments would be conducted on a case by case basis as appropriate to fulfill Indian Trust responsibilities related to traditional/cultural uses, as well as the health of the land and water resources.

Please note that there are no treatments proposed in pinyon pine stands in Alternative E. Accordingly, there would be no impacts to tribal gathering of pinyon pine nuts.

4.14.8 MITIGATION AND MONITORING

The BLM has formulated management restrictions to protect cultural resources and resources of concern to tribal governments during fire management activities (Appendix Q, Management Restrictions). In addition to these restrictions, the BLM is required under Section 106 of the NHPA to identify archaeological and historical properties eligible for or listed on the NRHP as well as sites and resources important to tribal groups and to determine if these sites and resources would be affected by a specific action. Standard BLM policy prior to planned actions such as RxFires, is to conduct a field survey within proposed burn areas where existing data reviews suggest that flammable properties or resources might be vulnerable to damage by planned RxFires. These areas would then be avoided if possible. Standard policy prior to ESR and/or restoration activities is to have a comprehensive field surface inventory of the area in question conducted by qualified professionals. Following the identification of archaeological and historical sites visible on the surface, the sites are avoided if possible during ground disturbing or other ESR/restoration activities. More information on mitigation measures related specifically to archaeological resources can be found in Section 4.13.7 of this document.

In all cases, consultation with federally recognized tribal groups claiming patrimony over the area of the undertaking is required by numerous federal laws and BLM policy. Consultation would focus on identifying important cultural resource sites, resource areas, and periods of critical use (i.e., the season of use of a given resource area) for the tribal governments so that treatments, under any alternative, would be tailored to avoid interference with treaty rights. Under any alternative, the access rights of the tribal governments to BLM-administered lands would be maintained. Additionally, the consultation process with tribal governments would help

identify opportunities to use proposed treatments to benefit cover types of importance to these groups.

The above-described consultation process would minimize the majority of potential impacts from site-specific fire management activities on sites and resources important to tribal groups.

4.14.9 Unavoidable Adverse Impacts

Unavoidable adverse impacts to culturally important resources or sacred sites from implementing any given alternative are generally restricted to the largely unpredictable effects of wildland fire. Section 106 of the NHPA and BLM guidelines require identifying cultural resources and consultation with potentially affected tribal governments. As such, for all components of the five alternatives that involve preventative treatments, pre-treatment inventories and consultation would be implemented to reduce to the greatest extent possible any adverse impacts on those resources identified by regional tribal governments as important or sacred. However, in cases of wildland fire pre-treatment inventories and consultation are not likely to be possible. As a result, cultural resources located in areas subject to wildland fire may be adversely impacted by either the fire itself or the suppression to control it.

4.14.10 Irretrievable and Irreversible Commitment of Resources

Irretrievable and irreversible impacts to culturally important resources or tribal sacred sites would be similar to those described for unavoidable adverse impacts. These impacts would be both irretrievable and irreversible based on the potential to completely destroy these sites and associated objects with RxFire, WFU, and mechanical treatments. Short-term irretrievable impacts to vegetation types important to affected tribal governments would also occur; however, these impacts would not be irreversible as these vegetation types could be rehabilitated/restored.

4.14.11 Cumulative Effects

Historical land management practices coupled with more recent drought conditions on lands within the planning area have resulted in a trend within existing cover types toward larger, high-severity wildland fires (typical under FRCC 3). As discussed elsewhere in this section and in Section 4.13, such fires have greater adverse impacts on cultural resources than do smaller, low-severity, and shorter duration fires. The exact numbers of such resources that have been impacted is currently unknown, as intensive level inventories for cultural resources have not been conducted for all areas burned as a result of wildland fire. Such inventories typically occur immediately prior to ESR and restoration activities, which may lag behind the fire episode by as much as several years.

Current and future management practices both for lands under the jurisdiction of the planning area BLM and for adjacent lands under the jurisdiction of other local, state, and federal agencies is trending toward reducing the frequency and scope of larger, high-severity wildland fires. Of the existing fire management plans for non-Bureau agencies located within or adjacent to the planning area, two identify specific plans for acreages to be treated through RxFire, WFU, and chemical and mechanical treatments. In particular, the Sawtooth National Forest Plan, currently under revision, calls for fire and fuels treatment impacts on between 3 percent and 15 percent of

the 2.2 million acres within the Forest boundary, depending on which alternative is selected. The Forest Plan also calls for the use of fire only as a treatment (as opposed to a mix of fire and mechanical or chemical treatment) for 16 percent to 90 percent of the Forest's WUI watersheds. A similar but smaller-scale treatment regime is in place for the Caribou and Targhee National Forests through their 1997 Forest Plan. Under this plan, an average of approximately 9,000 acres per year are to be treated for fuels reduction with an increasing focus on treatment-acres within the WUI.

Other fire management plans or general land use planning documents, such as those through the Idaho Department of Lands and the INL, would be subject to revision based upon the selection of an alternative from this EIS. As such, exact treatment-acreages are unknown at this time; however, all of these plans would be tied closely to the selected alternative from this EIS and would individually result in the treatment of fewer footprint-acres than are proposed in Alternatives B, C, or D of this EIS. All of the plans would focus on fuels reduction and the movement of cover types toward FRCC 1.

As more acres are treated, more cultural resources (both archaeological sites and natural resources of importance to the tribal governments) are likely to be impacted, resulting in an incremental impact on the collective cultural record of southern Idaho. It should be noted, though, that although an increase in the frequency of applying chemical, mechanical, and fire treatments has the potential to adversely impact increasing numbers of cultural sites, pre-treatment inventories for cultural resources and consultation with tribal groups under the mandates of Section 106 of the NHPA and BLM management restrictions are serving and would continue to serve as effective means for avoiding and mitigating these adverse effects. Further, archaeological sites are stationary entities; thus, any physical impact to a site on USFS land (or lands under the jurisdiction of non-Bureau agencies) would not result directly in an impact to archaeological sites on BLM-administered lands. Natural resources of importance to the tribal governments are different, however, in that wildlife management practices and efforts to control particular cover types on adjacent lands may impact similar resources on adjacent BLM-administered lands. Impacts to culturally important natural resources on the planning area resulting from fire management activities on adjacent lands is indirect and related to whether or not the adjacent management activities affect the FRCC of cover types and wildlife habitat on planning area. For a more detailed discussion of cumulative impacts on wildlife species, please see Section 4.5 of this document.

For the purposes of this EIS analysis, two basic scenarios are likely to occur in terms of cumulative impacts to cultural resources of importance to regional tribal groups. Under Alternative A, wildland fire would likely continue to trend toward large, high-severity fires, and potentially increasing numbers of archaeological sites and culturally important natural resources related to Native American treaty rights would be impacted as more acreage is burned or subjected to control and suppression activities. This could result in increasing impacts to tribal traditional practices (such as resource gathering and hunting) and ideological/religious practices. Under Alternatives B, C, D, and E, the number, size, and severity of wildland fire is expected to decrease over time as fuel loads are decreased. As the number and severity of wildland fires decreases, it would be expected that the overall frequency of damage to culturally important resources and sacred sites would then decrease. Further, as the number of acres treated through mechanical and/or chemical means or through RxFire increases, larger numbers of cultural sites

and areas of concern for tribal governments would be identified through pre-treatment inventories and consultation. As these sites and areas are identified, the proposed fuels treatment can be designed to avoid or limit adverse impacts.

4.15 ANALYSIS OF EFFECTS ON SOCIOECONOMICS

4.15.1 ANALYSIS ASSUMPTIONS AND METHODS

4.15.1.1 Relationship to Other Sections of the EIS

Social and economic analysis is related to the following sections. The following sections should be consulted for more detailed information regarding impacts to their respective resources:

- WUI (Section 4.3)
- Livestock Grazing Management (Section 4.9)
- Recreational Resources (Section 4.10)
- Visual Resources (Section 4.12)

4.15.1.2 Qualitative versus Quantitative Data

Economic impacts are considered with respect to each major sector of the economy in the planning area. Where quantitative data are available, a detailed analysis is shown. Where quantitative data are not available, a qualitative analysis is performed based on the best available data. Impacts analysis follows the structure of Section 3.15, Socioeconomics, examining effects on the social and economic settings planning area-wide.

4.15.1.3 Fire Management Program Expenditures

The average cost of wildland fire treatment is $105 per acre. The average cost for wildland fire suppression is $140 per acre (BLM 2003). Total cost for fire management efforts in the planning area is calculated by multiplying the number of acres of wildland fire and treatment or suppression by the appropriate cost per acre.

Table 4-47 identifies the suppression and treatment costs over 10 years for each alternative.

TABLE 4-47. FIRE MANAGEMENT COSTS FOR SUPPRESSION AND TREATMENTS OVER 10 YEARS BY ALTERNATIVE

Fire Management Costs	Alternatives				
	A	B	C	D	E
Treatment	$26,271,000	$67,830,000	$177,135,000	$159,810,000	$161,490,000
Suppression	$80,729,000	$46,170,000	$21,865,000	$24,190,000	$23,510,000
TOTALS	**$107,000,000**	**$114,000,000**	**$199,000,000**	**$184,000,000**	**$185,000,000**

Of the total expenditures for the fire management program in 2002, as expressed in Section 3.15, Socioeconomics, the following percentages are spent in each category below:

- 45 percent variable costs
- 30 percent fixed labor costs
- 25 percent other suppression costs (BLM 2004)

Both treatment and suppression have associated variable costs. Treatments are considered variable costs because they are contracted by the BLM. Contractors purchase seed, and apply seed with rangeland drills or aircraft. Seeding requires seedbed preparation, application of herbicides, planting, etc. Common variable costs for suppression include contracting for bulldozers to build fire lines and water trucks. Both treatment and suppression have the following associated variable costs that get funneled into the local economy: food, fuel, lodging, maintenance, vehicles, administrative costs, aviation, and warehousing.

Variable costs are calculated by multiplying the total cost for fire management by 45 percent. It is assumed that only the variable costs would change with each alternative (BLM 2003).

Expenditures on variable costs are assumed to be an infusion of dollars into the regional economy. An economic multiplier is the dollars evident in the local community based on dollars spent in one sector of the community. For example, one dollar spent on fire suppression equates to dollars spent in the local economy. It is assumed that approximately 70 percent of variable costs are spent in the local economy.

4.15.1.4 Impacts of Improvement of FRCC

In general, it is anticipated that improvement in FRCC (moving from FRCC 3 toward 1) would provide long-term socioeconomic benefits through decreases in risks to human safety, private land; fire-fighter safety, fire-fighting costs, and an improvement in overall vegetative conditions (ground cover, diversity, composition, and structure).

The improvement of key ecosystem components could provide benefits for associated uses of renewable resources, such as timber, rangeland, and wildlife habitat. Recreation, hunting, and tourism would likely experience an increase with new dollars being spent in various local communities.

As wildland fire size decreases and restoration opportunities increase, the economic contribution of fire fighting would be offset by increased restoration activities that would occur throughout the year, rather than only when fire suppression activity is high during the summer wildland fire months.

4.15.2 EFFECTS COMMON TO ALL ALTERNATIVES

4.15.2.1 Retail Trade Services

Retail trade services would only be affected secondarily by impacts to other sectors of the economy. Grazing and the government services sector could cause impacts to retail trade

services. External factors that would affect retail trade services include changes to the amount of grazing, an increase or decrease in the government services sector, and changes to tourism.

A second effect on the retail services and trade sector is the number of fire-fighters employed. More fire-fighters deployed to communities means more dollars spent in the retail and trade services sector on meals, gasoline, and other necessities. Conversely, reducing fire-fighters would translate into a decrease in retail economies in communities near fires. This is explained in more detail in the alternative analysis of variable costs.

4.15.2.2 Wildland Fire Suppression Costs

In this analysis, large fire suppression costs were considered. All Action Alternatives are expected to lead to a decrease in suppression costs after 30 years. Assuming treatments in the first 10 years are effective, increased treatment levels will leave resources and uses at less risk of damage from wildland fire, decreasing fire size and intensity across the landscape, particularly in Low-elevation Shrub, Perennial Grass, Invasive Annual Grass types and the Wildland Urban Interface.

4.15.2.3 Proportional Impacts

Based on the information shown in Section 3.15, Socioeconomics, certain counties rely more heavily on various market sectors of the economy. Counties with a high proportion of rangelands on BLM-administered lands could experience proportionally higher impact than the rest of the planning area. These counties include:

- Blaine
- Butte
- Camas
- Caribou
- Cassia
- Clark
- Gooding
- Lincoln
- Oneida

Similarly, the following counties have a high degree of tourism contributing to the economy, and could experience higher impacts as tourism is impacted in each alternative:

- Blaine
- Fremont
- Bonneville

Retail trade centers in the planning area might also experience a proportionally higher degree of impact. Retail trade centers are located in the following counties:

- Bannock
- Bonneville
- Madison
- Twin Falls

4.15.3 ALTERNATIVE A

Impacts to the social setting under Alternative A include continued risk of wildland fire. Homes and structures, discussed with WUI issues in Section 4.3, would be at the same risk as current conditions. High tourism areas could be affected by continued risk of wildland fire.

Direct impacts of Alternative A affecting the economic setting of the planning area include a change in grazing AUMs and fees. A total of 47,500 AUMs would be temporarily lost over a 10-year period, equating to a total of $65,075 in lost fees from grazing. In addition to direct dollar

amounts lost in this sector, it should be noted that receipts collected by the BLM for grazing and timber harvesting are returned to the state and counties. With continued large fires, timber being burned, and allotments closed, AUMs are temporarily unavailable, and thus receipts returned to counties are less.

Direct impacts would also be evident in BLM expenditures for fire management. Alternative A would equate to an approximate total of $107 million in fire suppression and vegetation treatment costs over 10 years.

Indirect impacts would be manifested in the multiplier effect into regional economics. An economic multiplier is the dollars evident in the local community based on dollars spent in one sector of the community. For example, one dollar spent on fire suppression equates to dollars spent in the local economy. Based on the costs of fire management discussed in the assumptions with $140 per acre for suppression and $105 per acre for treatment, a total of approximately $107 million would be spent over the next 10 years for the fire suppression and vegetation treatments in the planning area under Alternative A. Also stated in the assumptions is the distribution of variable versus fixed costs. Variable costs, and therefore areas of the economy that are boosted, include food, fuel, lodging, maintenance, vehicles, administrative costs, aviation, warehousing, and seeding. Variable costs consist of 50 percent of the total cost for treatment and suppression. Assuming approximately 70 percent of variable costs are spent in the local and regional economy, approximately $37 million would be funneled into the local economy (BLM 2003).

Alternative A has the potential to increase fire size and cost by leaving the land and resources at greater risk of damage from wildfire. Over the long-term, large fire events would continue to increase, similar to the trend seen over the past 30 years. Additionally, Alternative A would continue fire, fuels and related direction that restrict the application of wildland fire use in vegetation types that should experience more wildfire/disturbance to improve land health. Alternative A would also promote the expansion of invasive species that would further alter fire regimes in areas where less wildfire is desired.

4.15.4 ALTERNATIVE B

Impacts to the current economic setting of the planning area under Alternative B would include a reduction of 122,783 in grazing AUMs cumulatively over 10 years. Associated fees that would be lost in this action would be $168,213. If permittees do not have sufficient private land for their livestock while public lands are rested for the two years following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees do not have sufficient private land of their own, additional feed may need to be purchased for those livestock temporarily removed from the public lands. Cost implications of this impact are discussed in Section 4.9.

Fire suppression and vegetation treatment operations under this alternative would be an increase in cost for the fire suppression and vegetation treatment program to approximately $114 million over 10 years.

Indirect impacts would be manifested in the multiplier effect into regional economics. Based on the costs of fire/fuels management ($114 million) discussed in the assumptions, 50 percent of which is for variable costs and assuming approximately 70 percent of variable costs are spent in the local and regional economy, approximately $40 million would be funneled into the local economy, an increase of approximately $3 million from Alternative A (BLM 2003).

4.15.5 ALTERNATIVE C

Alternative C would result in a reduction in grazing of approximately 320,467 AUMs. This would result in a reduction of $437,040 in revenue from grazing. If permittees do not have sufficient private land for their livestock while public lands are rested for the two years following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees do not have sufficient private land of their own, additional feed may need to be purchased for those livestock temporarily removed from the public lands. Cost implications of this impact are discussed in the Livestock Grazing Management of this EIS.

Fire suppression and vegetation treatment costs would increase from Alternative A to a total of $199 million in fire suppression and vegetation treatment cost.

Indirect impacts would be manifested in the multiplier effect into regional economics. Based on the costs of fire/fuels management ($199 million) discussed in the assumptions, 50 percent of which is for variable costs, and assuming approximately 70 percent of variable costs are spent in the local and regional economy, approximately $70 million would be funneled into the local economy, an increase of approximately $33 million from Alternative A (BLM 2003).

4.15.6 ALTERNATIVE D

Impacts to the regional economic setting under Alternative D would result in an approximate decrease of 289,268 AUMs, translating to approximately $396,297 in grazing fees lost over 10 years. If permittees do not have sufficient private land for their livestock while public lands are rested for the two years following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees do not have sufficient private land of their own, additional feed may need to be purchased for those livestock temporarily removed from the public lands. Cost implications of this impact are discussed in the Livestock Grazing Management of this EIS. Alternative D would have the greatest impact on grazing income.

Fire suppression and vegetation treatment operation costs would increase from Alternative A to a total of $184 million.

Indirect impacts would be manifested in the multiplier effect into regional economics. Based on the costs of fire/fuels management ($184 million) discussed in the assumptions, 50 percent of which is for variable costs, and assuming approximately 70 percent of variable costs are spent in the local and regional economy, approximately $64 million would be funneled into the local economy, an approximate increase of $27 million from Alternative A (BLM 2003).

4.15.7 ALTERNATIVE E

Impacts to the regional economic setting under Alternative E would result in an approximate decrease of 292,242 AUMs, translating to approximately $400,371 in grazing fees lost over 10 years. If permittees do not have sufficient private land for their livestock while public lands are rested for the two years following the vegetation treatment, they may need to lease additional private rangeland for their livestock. If permittees do not have sufficient private land of their own, additional feed may need to be purchased for those livestock temporarily removed from the public lands. Cost implications of this impact are discussed in the Livestock Grazing Management of this EIS.

Fire suppression and vegetation treatment operation costs would increase from Alternative A to a total of $185 million. Indirect impacts would be manifested in the multiplier effect into regional economics. Based on the costs of fire/fuels management ($185 million) discussed in the assumptions, 50 percent of which is for variable costs, and assuming approximately 70 percent of variable costs are spent in the local and regional economy, approximately $65 million would be funneled into the local economy, an approximate increase of $28 million from Alternative A (BLM 2003).

In the Action Alternatives, as vegetation treatments and associated costs increase, suppression costs decrease.

4.15.8 MITIGATION AND MONITORING

The potential socioeconomic impacts of the proposed project can be partially mitigated by maximizing the use of local contracting for vegetation and fire management activities. This would infuse additional funds into the local economy and offset somewhat the impacts that may be incurred through the temporary loss of grazing resources. Additionally, it should be noted that the majority of unavoidable impacts are short-term, and would likely be offset by the increased long-term health of the planning area ecosystem and the associated long-term increase in the quantity of quality of its renewable resources.

4.15.9 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts include the temporary decreases in grazing income and retail sales associated with increased treatments, and the decrease in retail and services income resulting from decreased fire fighting expenditures.

4.15.10 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

Irretrievable impacts to socioeconomics include the short-term loss of grazing income and retail sales described above. However, this short-term revenue loss would be offset by long-term improvements in rangeland quality, as well as decreased risk to recreational setting and visual resources. Improvements in these resources would likely result in increased long-term retail sales based on continued increased tourism and recreational visitation to the planning area. Accordingly, the loss of these revenues would not be irreversible.

4.15.11 CUMULATIVE EFFECTS

Cumulative impacts to socioeconomics are considered relative to the long-term effects of the action alternatives in relation to other similar plans. These similar plans include the Interior Columbia Basin Ecosystem Management Project; the INL management plan; the Sawtooth, Caribou, and Targhee National Forests management plans; and the Idaho Statewide Implementation Strategy for the National Fire Plan. Overall, most of the goals of these plans are to reduce the intensity and duration of fires in the planning area.

Additionally, the NPS and the BLM have prepared a joint monument management plan for Craters of the Moon National Monument and Preserve, which is located entirely within the administrative boundary of the FMDA planning area. This management plan includes fire management decisions for the Monument and Preserve that, when considered in conjunction with the action alternatives, would result in cumulatively positive long-term impacts on vegetation resources. This would result in generally positive impact on recreational experience, potentially resulting in long-term benefits to socioeconomics from increased visitation to the area.

In the short term, additional fire management programs proposed in the above plans could cumulatively affect the cost of fire operations, reducing the cost of wildland fire suppression in addition to each of the alternatives. Short-term indirect cumulative impacts could include a further reduction of dollars input to the regional economy based on the services to reduced wildland fire suppression. In contrast, increased levels of proactive treatments using local contractors would benefit the economy.

Because the long-term impact of reducing the intensity and duration of fires would reduce risk to personal property and tourism lands (and hence the tourist economy), further reduction of wildland fire associated with the each of the past, present, and reasonably foreseeable future actions would reduce risks even further.

Cumulative impacts may vary in intensity depending on each alternative. In general, the long-term cumulative effects on socioeconomics for each alternative would be related to the amount of local contracting and increased acreages moving from FRCC 3 to FRCC 1. Of the five alternatives, Alternative A changes the FRCC of the fewest number of acres. Thus, Alternative A would have the least positive cumulative impact in conjunction with the other plans and management strategies in the foreseeable future. Alternative B would result in an increased number of acres with a changed FRCC relative to Alternative A. Alternatives C, D, and E would provide substantially greater improvements to the cumulative FRCC in the area than either Alternative A or B.

4.16 NON-FIRE, FUELS, AND VEGETATION MANAGEMENT RELATED CUMULATIVE EFFECTS

Current conditions of public lands in the planning area are the (cumulative) culmination of myriad past effects that have influenced the character and composition of today's forests and rangelands, as well as their social, economic, and political environments. Important past influences include pre-settlement and settlement histories across southern and eastern Idaho, as

well as the influences of agricultural development and multiple uses such as grazing, timber, mining, and recreation. Annual fluctuations in climate and wildfires have also contributed to the condition of today's public lands.

This section describes the cumulative impacts of past, present, and reasonably-foreseeable actions within the planning area that are outside the scope of fire management. These include trends in wildfire, livestock grazing, population growth, OHV use, recreation and tourism, and timber harvest. The analysis also considers the summary effects of the Proposed Plan Amendment in relation to these other actions. This analysis is at the broad, programmatic level for the 23- county planning area. Following the plan amendment, project level analyses would be performed at the field office level for site specific projects.

4.16.1 WILDFIRE

Prior to modern fire suppression, wildfire was an integral part of the natural ecosystems of the planning area, as demonstrated by historical ecological evidence. To withstand this disturbance, plant species and vegetation cover types developed various responses that enabled them to resist, tolerate, or take advantage of fire.

At present, many of the cover types within the planning area are subjected to wildland fires that are not within the historical range of variability. Large and/or uncharacteristic fires in these cover types can threaten people and property as well as the resiliency, integrity, and long-term sustainability of ecosystem components and processes. Fires are occurring more frequently and are burning more severely in some cover types. For example, the invasion by Invasive Annual Grasses such as cheatgrass and medusahead rye (*Taeniatherum caputmedusae*) into the sagebrush steppe has substantially increased fine fuel continuity in this cover type, making it more susceptible to large, frequent, and uncharacteristic fires. In other vegetation cover types, fires are occurring less frequently than they did historically, which has caused undesirable changes in species composition, structure, and an unnatural accumulation of fuels. For example, juniper species are encroaching into sagebrush steppe, and Dry Conifer cover types are slowly replacing Aspen and some Mountain Shrub cover types.

The 35-year wildfire history for the planning area's public lands depicts wide variability among years (Figure 4-27). The 35-year mean for these data is about 72,000 acres per year, with a range between about 1,000 acres (1993, 2004) and about 445,000 acres in 1996. Over this 35-year period, there have been 6 years with large fire seasons with burned acreages in excess of 200,000 acres. These years occurred in 1971, 1981, 1992, 1996, 1999, and 2000 (i.e, years with burned acreages greater than two standard deviations from the mean). Since 1992, it appears that large fire years have been occuring more frequently. This accelerated rate is apparently due to changes in vegetation cover types coupled with changes in fire regimes, especially in sagebrush steppe habitat that has been invaded and is now dominated by cheatgrass.

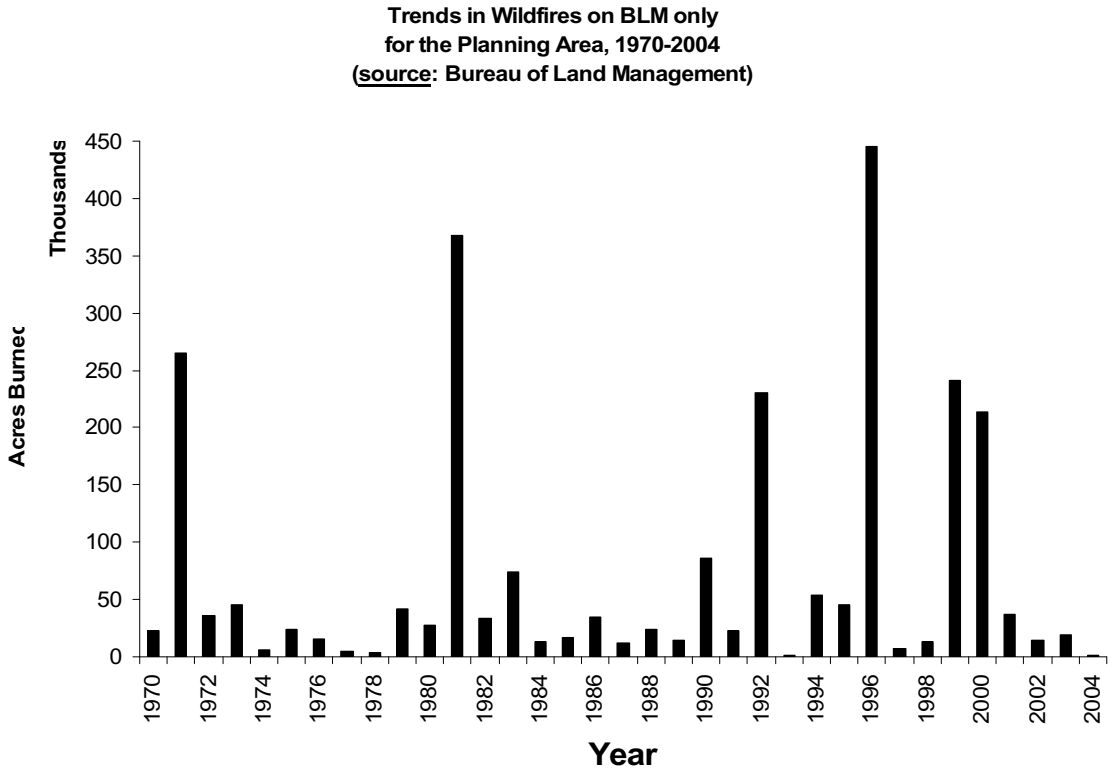

Figure 4-27. Trends in wildfire acres burned on BLM-administered public in the county planning area between 1970 and 2004.

Cheatgrass is a weedy Invasive Annual Grass from Europe that expanded into the sagebrush biome of North America in the late 1800s (Sparks et al. 1990); it reached its current distribution by about 1930 (Mack 1981). During this same period, cheatgrass spread across southern Idaho where it followed attempts at dryland farming, abandoned farms, summer-fallow lands, and dryland alfalfa fields that were heavily grazed after the hay crop was removed (Stewart and Hull 1949). Cheatgrass has continued its expansion since this time.

Cheatgrass is adapted to a wide variety of soil and moisture conditions. Cheatgrass exhibits a broad adaptability that enables it to produce seeds in most years, regardless of climate. Because cheatgrass is an annual plant, it is critical each year that its plants produce seeds to over-winter and produce plants the following year; although, viable seeds can survive in the soil for up to five years (Young et al. 1969). In good years it would produce multiple crops, large plants, and copious amounts of seeds, while in very dry years, it would produce small plants that are able to produce only a few viable seeds. Its value as forage similarly fluctuates with climate year to year. Furthermore, cheatgrass is a winter annual that may germinate in the fall and is capable of over-wintering; this can give it a big advantage over native perennial plants the following spring. By springtime, cheatgrass plants may already have roots and shoots while native species are only beginning to break dormancy and resume growth, giving cheatgrass a competitive advantage over the native species. Once the native sagebrush steppe becomes invaded and then dominated by cheatgrass, normal successional processes no longer function because cheatgrass maintains its

dominance by out-competing native species for resources as well as facilitating repeat wildfires that preclude the normal reestablishment of native species. Once cheatgrass becomes dominant, natural recovery back to the original sagebrush steppe community would not occur, even in the absence of grazing (Anderson and Inouye 2001).

In the planning area today, cheatgrass communities represent novel but stable communities that persist through time and are not only stable but favored by wildfires (Laycock 1991). Fires help to maintain this dysfunctional steady state ecology by reducing native plant seed sources while cheatgrass competes aggressively with native seedlings. This is a novel, uncharacteristic ecological state for the Snake River Plain that would persist unless active restoration is implemented.

Alternative A would do the least, and Alternative B would do little more in restoring sagebrush steppe communities that are now dominated by cheatgrass. Alternatives C, D and E, on the other hand, would provide the most proactive treatments directed at returning cheatgrass areas to sagebrush steppe communities (FRCC 1). This would lessen the risk of losing more habitat and key ecosystem components to large fires, whether of human or natural origin. These latter three alternatives would implement more proactive hazardous fuels reduction and restoration projects and move the vegetation cover types further toward DFC and FRCC 1. Thus, fire starts would result in smaller, easier-to-control fires with less overall impacts to natural and cultural resources.

4.16.2 GRAZING

Annually billed grazing use in the planning area has risen from about 180,000 AUMs in 1990 to about 395,000 AUMs in 2004 (Figure 4-28). Current use, however, is well below the permitted use (~645,000 AUMs) and the projected maximum use (~770,000 AUMs) as described in the 12 existing land use plans (LUPs) for the planning area. Assuming continuation of the current trend, approximately 650,000 AUMs could be billed in 2035, which is close to the permitted use. Based on past impact analyses done for the present LUPs, this level of permitted use would not have a significant adverse impact on vegetation resources in the planning area.

At present, the impacts of livestock grazing in the planning area are a relatively small disturbance factor when considered with the overall negative impacts of the combined wildfire/cheatgrass cycle that is impacting the low and Mid-elevation Shrub vegetation cover types.

The ecological interactions between cheatgrass and wildfires are the principal disturbance factors impacting the overall vegetation health of the planning area and this is one of the principal reasons for this analysis and EIS. Cheatgrass has invaded at least 26 percent of the BLM-administered lands in the planning area. Where cheatgrass is dominant, it serves as wildfire ignition sources and facilitates the rapid spread of fire into adjacent vegetation types. At present, the cheatgrass-wildfire cycle has caused more landscape level impacts than practically any other human-caused disturbance in the planning area. However, the invasion of cheatgrass is, to some extent, an indirect result of these human-caused disturbances. These past disturbances include agricultural development, livestock grazing, drought, and wildfires. In many locations, these influences have combined to change the natural sagebrush steppe community into cheatgrass

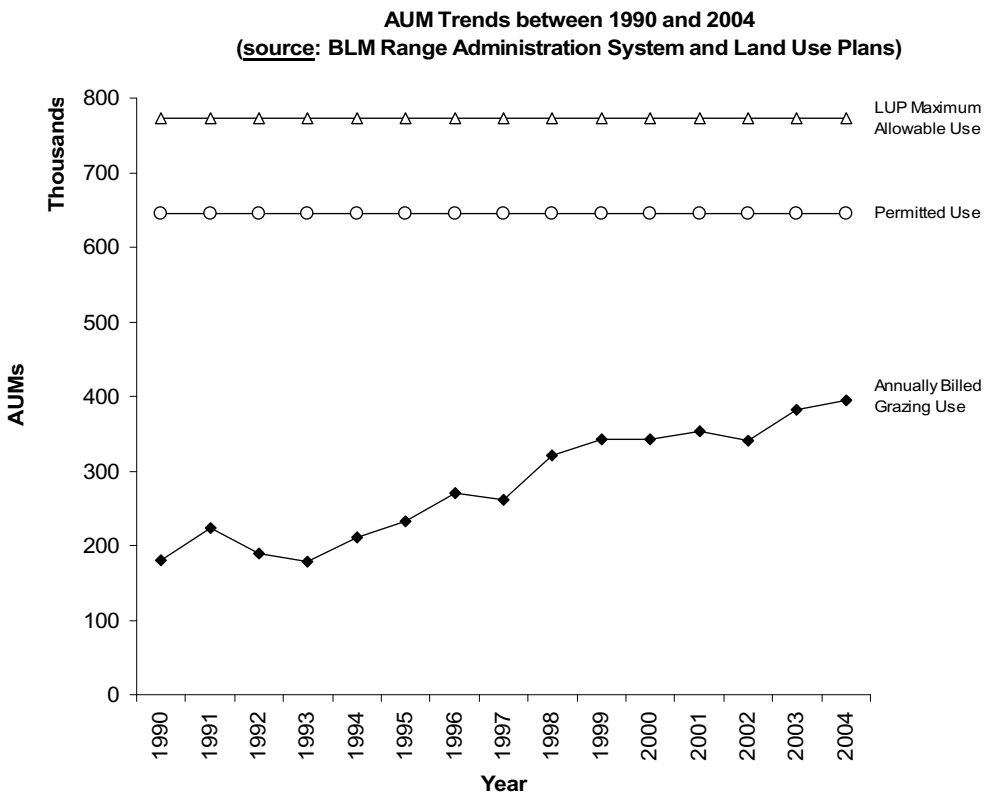

Figure 4-28. Trends in AUMs on BLM-administered public lands for the 23 county planning area between 1990 and 2004.

communities that are uncharacteristic of the sagebrush steppe and are well outside the range of its historic composition, diversity, and fire regimes.

On cheatgrass-dominated sites, it would take active restoration to recover the shrub, grass, forb diversity, and improved habitat qualities of the original sagebrush steppe habitat. Where cheatgrass is a minor component of the plant community, proper livestock grazing can maintain this condition. Once a cheatgrass threshold has been crossed and this non-native annual begins to dominate the plant community, however, adjusting livestock numbers would have little effect on restoring the original plant community. At present and at the landscape level where cheatgrass and wildfires are a problem, their combined effects on land health are judged by BLM as more significant than the current impacts of livestock grazing (Limbach and Pellant 2005).

Although grazing impacts are not as large as impacts of wildfire and cheatgrass, overgrazing would have adverse impacts on vegetation resources and would contribute cumulatively to difficulties in moving vegetation cover types to DFC and FRCC 1, particularly in cheatgrass-dominated areas of the Low-elevation and Mid-elevation Shrub and Perennial Grass cover types. Alternatives C, D, and E, however, would contribute positively to these cumulative impacts by moving these vegetation cover types toward DFC and FRCC 1. On the other hand, if grazing use changes, it may or may not contribute to moving towards DFC and FRCC 1. The monitoring program, which is part of the Proposed Plan Amendment, would be used to assess the cumulative

impacts of fire management, fuels reduction/restoration actions, grazing, and other uses on vegetation condition/rangeland health to ensure that rehabilitation and restoration projects are effective.

4.16.3 POPULATION GROWTH

From 1920 to 2000, the general population in the 23-county planning area rose from about 214,000 individuals to about 496,000 individuals (Figure 4-29). This more than doubling of the human population has widespread effects on resources and resource uses in the planning area. If this trend continues, population in the planning area could increase to around 650,000 individuals by the year 2030.

Since at least 1920, population growth has correlated with increased development of communities, roads, utilities, and agriculture. Much of this development has been at the expense of native sagebrush steppe habitat in the planning area. Agricultural development has especially impacted sagebrush steppe habitats in the Low-elevation and Mid-elevation Shrub vegetation cover types. Over the next 30 years, continued population growth could result in increased loss of habitats or their fragmentation, especially in the WUI. Expanding the WUI would also increase the risks to private land from wildfire. This increased risk would be offset somewhat by fire management activities outlined in the action alternatives, particularly Alternatives C and E, which have specific treatment acreages to address the WUI.

On the other hand, population growth has also contributed positively to the local economy through increased revenues to local municipalities and businesses. This growth correlates with building community infrastructure and increased commerce.

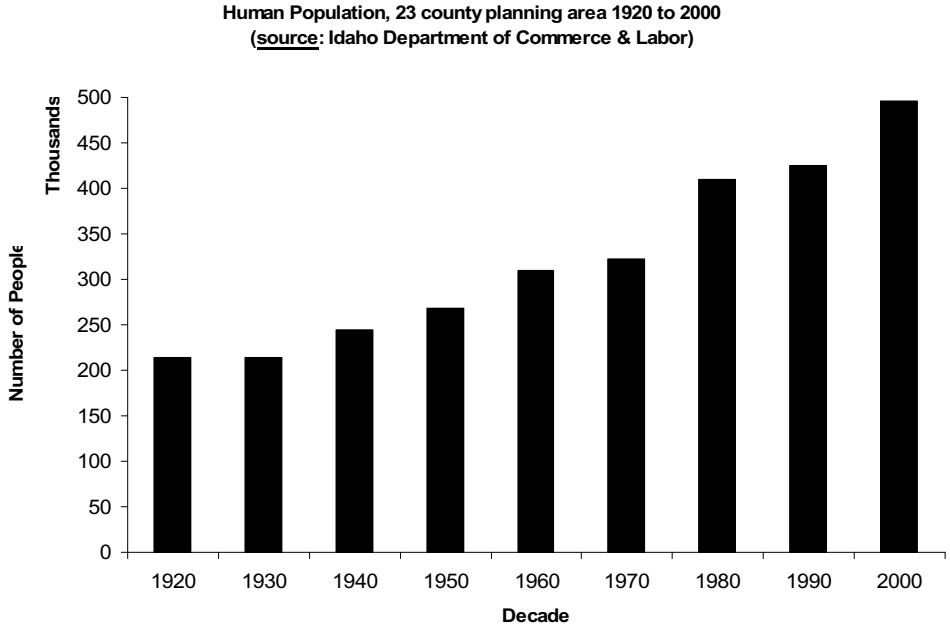

Figure 4-29. Population trends for the 23 county planning area between 1920 and 2000.

4.16.4 RECREATION AND TOURISM

Recreational use in the planning area is expected to increase in the near future as the population and tourism increases.

4.16.4.1 Recreation: Off-Highway Vehicles

OHV use in the planning area has sharply increased over the last 16 years (Figure 4-30); OHVs include ATVs and motorbikes. Since 1988, off-road ATV and motorbike registrations have increased from about 1,200 to 35,000 vehicles in 2003. It can be assumed that OHV use has likewise increased. Increased OHV use contributes to increased disturbance of habitat and wildlife, disturbance to vegetation and soils, the disruption or loss of habitat, and increased potential for erosion and sedimentation. Additionally, OHV noise can impact the enjoyment of non-motorized recreationists. However, it should be noted that the cumulative increase in disturbance is unlikely to be proportional to the increase in OHV registrations because the majority of OHV likely use existing trails.

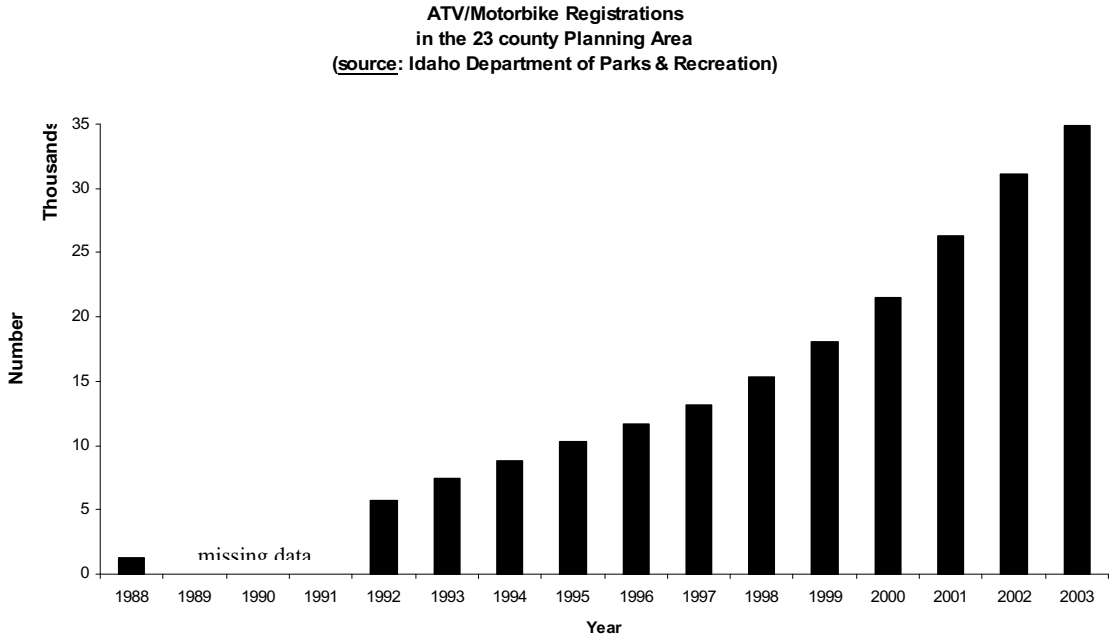

Figure 4-30. Trends in OHV registrations for the 23 county planning area between 1988 and 2003.

4.16.4.2 Tourism

Lodging revenues in the 23-county planning area have risen from about $70 million in 1993 to approximately $111 million in 2004 (Figure 4-31). Although there is some small annual variation, the general trend is a steady increase in lodging revenues. This indicates that tourism and travel through the planning area would likely to continue to rise over the next 30 years. It should be understood, however, that lodging revenues do not necessarily track increases in

recreation on public lands as well as OHV registrations, for example. These data are presented here to demonstrate the correlation with population and expected increases in tourism and revenue. Based on past growth, it is possible that tourism could contribute an estimated $100 million to $195 million annually in lodging revenues to the local economy of the planning area. This growth in lodging revenues would contribute to an estimated $4.7 million in annual revenues that would be generated by Alternative A, $4.0 million by Alternative B, $7.0 million by Alternative C, $6.4 million by Alternative D, and $6.5 million by Alternative E (see Section 4.15 for details on analysis methodology).

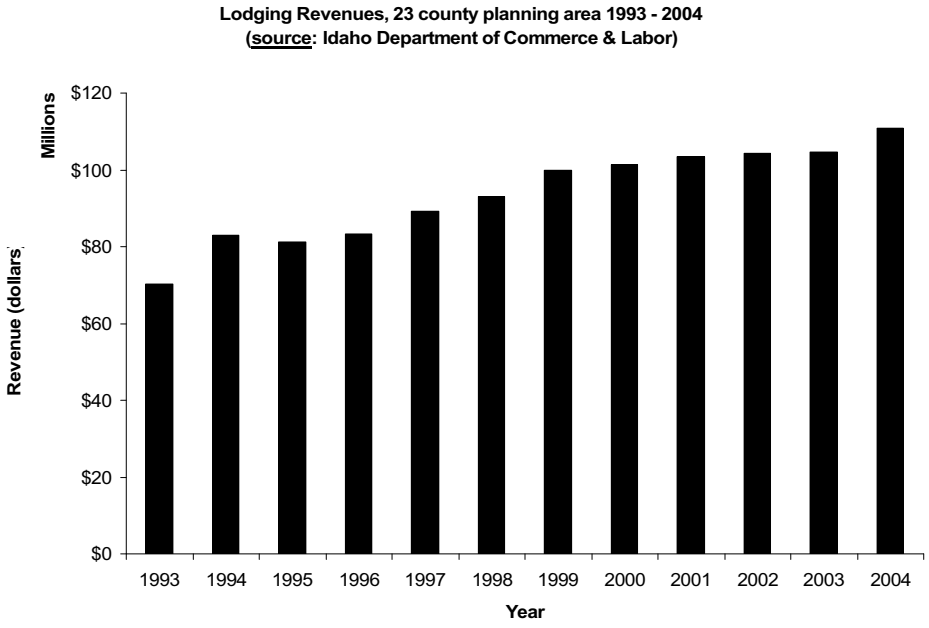

Figure 4-31. Lodging revenues for the 23 county planning area between 1993 and 2004.

Increases in population and tourism also contribute to increases in other activities like camping, hiking, hunting, fishing, sight-seeing, and other recreational uses. These recreational activities all have the potential to impact to some extent vegetation cover types, disturb wildlife, and potentially increase erosion and stream sedimentation.

Increases in population and recreational use would likely contribute to an increased risk of human-caused fire ignitions. Over the next 30 years, wildfires could increase up to 50 percent, assuming that the likelihood of human-caused fire ignitions increases proportionally with population growth. These additional wildfires would increase the risk of habitat loss and increase the need for fire suppression activities. This potential increase in fire risk would be offset to some extent by the fire management actions proposed in the alternatives. Alternative A and B contribute the least annual short-term disturbance to habitat and would be least effective in off-setting the increased risk of human-caused wildfires. Alternatives C, D, and E, on the other hand, would contribute the most short-term disturbance but would go much further in returning the planning area to FRCC 1, which would lessen the risk of large fires, of human or natural origin, that result in the loss of key ecosystem components. These latter three alternatives would

implement more proactive hazardous fuels reduction and restoration projects and move the vegetation cover types further toward DFC and FRCC 1. Thus, fire starts would result in smaller, easier-to-control fires with less overall impacts to natural and cultural resources.

In summary, the potential for recreational disturbance has cumulatively increased approximately 100 percent over the last 70 years and would likely increase an additional 60 percent over the next 30 years. This would contribute cumulatively to the short-term disturbance of vegetation and wildlife habitat resulting from each of the action alternatives. Alternative A would contribute the least short-term vegetation management-related disturbance, followed by Alternative B. Alternatives C, D, and E would result in similar habitat disturbances (approximately 1,500,000 to 1,700,000 footprint acres). Alternatives C, D, and E, however, would also result in increased ecosystem health and smaller, less destructive fires over the next 30 years. Healthier habits would be more resilient to increased recreational impacts.

4.16.5 TIMBER HARVEST

From 1987 to 2003, timber harvest (sawlogs) in the planning area exhibited large annual fluctuations (Figure 4-32). From 1987 to 1990, timber harvest varied from approximately 4 million to approximately 10 million board feet annually. In 1991, timber harvest increased to about 24 million board feet and remained over 12 million board feet until 1995. Since 1996, timber harvest has remained below 7 million board feet. In 2003, timber harvest was about 1 million board feet. Based on the last 7 years, timber harvest in the next 10 years to 30 years would likely hover around the 2 million to 5 million board feet annually. Based on USFS statistics in the general vicinity of the planning area, the acreage harvested per board feet is about 8.4 acres for every 1,000 board feet of timber. This indicates that the potential annual disturbance of woody vegetation cover types for timber harvest in the planning area would continue to range from approximately 16,800 to 42,000 acres annually. The majority of this future harvest, however, would not be made on BLM-administered lands.

Timber harvest in the planning area would affect Dry Conifer, Wet/Cold Conifer, and some Aspen/Conifer vegetation types. This would have direct impacts on the wildlife that occupy these habitats. Subsequent to removing large high-value trees, timber harvest also promotes the spread of shade-intolerant coniferous species. However, in many cases timber harvest can also improve forage habitat by creating open spaces with edge habitat that has greater forb production than unbroken forested habitat. Projected timber harvest could add cumulatively to the short-term disturbance of wooded vegetation types when considered jointly with the action alternatives. Alternative B would contribute most to the cumulative short-term disturbance to wooded vegetation types, with total treatments footprint acreage ranging from 18 percent to 25 percent of the total available habitat over a 10-year period. Alternatives A and D have virtually no treatments in these vegetation types. Alternatives C and E have a total treatment acreage of less than 10 percent of the total available habitat over a 10-year period. Alternatives C and E would come closest to meeting project goals of DFC and FRCC in this vegetation type. Accordingly, they would contribute the second highest to short-term disturbance, but would offset that disturbance and the cumulative timber harvest disturbance with long-term habitat and FRCC improvements.

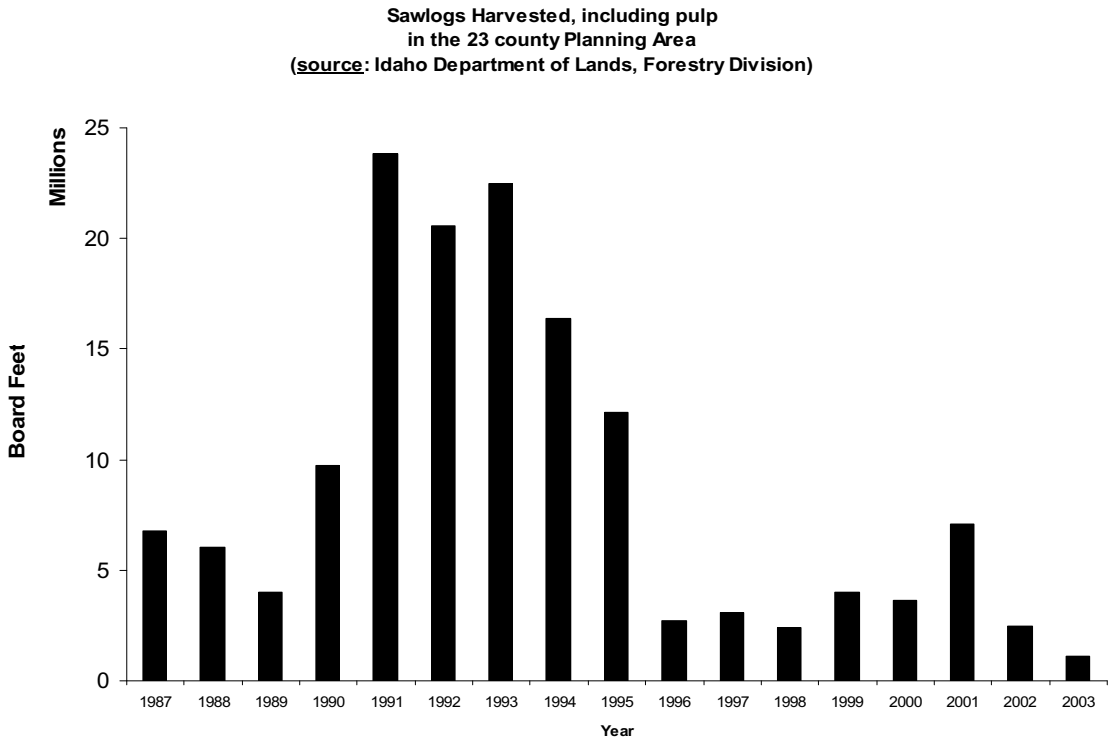

Figure 4-32. Trend of annual sawlog harvests for the 23 county planning area between 1987 and 2003. These values are the combined harvests irrespective of source (i.e., private, state, federal, etc.).