

## ■ **Alternative 2**

Effects would be the same as Alternative 1.

## ■ **Alternative 4**

### □ **Direct and Indirect Effects**

This alternative would provide for planting “species at risk” where natural regeneration fails. The determination of natural regeneration failure can take two to five years. Culturists would assess seed fall, germination, seedling survival and “free to grow” status to determine natural regeneration success. Planting would provide the opportunity to increase the occurrence of the seral “species at risk” by direct establishment at desired numbers and locations in species mixtures typical to the environment, including shade tolerant species like Douglas-fir.

Regeneration in salvage harvest areas would develop under lower slash conditions with fewer fire-killed trees to eventually fall to the ground with the effect of decreasing the threat of stand replacement fire intensity should another wildfire occur in the next hundred years or so.

Under Alternative 4, commercial thinning, shelterwood preparation cutting of 1454 acres on VRU 2 sites would provide direct enhancement or recruitment of “species at risk” (refer to Table 4.10.4). Because these treatments would favor these species over others, they would improve the presence, health, vigor and reproductive capability of existing “species at risk.”

Timber harvesting operations could damage conifer regeneration in skid trails and landings while at the same time creating bare soils or reduced duff conditions favorable to seral species seed germination and growth.

Reforestation funding would likely be inadequate within the timeframe for successfully establishing conifers in all locations where natural regeneration fails. Timber sale receipts could be available for reforestation costs through the Knutson-Vandenberg (KV) Act.

In the short-term, this alternative would provide for greater establishment and retention of “species at risk” conifers than Alternatives 1 or 2 by providing tree planting of these “species at risk” where natural regeneration fails and would provide the possibility of collecting additional

reforestation funds through the KV trust fund deposits. In the long-term, the harvest treatments would enhance the environment of these “species at risk” which survived the wildfires of 2000.

### □ **Cumulative Effects**

Establishment and maintenance of “species at risk” at levels within the range of natural variability is key to a host of ecosystem functions. Herbicide treatment of noxious weeds to be completed under the Big Game Winter Range and Burned Area Weed Management EIS could potentially affect conifer regeneration by stunting growth of older seedlings and saplings and killing young seedlings. The type of herbicide, timing, and location would be coordinated with District Culturists responsible for monitoring conifer regeneration in order to minimize adverse effects.

There are no reasonably foreseeable future actions that would have a significant contribution to the presence of “species at risk”.

## ■ **Alternative 5**

This alternative would have direct, indirect and cumulative effects similar to Alternative 4 except that this alternative would treat more stands through commercial thinning and shelterwood preparation cutting.

Under Alternative 5, 2632 acres would be treated on VRU 2, VRU 3 and VRU 4 sites to enhance or recruit “species at risk” (refer to Table 4.10.2). Because treatments would favor these species over others, they would improve the presence, health, vigor and reproductive capability of existing “species at risk.”

In the short term, this alternative would provide for greater establishment of “species at risk” conifers than all other alternatives because of the larger vegetative treatment area and greater potential to generate Knutson-Vandenberg (KV) funds for reforestation activities

## □ **4.10.5 Native Flora**

### ■ **Effects Common to All Alternatives**

The change composition of the native and non-native flora that will naturally change over time is referred to as succession. In the long term,

most non-native plants will persist in the environment, even though succession will generally cause a reduction in overall presence (in the case of shade intolerant non-natives being overgrown by native flora).

#### ■ **Alternative 1**

##### □ *Direct and Indirect Effects*

Alternative 1 would consist of just the native plant response to wildfire effects. This would protect native flora by allowing natural processes to occur unhindered.

##### □ *Cumulative Effects*

The rehabilitation work under BAER and suppression rehabilitation resulted in seeding of non-native seed mixes for erosion control during fireline and safety zone rehabilitation, culvert replacement, etc., over a limited area immediately following the fires. Flora from these non-native seed mixes can quickly occupy these disturbed sites and persist for long periods, typically out competing native flora. Herbicide treatment of noxious weeds to be completed under the Big Game Winter Range and Burned Area Weed Management EIS could potentially affect conifer regeneration and native plants by stunting growth or killing individual plants. Herbicide treatment could also be beneficial to native plants by reducing competition from noxious weeds, which would increase the vigor of these native plants. The type of herbicide, timing, and location can greatly reduce effects on native flora.

#### ■ **Alternative 2**

##### □ *Direct and Indirect Effects*

This alternative would be similar to Alternative 1 in that native plant response to wildfire effects would be the primary process. The minor difference would be in the associated, but limited, direct seeding of non-natives for erosion control during the following activities: mine and stream rehabilitation; culvert and stream crossing removal/replacement; road closures; riparian stabilization/planting (generally native hardwoods); and weed treatments along roads. Flora from these non-native seed mixes could quickly occupy these disturbed sites and generally persist for long periods, out competing native flora.

##### □ *Cumulative Effects*

Effects would be the same as Alternative 1.

#### ■ **Alternative 4**

##### □ *Direct and Indirect Effects*

This alternative would be similar to Alternatives 1 and 2 in that native plant response to wildfire effects would be the primary process; plus associated, but limited, direct seeding of non-natives for erosion control; plus native plant disturbance from commercial fuels reduction treatments in VRU 2. Grass seeding of non-natives for erosion control would affect native flora, though the practice would retain the soil resource. Flora from these non-native seed mixes could quickly occupy these disturbed sites and persist for long periods, out-competing native flora.

Prescribed burning would generally be favorable to native plants, as they have evolved with fire as a primary disturbance. Mechanical operations during commercial timber harvest could displace or disturb individual plants in the short term. Soil disturbance from timber harvest operations could provide favorable conditions for both native and exotic plants, including noxious weeds. Mitigation measures and design criteria would be used to limit any adverse effects.

##### □ *Cumulative Effects*

Effects would be the same as Alternative 1.

#### ■ **Alternative 5**

##### □ *Direct and Indirect Effects*

Effects would be the same as Alternative 4.

##### □ *Cumulative Effects*

Effects would be the same as Alternative 1.

## ■ 4.11 Threatened, Endangered and Sensitive Plants

Effects were analyzed by assessing the activities proposed in each alternative and the potential effects to the species that are known or have potential habitat in the project area (refer to Threatened, Endangered and Sensitive Plant section in Chapter 3). There will be no effects to any Federally Listed (Threatened or Endangered), Proposed, or Candidate species. The detailed effects analysis for each Sensitive species is described more fully in the Biological Evaluation for Sensitive Plant Species (located in the Project File). Because these species are only one component of the native vegetation in general, the overall effects on native flora are also considered.

### □ 4.11.1 Alternative 1

#### ■ Direct and Indirect Effects

There would be no direct effects to threatened, endangered and sensitive (TES) plant species. However, fuel accumulations may contribute to higher intensity fires, which may or may not affect TES plant species. It is possible that clustered lady's slipper could be negatively affected by future high intensity fire. The probable effect of high intensity fires would be mortality of individual plants but the populations would likely remain viable. Stands in VRU 2, which have more canopy closure than historic conditions, would have less potential habitat for common clarkia.

#### ■ Cumulative Effects

Rehabilitation work under the BAER plan would continue, but would not affect rare plant species (Lolo National Forest 2000 BAER report). Forest-wide project-specific surveys and TES plant species management would continue. Monitoring of known TES plant populations would continue, and trends would be assessed. Noxious weeds would continue to be treated (Lolo National Forest Winter Range and Burned Area Weed Management EIS, Superior and Ninemile Ranger District weed management programs, and Weed Management Areas on

private land), decreasing the effects of weed invasion on native flora, including rare species.

The Purpose and Need of this EIS as related to TES plant species is: "Desired outcome for rare and sensitive plant species is that existing habitats and populations are protected, and that potential habitats are improved for existing species" (refer to Chapter 1). This alternative would meet the goal of the Lolo National Forest Plan to maintain viable populations of all indigenous plants. It would not address recommendations for Invasive Species and Rare Plants from the assessment of the 2000 fire season, *Toward Restoration and Recovery*. Potential habitats as related to fire exclusion and fuel accumulations would not be improved. However, continuing weed treatment would improve habitat.

### □ 4.11.2 Effects Common to Alternatives 2, 4 and 5

#### ■ Direct and Indirect Effects

While individual sensitive plants may be affected by proposed activities, populations would remain viable.

#### □ Restoration and Recovery

The proposed restoration and recovery activities described in Chapter 2 (e.g., travel management, weed treatment, soil stabilization, riparian restoration, road closures & decommissioning, culverts, seeding, and planting) would generally have no direct effects on these rare plant species or their habitats, because they would not occur in wetland habitats. The exceptions would be wet microsite habitats of musk-root, small yellow lady's slipper, and western pearl flower. However, these microsites are not present in the areas affected by streamside activities such as culvert replacement.

Some of the proposed restoration activities could possibly increase the risk of weed invasion. Noxious weeds and other invasive non-native plant species can threaten the composition and health of native plant communities and often displace native plant species (Sheley 1999). This can include rare plant species as well. Those species that are found in open, early seral habitats, such as common clarkia, are especially

susceptible to the indirect effects of weed invasion (Vanderhorst 1997).

#### □ *Weed Treatments*

The weed control proposed in this analysis would reduce or eradicate noxious weeds and improve the vigor of native vegetation, thereby increasing resistance to further invasion (refer to the Noxious and Invasive Plant Species section in Chapter 4). Clustered ladyslipper, candystick, Iceland moss-lichen, western boneset, musk-root, small yellow lady's slipper, and western pearl flower do not occur in habitats, which have a high risk of weed invasion on the Lolo National Forest. Tapertip onion and tapered-root orogenia were not found during surveys. Although their potential habitat could be affected by restoration activities, weed control would maintain habitat integrity.

#### ■ **Monitoring**

Three types of monitoring would take place: baseline, validation, and effectiveness.

Baseline monitoring of the known clustered ladyslipper populations would be done before any type of treatment was implemented. This would include measuring such parameters as number of plants, numbers of flowers and fruits produced, and habitat conditions (such as other species present, amount of canopy closure, etc.). Validation monitoring would assess changes in habitat conditions following treatments. Effectiveness monitoring would continue to assess the characteristics which influence population viability, including population size, vigor, pollination, and reproductive success (Menges 1990). From this, continued population viability could be compared to the baseline, and future management actions would be adapted as necessary. The monitoring would be conducted by qualified Botany or Forest Ecology personnel on the Lolo National Forest. Monitoring would take place yearly for 3 years beginning just prior to implementation, and then every other year for 6 more years, at appropriate times during the growing season (i.e. while the plants are flowering and fruiting).

### □ **4.11.3 Alternative 2**

#### ■ **Direct and Indirect Effects**

See discussion above in the Effects Common to Alternatives 2, 4 and 5 for direct and indirect effects of this alternative.

#### ■ **Cumulative Effects**

Cumulative Effects would be the same as Alternative 1.

As in Alternative 1, this alternative would meet the Lolo National Forest Plan goal to maintain viable populations of all indigenous plants. It would address recommendations for Invasive Species and Rare Plants from the assessment of the 2000 fire season, *Toward Restoration and Recovery*, because continuing weed treatment would improve habitat, as described above. However, potential habitats as related to fire exclusion and fuel accumulations would not be improved.

### □ **4.11.4 Effects Common to Alternatives 4 and 5**

#### ■ **Direct and Indirect Effects**

#### □ *Fuel Treatments (prescribed fire and thinning)*

Native plant species have evolved with and adapted to natural fires. These fires varied in intensity and frequency, depending on vegetation, fire regime, and weather conditions. Native plant species differ in their response to fire intensity and timing (Wildland Fire in Ecosystems, Effects of Fire on Flora, USDA 2000). Certain native grasses, forbs, and shrubs are more vulnerable during the spring while they are actively growing, but are not affected by fires during their dormant season. Other species require fire for seed germination. Still other early seral species require bare mineral soil and an open forest canopy to establish. For example, common clarkia is found in habitats influenced by past fires, and fire may be important for maintaining habitat and/or creating new habitat for the species (Vanderhorst 1997). On the Lolo National Forest, fire exclusion has resulted in a loss of much of this early seral habitat, especially in VRU 2 (dry, low elevation habitats). Tapered-

root orogenia and tapertip onion also occur in these types of habitats.

Prescribed fire would be used to reduce fuels following timber harvest. In other areas, ecosystem burns would use low-intensity fire to reduce existing fuels and kill small diameter trees. Direct fire effects to clustered ladyslipper are unknown. Many orchid species can sustain prolonged dormancy; that is, can remain underground for years without producing leaves, stems or flowers (Lesica 1994). This may be an adaptation to fire. Complete removal of the overstory canopy can contribute to a significant loss of plant numbers and/or vigor in clustered ladyslipper populations (Greenlee, 1997). However, the species does occur in frequent-fire type habitats, although these stands are more densely stocked than historical conditions because of fire suppression. Historically, populations of clustered ladyslipper in these habitat types probably "followed" patches of suitable habitat across the landscape as disturbances and successional changes occurred (Greenlee, 1997). The indirect effects of prescribed fire and fuel treatments may benefit those species that grow in dry, fire-adapted habitats (clustered ladyslipper, common clarkia, tapered-root orogenia, and tapertip onion). Fuel treatments would not occur in habitats for western boneset, musk-root, small yellow lady's slipper, and western pearl flower in any of the alternatives.

Complete removal of the overstory canopy can contribute to a significant loss of plant numbers and/or vigor in clustered ladyslipper populations (Greenlee 1997). Like prescribed fire, thinning would also help maintain a partially open overstory canopy, and may benefit common clarkia and clustered ladyslipper (Greenlee 1997), and possibly taper-root orogenia and tapertip onion. There would be some ground disturbance associated with thinning, but not near known rare plant populations. Opening the forest canopy and creating bare mineral soil could also permit the establishment of noxious weeds. However, the design criteria and mitigation measures for proposed ground disturbing and habitat-altering activities would include direct and indirect weed control methods (refer to Noxious and Invasive Plant Species section in Chapter 4).

#### □ *Timber Harvest*

Fire and insect killed trees would be harvested throughout the analysis area, which includes potential habitat of clustered ladyslipper, common clarkia, candystick, and Iceland moss-lichen. Harvest methods would include tractor, skyline, and helicopter logging. Timber harvest would not occur in habitats for western boneset, musk-root, small yellow lady's slipper, and western pearl flower in any of the alternatives.

Known populations of clustered ladyslipper exist in Unit 180 that would be yarded with a helicopter. Proposed mitigation measures (refer to Chapter 2) would maintain population viability and maintain optimum habitat for these populations.

Potential habitat for candystick and Iceland moss-lichen exists on 41 acres (Units 172, 173, 175 and 176) in Alternative 4 and 72 acres (Units 171, 172, 173, 174, 175, and 176) in Alternative 5 would be yarded with tractor or skyline yarding systems. There would be no direct effects to either candystick or Iceland moss-lichen or their potential habitat because no plants are known and very little potential habitat would be affected. In addition, fire intensity was generally high, with high overstory mortality, in the candystick and Iceland moss-lichen habitats. This would preclude survival of either candystick, because the overstory trees are gone (Lichthardt 1995) or Iceland moss-lichen, because the menziesia has been killed. Thus, the ground disturbance associated with tractor logging would have no effect. There would be no direct effects to other species.

#### ■ *Cumulative Effects*

In the long term, cumulative effects to clustered ladyslipper, common clarkia, tapered-root orogenia, and tapertip onion would be beneficial, because suitable habitat would be maintained. In Region One National Forests, including the Lolo National Forest, clustered ladyslipper is being managed under a Conservation Assessment (Greenlee, 1997). Cumulative effects to populations and habitats from timber harvest and prescribed fire are being monitored on the Lolo and Nez Perce National Forests. Potential habitats as related to fire exclusion and fuel accumulations would be improved, and ongoing and proposed weed treatment would improve habitat.

The Purpose and Need of this EIS as related to TES plant species is: "Desired outcome for rare and sensitive plant species is that existing habitats and populations are protected, and that potential habitats are improved for existing species" (refer to Chapter 1). These alternatives would meet the goal of the Lolo National Forest Plan to maintain viable populations of all indigenous plants. It would also address recommendations for Invasive Species and, indirectly, rare plants from the assessment of the 2000 fire season, *Toward Restoration and Recovery*, because weed treatment, fuel reduction, and habitat maintenance would improve habitat for certain rare plants.

#### 4.11.5 Alternative 4

See the above sections (Effects Common to Alternatives 2, 4 and 5 and Effects Common to Alternatives 4 and 5) for discussion of effects of this alternative.

#### 4.11.6 Alternative 5

##### ■ Direct and Indirect Effects

Alternative 5 is the only alternative that proposes temporary road construction. Approximately 1.7 miles of temporary road construction would occur along ridgetops, where there is some potential habitat for candystick. However, no plants were located during surveys. There would be no significant reduction in habitat.

See the above sections (Effects Common to Alternatives 2, 4 and 5 and Effects Common to Alternatives 4 and 5) for discussion of other effects (including cumulative effects) of this alternative.

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## ■ 4.12 Noxious and Invasive Plant Species

#### 4.12.1 Alternative 1

##### ■ Direct and Indirect Effects

This alternative would have no direct effects on noxious weed species. However, weeds could increase in areas that are currently infested, and

that are not covered by other ongoing weed management actions.

##### ■ Cumulative Effects

Rehabilitation work under the BAER plan would continue, as would other ongoing weed management activities being carried out as part of the Lolo National Forest Winter Range and Burned Area Weed Management EIS, the Weed Management Areas on private land, and Superior and Ninemile Ranger Districts weed management programs. There would be less weed control than with the other alternatives, which means that the overall cumulative effects to native vegetation and ecosystem structure and function would be less beneficial than the other alternatives.

This alternative would not address recommendations for Invasive Species and Rare Plants from the assessment of the 2000 fire season, *Toward Restoration and Recovery*.

#### 4.12.2 Alternatives 2, 4 and 5

##### ■ Direct and Indirect Effects

The ground disturbing activities proposed in these alternatives would have a high risk of weed spread in (1) habitats that have high susceptibility to weed invasion or (2) areas that are already disturbed. However, a comprehensive plan of weed control and prevention would be integrated into project design for all of the proposed activities, regardless of where they would occur, which would reduce or eradicate noxious weeds and improve the vigor of native vegetation, thereby increasing resistance to further weed invasion. Weed control, both direct herbicide use and non-herbicide prevention measures, would be included as design criteria.

##### *Proposed Direct Methods of Weed Control*

Under Alternatives 2, 4 and 5, herbicide treatment of noxious weeds would occur on approximately 520 miles of road identified for reconstruction or closure. The treated areas would vary slightly by alternative depending on the miles of road reconstruction and closures and need determined by existing road closures. Treatments would be commensurate with the location of existing populations and with weed

risk. Monitoring would take place to determine effectiveness of treatment.

In areas proposed for mine reclamation and gravel source development, inventory would be done to locate any new weed infestations. These would subsequently be sprayed and monitored to determine effectiveness of treatment.

All herbicide treatments would follow the procedures and mitigation measures outlined in the Lolo National Forest Winter Range and Burned Area Weed Management EIS (2001) and the Lolo National Forest Noxious Weed Management Final EIS (1991).

#### **Proposed Indirect Methods of Weed Control**

**Erosion reduction:** This would be accomplished by stream restoration activities such as riparian planting, culvert replacement, and soil stabilization.

**Seeding:** This would take place in conjunction with mine reclamation, and other ground-disturbing activities. (See Appendix H for Native Grass Seed Mixes)

**Mulching:** As part of erosion reduction, this would also prevent weed establishment.

**Equipment washing:** Any equipment used for restoration activities and timber harvest (Alternatives 4 and 5) would be washed to prevent dispersing weed seeds.

**Travel management:** Decommissioning and closing roads would prevent weed seed dispersal by vehicles.

#### **Cumulative Effects**

Ongoing weed management in the analysis area includes weed control as a result of the Lolo National Forest Winter Range and Burned Area Weed Management EIS, the Superior and Ninemile Ranger Districts' weed programs, and Weed Management Areas that incorporate private land. Because of proposed weed control measures in the Post Burn project area, these alternatives would be more beneficial to native vegetation and ecosystems than Alternative 1. Integrated weed management, including active weed control, for the analysis area is tiered to the Big Game Winter Range and Burned Area Weed Management EIS (2001). Alternative D of the EIS (page II-6) will be implemented in the Post Burn analysis area. It includes restoration with prescribed fire, cultural control, biological control, herbicide application, education, and

prevention. Tables II-7 and II-8 on pages II-46 through II-55 show the treatments proposed for this alternative that would be implemented in the Post-Burn project area. A maximum of 21,750 acres would be treated.

These alternatives would follow Lolo National Forest Plan management direction for noxious weeds. They would also address recommendations for invasive species and, indirectly, rare plants from the assessment of the 2000 fire season, *Toward Restoration and Recovery*, since continuing weed treatment would improve habitat for rare plants.

#### **Monitoring**

Monitoring would be similar to that which is being conducted as part of the Lolo National Forest Winter Range and Burned Area Weed Management EIS (page II-24). Monitoring of environmental conditions would occur during direct weed treatment. Monitoring of non-target resources, including wildlife, plant and animal abundance, and aquatic resources would also occur. Effectiveness monitoring would be implemented during the next growing season following treatment.

Inventories for new infestations as a result of the proposed activities would be conducted every growing season. The monitoring and inventories would be conducted by qualified Weed, Range, and/or Botany personnel on the Lolo National Forest.

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## **4.13 Wildlife**

### **4.13.1 Threatened and Endangered Species**

#### **Bald Eagle**

##### **Effects Common to All Alternatives**

The Clark Fork River borders the project area but almost all of the land along the river is in State or private ownership. The Forest Service has no influence on management activities on those lands. None of the proposed activities on Forest Service land is within any suitable bald eagle habitat; therefore, all alternatives would have **no effect** on bald eagles. No alternative

would have any direct, indirect or cumulative effects on bald eagles.

■ **Gray Wolf**

Big game habitat quality, shown by winter range condition and elk security, is used to indicate change in potential wolf prey populations. Open road density is used to estimate the potential for human contact.

□ ***Effects Common to All Alternatives***

No prescribed burning is proposed for the winter range areas in the fire perimeters under any alternative. Some site preparation burning treatments may overlap slightly with winter range. Because there would be no prescribed burning in big game winter range, all of the alternatives would have no effect on winter range.

Gains in elk security will be made as burned cover grows back.

□ ***Cumulative Effects Common to All Alternatives***

**Past to present:** Wolf populations declined in the U.S. due to a combination of shooting, trapping, poisoning, and declines in prey populations. Wolves preyed on livestock and competed directly with settlers for game; therefore, wolves and other predators were considered a problem. Bounties and government sponsored predator control programs helped eliminate wolves in many areas. Ironically, these programs also removed wolves from Yellowstone National Park. By the 1930s, wolves had been eliminated in most of the lower 48 states, with only a few wolves remaining in Minnesota.

Wolves were first listed as endangered species in 1973. Because this law now protects wolves, and because prey populations have increased significantly, wolves began moving back into western Montana from Canada. A wolf pack naturally re-colonized the Ninemile valley, which is in the project area. The draft environmental impact statement to reintroduce wolves to Yellowstone National Park and

Central Idaho came out in 1993 with a proposal to speed up wolf recovery. In 1995 and 1996, wolves from Canada were released in Yellowstone National Park and Central Idaho. By 2000, the estimated wolf populations were 140 wolves in Yellowstone, 187 wolves in Idaho and 71 wolves in Montana (USFWS 2001). The main sources of human caused mortality in western Montana have been wolves being killed on the highway and mortality associated with livestock predation.

In 1998, the U.S. Fish and Wildlife Service announced that it would consider delisting or reclassifying specific wolf populations. The state of Montana has established an advisory committee in preparation for taking over wolf management after delisting. The draft of the Montana Wolf Conservation and Management Planning Document was circulated for public comment in January 2002. The comment period closed April 30, 2002 and about 4,000 comments were received. The final document is scheduled for release in late 2002.

The USFWS and Wildlife Services has killed four wolves in the Ninemile Valley so far this year after the wolves killed sheep and llamas.

**Foreseeable Future Actions:** Activities that could affect elk security include timber harvest and road construction. No other large-scale timber harvests are proposed on Forest Service lands in this area. A post and pole sale on approximately 40 acres in Bird Creek will not change elk security. Precommercial thinning approximately 100 acres also will not change elk security because of the proximity to open roads and small size of individual stands. There are no proposals for new road construction so open road density will not increase. There are several proposals to improve big game winter range. Under the Big Game Winter Range and Burned Area Weed Management EIS, herbicide treatment will be done on winter range within the Post Burn project area. In addition, there is about 1000 acres of winter range burning proposed in the lower Trout Creek drainage that will benefit forage production. These beneficial treatments will improve forage production on winter range and may increase the prey base for wolves.

**Table 4.13.1. Percent of Elk Security within the Herd Unit by Alternative**

| Herd Unit | Alternative 1 | Alternative 2 | Alternative 4 | Alternative 5 |
|-----------|---------------|---------------|---------------|---------------|
|-----------|---------------|---------------|---------------|---------------|

|                                            |     |     |     |     |
|--------------------------------------------|-----|-----|-----|-----|
| Sunrise                                    | 44% | 44% | 49% | 44% |
| Van Ness                                   | 47% | 49% | 49% | 49% |
| Johnson                                    | 20% | 22% | 23% | 21% |
| Upper Ninemile<br>(Forest Service portion) | 28% | 32% | 32% | 31% |

**Table 4.13.2. Open Road Density within the Herd Unit by Alternative (miles/square mile)**

| Herd Unit                                  | Alternative 1 | Alternative 2 | Alternative 4 | Alternative 5 |
|--------------------------------------------|---------------|---------------|---------------|---------------|
| Sunrise                                    | 1.3           | 1.3           | 1.1           | 1.3           |
| Van Ness                                   | 1.1           | 1.0           | 1.0           | 1.0           |
| Johnson                                    | 1.2           | 1.2           | 1.1           | 1.2           |
| Upper Ninemile<br>(Forest Service portion) | 0.9           | 0.7           | 0.7           | 0.7           |

☐ **Alternative 1**

**Direct and Indirect Effects:** This alternative would have **no effect** on wolves because there would be no change in elk security or open road density (refer to Tables 4.13.1 and 4.13.2).

**Cumulative Effects:** This alternative would have no cumulative effects on wolves because vegetation and open road density would not change.

☐ **Alternative 2**

**Direct and Indirect Effects:** This alternative would have **no effect** on wolves. Under this alternative, elk security would remain the same in the Sunrise elk herd unit and would increase in the other herd units (refer to Table 4.13.1, above, and Map 4.13.1 in Appendix A). The open road density would remain the same in the Sunrise and Johnson herd units and would decrease in the other two herd units (refer to Table 4.13.2). This alternative would provide an overall improvement in wolf habitat.

**Cumulative Effects:** This alternative would have no cumulative effects on wolves. This alternative could result in a slight improvement to wolf habitat because elk security would remain the same or would increase and open road density would stay the same or would decrease in all elk herd units, which may improve habitat for wolf prey species and reduce the probability of human contact.

☐ **Alternative 4**

**Direct and Indirect Effects:** This alternative would have **no effect** on wolves. Under this

alternative, elk security would increase in all herd units (refer to Table 4.13.1). The gains would be from road closures or seasonal restrictions. Vegetation treatments in the Johnson and Upper Ninemile herd units may reduce cover on about 120 acres in the Johnson herd unit and about 50 acres in the Upper Ninemile herd unit. The cover reductions would be scattered across many small areas and would not change the overall percentage of elk security. The open road density would decrease in all of the herd units, which would reduce the probability of human contact (refer to Table 4.13.2, above, and Map 4.13.2 in Appendix A)

**Cumulative Effects:** This alternative would have no cumulative effects on wolves. This alternative could result in a slight improvement to wolf habitat because elk security would increase and open road density would decrease in all elk herd units, which may improve habitat for wolf prey species and reduce the probability of human contact.

☐ **Alternative 5**

**Direct and Indirect Effects:** This alternative would have **no effect** on wolves. Under this alternative, elk security would remain the same or increase in all elk herd units (refer to Table 4.13.1, above, and Map 4.13.3 in Appendix A.) and the open road densities would remain the same or decrease (Table 4.13.2). This alternative would increase potential prey populations and decrease the potential for human contact.

**Cumulative Effects:** This alternative would have no cumulative effects on wolves. This alternative could result in a slight improvement to wolf habitat because elk security would

remain the same or would increase and open road density would stay the same or would decrease in all elk herd unit, which may improve habitat for wolf prey species and reduce the probability of human contact.

### ■ Grizzly Bear

No Bear Management Analysis Areas (BMAA) are designated in the project area. Elk herd units are used for analysis because they are larger than the minimum acreage for a BMAA

Effects on potential grizzly bear habitat are analyzed using elk security and open road density. These factors will only be used for relative comparison because the project is not in a grizzly bear recovery area, there are no known bears present at this time and there are no standards for these factors.

#### □ *Effects Common to All Alternatives*

Gains in elk security will be made as burned cover grows back.

#### □ *Cumulative Effects Common to All Alternatives*

**Past to Present:** Habitat loss from human encroachment and mortality from shooting are two major factors in grizzly bear population declines. Grizzly bears are protected by law and have been proposed for delisting. Conflicts between people and grizzly bears are probably the major challenge in grizzly recovery, as the outcome with the Ninemile grizzly shows.

**Foreseeable Future Actions:** Activities that could change elk security include timber harvest and road construction. No other large-scale timber harvests are planned on Forest Service lands in this area. A post and pole sale on approximately 40 acres in Bird Creek will not change elk security. Precommercial thinning of approximately 100 acres would also not change elk security because of the proximity to open roads and small size of the individual stands. There are no known proposals for new road construction in this area so open road density will not increase.

#### □ *Alternative 1*

**Direct and Indirect Effects:** Under this alternative there would be no change in cover (measured by elk security) or open road density

(refer to Tables 4.13.1 and 4.13.2). This alternative would provide no opportunity to increase elk security or decrease the open road density, which would be considered habitat improvements for grizzly bears. Even though there is no grizzly bear known to be present, there is no established method to confirm that there is no effect on habitat outside the recovery zone. Therefore, this alternative **may affect, but would not likely to adversely affect** potential grizzly bear habitat.

**Cumulative Effects:** This alternative would have no cumulative effects because vegetation and open road density would not change.

#### □ *Alternative 2*

**Direct and Indirect Effects:** Under this alternative, elk security would remain the same in the Sunrise elk herd unit and would increase in the other herd units (refer to Table 4.13.1). The open road density would remain the same in the Sunrise and Johnson herd units and would decrease in the other two herd units (refer to Table 4.13.2). Even though this alternative would probably improve potential habitat for grizzly bears, there is no established method to confirm that there is no effect on habitat outside the recovery zone. Therefore, This alternative **may affect, but would not likely to adversely affect** potential grizzly bear habitat.

**Cumulative Effects:** This alternative would have no cumulative effects on grizzly bears. This alternative could result in a slight improvement to grizzly bear habitat because there are no vegetative treatments, elk security would remain the same or increase and open road density would remain the same or decrease in all herd units.

#### □ *Alternative 4*

**Direct and Indirect Effects:** Elk security would increase and open road density would decrease in all herd units (refer to Tables 4.13.1 and 4.13.2), which would have an overall improvement in potential grizzly bear habitat. The gains in elk security would be from road closures or seasonal restrictions. Vegetation treatments in the Johnson and Upper Ninemile herd units may reduce cover on about 120 acres in the Johnson herd unit and about 50 acres in the Upper Ninemile herd unit. The cover reductions would be scattered across many small areas and would

not change the overall percentage of elk security. Even though this alternative probably would provide the most improvement for potential grizzly bear habitat, there is no established method to confirm that there would be no effect on habitat outside the recovery zone. Therefore, this alternative **may affect, but would not likely to adversely affect** potential grizzly bear habitat.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve potential habitat. Habitat would improve because elk security would increase and open road density would decrease in all elk herd units.

#### □ *Alternative 5*

**Direct and Indirect Effects:** Under this alternative, the high level of elk security would be maintained in the Sunrise herd unit, and would increase in the other herd units (refer to Table 4.13.1). The gains would be from road closures or seasonal restrictions. Vegetation treatments in the Johnson and Upper Ninemile herd units may reduce cover on about 240 acres in the Johnson herd unit and about 230 acres in the Upper Ninemile herd unit. The elk security gains from road closures would outweigh the losses from timber harvest.

Even though this alternative probably would improve potential habitat for grizzly bears, there is no established method to confirm that there would be no effect on habitat outside the recovery zone. Therefore, this alternative **may affect, but would not likely to adversely affect** potential grizzly bear habitat.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve potential habitat. Habitat would improve because elk security would remain the same or would increase and open road density would remain the same or would decrease in all elk herd units.

#### ■ **Lynx**

Foraging habitat, denning habitat, unsuitable habitat, and open road density are used to assess effects to lynx habitat

#### □ *Effects Common to All Alternatives*

No treatments are proposed in any lynx foraging habitat under any alternative; therefore, all alternatives would have no effect on foraging habitat. Gains in foraging habitat would only occur as young, unsuitable stands mature.

#### □ *Cumulative Effects Common to All Alternatives*

Past to Present: Some of the earliest records of lynx in Montana consist of 12 museum specimens collected between 1887 and 1921 (McKelvey et al. 1999). One specimen was trapped near Plains, MT, which is about 15 miles northwest of the project area.

An article in the Mineral Independent newspaper (Mineral Co. MT) from January 26, 1950 reports that the Grunhuvds were running a trapline near Superior and had trapped nine lynx. The Jensen's and Kay's lynx catch brought the total to nearly 20. Also, lynx only brought a \$2 bounty compared to the \$25 bounty for mountain lions.

The Montana Fish and Game Department did not start keeping trapping records until 1950. Between 1950 and 1997 the records show 3,012 lynx were trapped in the state (McKelvey et al. 1999).

Besides trapping, increased road access, fire suppression and timber harvesting have all had impacts on lynx populations. Expanding networks of logging roads made access for trapping easier. Fire suppression may have reduced areas that have high populations of snowshoe hares, because hares tend to favor younger stands of lodgepole pine that would grow following a stand replacement fire. Losensky's (1997) work has some information on the historical vegetation in Montana and shows that the non-stocked and 1 to 40 year old stands made up 48 to 77 percent of the lodgepole pine habitat.

Extensive clearcuts that left no foraging or denning habitat also reduced lynx habitat. Now, twenty to thirty years later, those same clearcuts that removed habitat have become foraging habitat. If young forest stands are not created by natural or planned activities, then lynx foraging habitat will continue to decline.

**Table 4.13.2a. Losensky’s Historic Vegetation Conditions. Percent of lodgepole pine in each age class**

| Climatic section | Non Stocked | 1- 40 years old | 41-100 years old | Mature greater than 100 years | Potential Old Growth 121+ years |
|------------------|-------------|-----------------|------------------|-------------------------------|---------------------------------|
| Section 8        | 34          | 43              | 16               | 4                             | 3                               |
| Section 10       | 28          | 42              | 20               | 7                             | 3                               |
| Section 11       | 11          | 37              | 41               | 8                             | 3                               |

The project area overlaps 3 of the climatic sections described in Losensky (1997).

The Montana Department of Fish, Wildlife and Parks regulates trapping in the state. The trapping season for lynx is now closed in Montana. Even though this removes the direct trapping pressure, there is still the potential for lynx being caught in traps set for other species.

**Foreseeable Future Actions:** The activity that could impact foraging habitat would be

precommercial thinning in lynx habitat. The roughly 100 acres of proposed thinning are all outside of lynx habitat. The activity that would produce unsuitable habitat or reduce denning habitat would be regeneration harvest. The only planned harvest activity is a roughly 40 acre post and pole sale in Bird Creek, which is not in denning or foraging habitat. There are no known proposals for new road construction in the area so there will not be an increase in open road density.

**Table 4.13.3. Open Road Density Within LAUs by Alternative (miles/square mile)**

| LAU                   | Alternative 1 | Alternative 2 | Alternative 4 | Alternative 5 |
|-----------------------|---------------|---------------|---------------|---------------|
| Upper Ninemile-Siegel | 1.0           | 0.8           | 0.7           | 0.8           |
| Ninemile Divide       | 0.4           | 0.3           | 0.2           | 0.3           |
| Trout                 | 0.8           | 0.8           | 0.6           | 0.8           |
| McCormick             | 0.2           | 0.01          | 0.01          | 0.01          |

**Table 4.13.4. Acres and Percent of Lynx Denning Habitat Within the LAUs by Alternative**

| LAU                   | Alternative 1 Denning Habitat (acres percent) | Alternative 2 Denning and Other Habitat Treated (acres) | Alternative 2 Resulting Denning Habitat (acres percent) | Alternative 4 Denning Other Habitat Treated (acres) | Alternative 4 Resulting Denning Habitat (acres percent) | Alternative 5 Denning Other Habitat Treated (acres) | Alternative 5 Resulting Denning Habitat (acres percent) |
|-----------------------|-----------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|
| Upper Ninemile-Siegel | 10,940<br>33%                                 | 0                                                       | 10,940<br>33%                                           | 130<br>135                                          | 10,810<br>33%                                           | 610<br>580                                          | 10,330<br>31%                                           |
| Ninemile Divide       | 6130<br>18%                                   | 0                                                       | 6130<br>18%                                             | 22<br>88                                            | 6108<br>18%                                             | 610<br>220                                          | 5520<br>16%                                             |
| Trout                 | 17,280<br>46%                                 | 0                                                       | 17,280<br>46%                                           | 150<br>92                                           | 17,130<br>45%                                           | 400<br>260                                          | 16,880<br>45%                                           |
| McCormick             | 5600<br>20%                                   | 0                                                       | 5600<br>20%                                             | 0<br>0                                              | 5600<br>20%                                             | 38<br>0                                             | 5562<br>20%                                             |

**Table 4.13.5. Acres and Percent of Unsuitable Lynx Habitat Within the LAUs by Alternative**

| LAU                          | Alternative 1<br>Unsuitable<br>Habitat (acres and<br>percent) | Alternative 2<br>Unsuitable<br>Habitat (acres<br>and percent) | Alternative 4<br>Unsuitable<br>Habitat (acres<br>and percent) | Alternative 5<br>Unsuitable Habitat<br>(acres and percent) |
|------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------|
| Upper<br>Ninemile-<br>Siegel | 4635<br>14%                                                   | 4635<br>14%                                                   | 4900<br>15%                                                   | 5825<br>18%                                                |
| Ninemile<br>Divide           | 3935<br>12%                                                   | 3935<br>12%                                                   | 4045<br>12%                                                   | 4765<br>14%                                                |
| Trout                        | 1707<br>5%                                                    | 1707<br>5%                                                    | 1959<br>5%                                                    | 2367<br>6%                                                 |
| McCormick                    | 4687<br>17%                                                   | 4687<br>17%                                                   | 4687<br>17%                                                   | 46725<br>17%                                               |

#### □ *Alternative 1*

**Direct and Indirect Effects:** This alternative would have **no effect** on lynx because there would be no change in habitat (refer to Tables 4.13.3, 4.13.4 and 4.13.5, above, and Maps 3.18.4 through 3.18.11 in Appendix A).

**Cumulative Effects:** This alternative would have no cumulative effects because vegetation and open road density would not change.

#### □ *Alternative 2*

**Direct and Indirect Effects:** This alternative would have **no effect** on lynx because open road density would decrease (refer to Table 4.13.3) and there would be no change in denning or unsuitable habitat (refer to Tables 4.13.4 and 4.13.5, above, and Maps 3.18.4 through 3.18.11 in Appendix A).

**Cumulative Effects:** This alternative would have no cumulative effects because there would be no change in the vegetation. The open road density would remain the same or decrease in all LAUs but there would be no opportunity to produce additional foraging habitat.

#### □ *Alternative 4*

**Direct and Indirect Effects:** Under this alternative, there would be no vegetation treatments in the McCormick LAU; therefore, denning and unsuitable habitat would remain the same. Potential denning habitat is abundant in all of the LAUs and the LAU with the least denning habitat still has twice the amount recommended in the Lynx Conservation Assessment and Strategy (LCAS). Some potential denning habitat would be treated in the Upper Ninemile-Siegel, Ninemile Divide and

Trout Creek LAUs. The treatments would be all portions of units that overlap the edges of denning habitat. The total acres treated in each LAU would range from 0 to 150 acres (refer to Table 4.13.4, above, and Maps 4.13.4 through 4.13.6 in Appendix A). These treatments would only include small amounts of potential denning habitat and would not change the overall percentage of denning habitat; therefore, this alternative **may affect but would not likely to adversely affect** lynx denning habitat.

The high to moderate high severity portions of the fires created many acres of unsuitable habitat because there is not enough vegetation to support snowshoe hares. If a stand is unsuitable because of having been severely burned, harvesting some of the material while leaving sufficient snags (standing dead trees) and woody debris would not increase the acres of unsuitable habitat. No existing foraging habitat would be treated; thus, no foraging habitat would be converted to unsuitable habitat. The denning habitat that would be treated would be considered unsuitable habitat. Also, some “other” habitat (not foraging, denning or unsuitable habitat) would be treated and would become unsuitable. These unsuitable stands would become foraging habitat in about 15 years. Additional unsuitable habitat would be created in the Upper Ninemile-Siegel, Ninemile Divide and Trout Creek LAUs. The additional unsuitable habitat would range from 88 to 135 acres and these treatments mostly would include small portions of many stands. The treatments in the Upper Ninemile-Siegel LAU would increase the unsuitable habitat by one percent. None of the treatments would increase the overall percentage of unsuitable habitat in any of the other LAUs and none of the LAUs is near the 30 percent threshold recommended in the LCAS (refer to Maps 4.13.7 through 4.13.9 in Appendix A). Because all of

the LAUs would meet the recommendations for unsuitable habitat, this alternative **may affect but would not likely to adversely affect** lynx habitat.

Under this alternative, the open road density would decrease in all of the LAUs and would be well below the recommended level of 2 miles/square mile (refer to Table 4.13.3). Because this alternative would meet the recommended open road densities, this alternative **may affect but would not likely to adversely affect** lynx habitat.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve lynx habitat because denning habitat would exceed the recommended amount and open road density would decrease in all LAUs. This may improve habitat for prey species and reduce the probability of human contact. This alternative would also produce some unsuitable habitat, which would become foraging habitat in about 15 years.

#### □ *Alternative 5*

**Direct and Indirect Effects:** Under this alternative, there would be only 38 acres of vegetation treatments in the McCormick LAU, therefore, there would be only a minor change in denning and unsuitable habitat. Potential habitat is abundant in all the LAUs and the LAU with the least denning habitat still exceeds the recommended amount in the LCAS. Some potential denning habitat would be treated in the Upper Ninemile-Siegel, Ninemile Divide and the Trout Creek LAUs. The treatments would all be portions of units that overlap the edges of denning habitat. The total acres of denning habitat treated in each LAU would range from 38 to 610 acres (refer to Table 4.13.4, above, and Refer to Maps 4.13.10 through 4.13.12 in Appendix A). These treatments would decrease denning habitat by one to two percent. Even with this slight decrease, percentage of denning habitat would range from 16 to 45 percent and would still exceed the recommended level of ten percent. Because denning habitat would exceed the recommended level, this alternative **may affect but would not likely to adversely affect** lynx denning habitat.

The high to moderate high severity portions of the fires created many acres of unsuitable habitat because there is not enough vegetation to support

snowshoe hares. If a stand is unsuitable because of having been severely burned, harvesting some of the material while leaving sufficient snags (standing dead trees) and woody debris would not increase the acres of unsuitable habitat. No existing foraging habitat would be treated; thus, no foraging habitat would be converted to unsuitable habitat. The denning habitat that would be treated would be considered unsuitable habitat. In addition, some “other” habitat (not foraging, denning or unsuitable habitat) would be treated and would become unsuitable. These unsuitable stands would become foraging habitat in about 15 years. Additional unsuitable habitat would be created in all these LAUs. The additional unsuitable habitat would range from 38 to 580 acres and most of these treatments would occur in small portions of many stands. These treatments would increase the overall percentage of unsuitable habitat by one to four percent. Unsuitable habitat would range from 6 to 18 percent, and none of the LAUs would be near the 30 percent threshold recommended in the LCAS (refer to Table 4.13.4). Because all of the LAUs would meet the recommendations for unsuitable habitat, this alternative **may affect but would not likely to adversely affect** lynx habitat.

Under this alternative, open road density would remain the same or decrease in all of the LAUs and would be well below the recommended level of two miles/square mile (refer to Table 4.13.3, above, and Maps 4.13.13 through 4.13.15 in Appendix A). Because this alternative would meet the recommended open road densities, it **may affect but would not likely to adversely affect** lynx habitat.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve lynx habitat because denning habitat would exceed the recommended amount and open road density would remain the same or would decrease in all LAUs. This may improve habitat for prey species and reduce the probability of human contact. This alternative would also produce some unsuitable habitat, which would become foraging habitat in about 15 years.

## □ 4.13.2 Sensitive Species

### ■ **Coeur d’Alene salamander**

#### □ **Alternative 1**

**Direct and Indirect Effects:** This alternative would have **no impact** on Coeur d’Alene salamanders because there would be no disturbance to riparian areas.

**Cumulative Effects:** Past placer mining and many other activities that drastically changed stream structure were probably the major impact on these salamanders. This alternative would have no cumulative effects on this species.

❑ **Alternatives 2, 4 and 5**

**Direct and Indirect Effects:** The Lolo National Forest operates under the guidelines of the Inland Native Fish Strategy, which includes buffering areas within 300 feet of fish bearing streams, 150 feet of non-fish bearing streams and 50 to 150 feet near wetlands. These measures maintain cover and limit disturbance in the riparian area and should adequately protect habitat for these salamanders.

Under these alternatives, in-stream habitat improvement work, including a small dam removal and placer mine reclamation, would be completed. These locations are not likely habitat for Coeur d’Alene salamanders because of the previous disturbance. These in-stream projects would cause a short-term disturbance but would produce long-term benefits for the aquatic habitat.

Because of the riparian buffers and the long-term benefits of the in-stream habitat improvement projects, this project would have **no impact** on Coeur d’Alene salamanders.

**Cumulative Effects:** Past placer mining and many other activities that drastically changed stream structure were probably the major impact on these salamanders. None of the alternatives would contribute to the cumulative effects on this species. Because of fisheries and streamside mitigation and mine reclamation on the Lolo

National Forest, there would probably be little cumulative impact on habitat for these salamanders.

■ **Harlequin duck**

❑ **Effects Common to All Alternatives**

Because there are no vegetation treatments proposed in the riparian area along Trout Creek, all alternatives would have **no impact** on harlequin ducks. All alternatives would have no direct, indirect or cumulative effects on this species.

■ **Northern goshawk**

❑ **Cumulative Effects Common to All Alternatives**

**Past to Present:** Throughout North America, extensive clearcutting, removal of large trees and conversion of forested habitats to agriculture and developments have impacted goshawk populations. Fire suppression may have also reduced the number of stands with an open understory (Graham et al. 1999). These birds do not appear to forage effectively in large, cleared areas during nesting season, and large trees are important nest sites (Reynolds et al. 1992).

There is no information on goshawk populations in pre-settlement times. There is also no information from historic times. Most of the information on goshawks in the project area has been collected during the last 10 years. With no historic population information for comparison, habitat conditions are the next factor to examine. Information on historic vegetation conditions is also fairly generalized. Losensky’s (1997) work has some information on the historical vegetation in Montana. The table below shows the percentages of all the cover types in different age classes. This project area overlaps three climatic sections in his report.

**Table 4.13.5a. Losensky’s Historic Vegetation Conditions. Percent of all cover types in each age class**

| Climatic Section | less than 60 years old | 61-100 years old | Mature greater than 100 years | Potential Old Growth 121+ years |
|------------------|------------------------|------------------|-------------------------------|---------------------------------|
| Section 8        | 49                     | 12               | 15                            | 24                              |
| Section 10       | 50                     | 7                | 17                            | 26                              |

|            |    |    |    |    |
|------------|----|----|----|----|
| Section 11 | 40 | 20 | 18 | 22 |
|------------|----|----|----|----|

The Forest Service has harvest records back to about the 1950s. The following table shows the approximate acres of regeneration harvest by decade for the project area.

**Table 4.13.5b. Regeneration Acres in the Project Area**

|                    | 1990s | 1980s | 1970s | 1960s | 1950s | Total  |
|--------------------|-------|-------|-------|-------|-------|--------|
| Regeneration acres | 1540  | 2970  | 4480  | 5010  | 560   | 14,560 |

This shows about 14,560 acres less than 50 years old in the project area. There are also about 700 acres that are non-stocked (recently burned, no seedlings established) that would give a total of about 15,260 acres of non-stocked and young stands. The project area contains about 127,000 acres. If Losensky shows 40 to 50 percent of the area as less than 60 years old, that would mean that historically 50,800 to 63,500 acres would have been in this age class. Before the fires, there were about 14,560 acres of young stands, which is less than half the acres of young stands shown by Losensky (1997).

The 2000 fires burned about 14,460 acres at high to moderate/high severity, which moved these stands back to non-stocked stands. Adding these acres to the regeneration acres would total about 29,720 acres of young and non-stocked stands, still less than the 50,800 to 63,500 acres of young stands that Losensky shows. The estimate of about 29,720 acres of young and non-stocked stands may be a little high because some of the stands that burned at high severity were already young stands.

The potential old growth in the EMAs ranges from 17 to 34 percent. The low percentage (17 percent) in the Trout Creek EMA reflects lack of information for the roadless and proposed wilderness stands. The other EMAs, at 23 and 34 percent potential old growth, fall into the same range as Losensky's (1997) of 22 to 26 percent potential old growth. Even with all the timber harvesting that has been done during the last 100 years, the amount of potential old growth habitat is still close to Losensky's (1997) estimates. The severely burned stands will take a long time to return to suitable goshawk habitat.

**Foreseeable Future Actions:** The main activity that could affect goshawk habitat would be timber harvest. No other large-scale timber harvests are proposed on Forest Service lands in this area. A post and pole sale on approximately

40 acres in Bird Creek is not in potential goshawk habitat. Precommercial thinning planned for approximately 100 acres would not change goshawk habitat because these birds do not generally use young stands.

❑ **Alternative 1**

**Direct and Indirect Effects:** Because this alternative would not alter the vegetation, it would have **no impact** on goshawk habitat.

**Cumulative Effects:** This alternative would have no cumulative effects on goshawk habitat because the vegetation would not be altered.

❑ **Alternative 2**

**Direct and Indirect Effects:** Because this alternative would not alter the vegetation, it would have **no impact** on goshawk habitat.

**Cumulative Effects:** This alternative would have no cumulative effects on goshawk habitat because the vegetation would not be altered.

❑ **Alternative 4**

**Direct and Indirect Effects:** This alternative would treat approximately 35 acres of vegetation in potential goshawk habitat. Because the vegetation treatments would be designed to promote old growth with an open understory and because the treatment would involve only about one percent of the potential habitat, this alternative would have **no impact** on goshawk habitat.

**Cumulative Effects:** This alternative would have no cumulative effects because the vegetation treatments would be designed to promote old growth with an open understory and because the treatment only involves one percent of the potential habitat.

#### □ *Alternative 5*

**Direct and Indirect Effects:** This alternative would treat approximately 67 acres of vegetation in potential goshawk habitat in seven stands. Because the vegetation treatments would be designed to promote old growth with an open understory and because the treatment would involve only about two percent of the potential habitat, this alternative would have no impact on goshawk habitat.

**Cumulative Effects:** This alternative would have no cumulative effects because the vegetation treatments would be designed to promote old growth with an open understory and because the treatment only involves two percent of the potential habitat.

#### ■ **Black-Backed woodpecker**

Acres of potential black-backed habitat treated are used to analyze the effects on black-backed woodpeckers.

#### □ *Effects Common to All Alternatives*

No timber harvest would occur in the stands where black-backed woodpecker nests were located during the 2001 surveys. Proposed harvest stands in potential black-backed woodpecker habitat would be surveyed again each spring before harvesting begins. If black-backed woodpecker nests were located, then the nest tree would remain and a reserve patch would be marked around the nest tree. Clumps of reserve trees would be left in all regeneration stands. The clump around the nest tree could be used as one of the reserve clumps. The size and number of reserve trees and clumps would be designated for each stand in the harvest prescription.

#### □ *Cumulative Effects Common to All Alternatives*

**Past to Present:** For many forest types in the Northern Rockies, stand replacement fires were the common fire regime. Studies of historic vegetation conditions indicate about 44 percent of this area was non-stocked or in seedling or sapling age classes (Losensky 1997). Older accounts suggest that black-backed woodpeckers were relatively abundant in recently burned forests (Bent 1939). Black-backed woodpecker numbers are often highest in stands that have

burned within the last five years, and black-back numbers decline rapidly after that, as insect activity declines (Hutto 1995). Active fire suppression has greatly reduced the number of acres that burn with stand replacing fires. The forests that did burn were usually quickly salvaged to remove wood while it still had value. The combined effect of fire suppression and salvage harvest has greatly reduced the acres of standing burned trees, which is preferred black-backed woodpecker habitat. Due to this reduction in habitat, black-backed woodpeckers went from being relatively abundant to relatively rare.

The listing of black-backed woodpeckers as a sensitive species has highlighted the importance of burned trees as wildlife habitat. Several studies (Caton 1996, Hutto 1995, and Saab and Dudley 1998) have shown the close tie between these woodpeckers and burned forest. In some fires on National Forest land, one reason salvage has been limited is to maintain woodpecker habitat. Wildfires within wilderness areas have been the main source of burned habitat in western Montana during recent years. Prescribed burning, usually for big game winter range, has produced small amounts of burned trees that attracted black-backed woodpeckers.

Because of the high likelihood of salvage on private land, no private land is considered to have any values as potential as black-backed woodpecker habitat. For example, the roughly 2 sections of Plum Creek Timber Company property that burned in the Flat Fire was salvaged immediately after the fires and no potential black-backed woodpecker habitat remains.

**Foreseeable Future Actions:** The main activity that could change black-backed woodpecker habitat is salvage of burned timber. Most, if not all, salvage of fire-killed timber on private lands has already been completed. No other large-scale timber harvests are proposed on Forest Service lands in this area. A post and pole sale on approximately 40 acres in Bird Creek and precommercial thinning of approximately 100 acres would not change any burned stands.

#### □ *Alternative 1*

**Direct and Indirect Effects:** This alternative would have **no impact** on black-backed woodpecker habitat because there would be no

change in potential black-backed woodpecker habitat. Refer to Maps 3.18.13 and 3.18.14 in Appendix A.

**Cumulative Effects:** This alternative would have no cumulative effects on black-backed woodpecker habitat because there would be no change in the vegetation.

#### □ *Alternative 2*

**Direct and Indirect Effects:** This alternative would have **no impact** on black-backed woodpecker habitat because there would be no change in potential black-backed woodpecker habitat. Refer to Maps 3.18.13 and 3.18.14 in Appendix A.

**Cumulative Effects:** This alternative would have no cumulative effects on black-backed woodpecker habitat because there would be no change in the vegetation.

#### □ *Alternative 4*

**Direct and Indirect Effects:** This alternative would treat approximately 478 acres of potential black-backed woodpecker habitat out of 9870 acres, or about five percent of the potential habitat. That would leave 9382 acres of untreated potential habitat. Even stands that would be salvaged would have some value as foraging habitat for these woodpeckers. Refer to Maps 4.13.16 through 4.13.17 in Appendix A.

Recommendations from several studies for maintaining black-backed woodpecker habitat while harvesting in burned stands include:

- Take trees from one part of the burn and leave another part of the burned area untouched (Hutto 1995)
  - This recommendation would be met because, even though about 478 acres would be treated, about 9380 acres of potential black-backed woodpecker habitat would not be treated
- Retaining clumps of trees rather than uniformly distributed trees would benefit the entire cavity nesting bird community (Saab and Dudley 1998)
  - Clumps of snags occur naturally in the proposed units and would be retained. For example, the estimate of snags retained in Unit 708 ranges from 58 to 237 snags per acre.

- Retain large snags because these snags have greater longevity than smaller snags (Saab and Dudley 1998)
  - Minimum diameter standards for snags are designated in the prescriptions and harvest contract. Snag retention guidelines are specific to each unit because the composition of each unit is different. For example, some units would have snag retention of 8 to 12 snags per acre greater than 12 inches dbh. In a stand with an average dbh of 10 inches, 12-inch dbh trees may be some of the larger ones in the unit. In stands with larger average dbh, the minimum diameter retained would be larger.
  - Nearly all of the ponderosa pine would remain on site because the timber value has been lost because of blue stain fungus. Some of these are the largest trees in the stand.
- Focus harvest on species less valuable to woodpeckers such as lodgepole pine, and retain more valuable species such as larch, Douglas fir and ponderosa pine (O'Connor and Hillis 2000).
  - Pure lodgepole pine was not considered as potential black-backed woodpecker habitat
  - Nearly all of the ponderosa pine will remain on site because the timber value has been lost because of blue stain fungus
- Retain large patches (O'Connor and Hillis 2000).
  - Three blocks of potential black-backed woodpecker habitat are about 1000 acres or greater and two blocks are greater than 500 acres.
- Stands that burned at high intensity but still have the bark intact are most likely high quality black-backed woodpecker habitat (O'Connor and Hillis 2000).
  - Stands that burned at high and moderate/high intensity in preferred species were considered as potential habitat
  - All of the stands included in potential habitat had intact bark following the fires

Considering the number of acres burned during 2000 and the small percentage of the area proposed for timber harvest, this alternative **may impact individuals or habitat, but will not**

**likely result in a trend toward federal listing** of black-backed woodpeckers.

**Cumulative Effects:** This alternative would decrease the amount of potential black-backed woodpecker habitat by about five percent. This would contribute to the long-term decline of post-fire habitat. Because 95 percent of the potential habitat would remain, the overall impact to potential black-backed woodpecker habitat would be slight.

#### ❑ *Alternative 5*

**Direct and Indirect Effects:** This alternative would treat about 1020 acres of potential black-backed woodpecker habitat out of 9870 acres, or about ten percent of the potential habitat. That would leave 8850 acres of untreated potential habitat. Refer to Maps 4.13.19 through 4.13.21. Even stands that would be salvaged would have some value as foraging habitat for these woodpeckers.

This alternative is the same as the recommendations listed in alternative 4 except:

- Take trees from one part of the burn and leave another part of the burned area untouched (Hutto 1995)
  - This recommendation would be met because even though about 1020 acres would be treated, about 8850 acres of potential black-backed woodpecker habitat would not be treated

Considering the number of acres burned during 2000 and the small percentage of the area proposed for timber harvest, this alternative, **may impact individuals or habitat, but will not likely result in a trend toward federal listing** of black-backed woodpeckers.

**Cumulative Effects:** This alternative would decrease the amount of potential black-backed woodpecker habitat by about ten percent. This would contribute to the long-term decline of post-fire habitat. Because 90 percent of the potential habitat would remain, the overall impact to potential black-backed woodpecker habitat would be slight.

#### ■ **Flammulated owl**

#### ❑ **Effects Common to All Alternatives**

Because none of the alternatives proposes prescribed burning in big game winter range, none of the alternatives would improve flammulated owl habitat using prescribed fire.

#### ❑ *Cumulative Effects Common to All Alternatives*

**Foreseeable Future Actions:** The main activity that could reduce flammulated owl habitat would be clearcutting in low elevation forests. No other large-scale timber harvests are proposed on Forest Service lands in this area. A post and pole sale on approximately 40 acres in Bird Creek and precommercial thinning of approximately 100 acres will not occur in flammulated owl habitat. The activity that can improve flammulated owl habitat is prescribed burning. There are approximately 1000 acres of winter range burning planned in the lower Trout Creek drainage what will open up the understory and improve foraging areas for these owls.

#### ❑ *Alternative 1*

**Direct and Indirect Effects:** Because there would be no change in vegetation, this alternative would have **no impact** on flammulated owl habitat. There would also be no opportunity for habitat improvement.

**Cumulative Effects:** This alternative would have no cumulative effects on flammulated owl habitat because the vegetation would not change.

#### ❑ *Alternative 2*

**Direct and Indirect Effects:** This alternative would have **no impact** on flammulated owl habitat because no vegetation would be treated. There would also be no opportunity for habitat improvement.

**Cumulative Effects:** This alternative would have no cumulative effects on flammulated owl habitat because the vegetation would not change.

#### ❑ *Alternative 4*

**Direct and Indirect Effects:** Only a portion of one harvest unit would overlap flammulated owl habitat and about ten acres out of about 11,150 acres of potential habitat would be treated. Because of the small area treated, this alternative would have **no impact** on flammulated owl habitat.

**Cumulative Effects:** This alternative would slightly improve foraging habitat for flammulated owls. Because of the small amount of habitat treated, this alternative would have no cumulative effects on potential flammulated owl habitat.

❑ *Alternative 5*

**Direct and Indirect Effects:** Under this alternative, only one harvest unit is proposed in potential flammulated owl habitat and the edges of six other harvest units would slightly overlap flammulated owl habitat. These treatments would primarily remove smaller trees and open up the understory. All live trees that meet the Region One old growth criteria would remain on site. The total area treated would be about 100 acres out of about 11,150 acres, less than one percent of the potential habitat. Overall, this alternative would have **no impact** on flammulated owls and could slightly improve foraging habitat.

**Cumulative Effects:** This alternative would slightly improve foraging habitat for flammulated owls. Because of the small amount of habitat treated, this alternative would have no cumulative effects on potential flammulated owl habitat.

■ **Townsend's big-eared bat**

❑ *Effects Common to All Alternatives*

No activities would occur directly around any open adit, therefore all alternative would have **no impact** on Townsend's big-eared bats. All alternatives would have no direct, indirect or cumulative effects on Townsend's big-eared bats.

■ **Fisher**

Effects to fisher habitat are analyzed by the amount of potential habitat treated and the types of treatment.

❑ *Cumulative Effects Common to All Alternatives*

**Past to Present:** Trapping, increased road access and extensive clearcutting, especially in riparian areas, probably caused fisher population declines. Fishers were released in some areas of

western Montana around 1959 and again from 1988 through 1991 to augment low populations (Powell and Zielinski 1994). The FWP now regulates trapping, but fishers remain vulnerable to trapping pressure. The decreasing use of clearcutting and riparian harvest may have stabilized the amount of fisher habitat.

**Foreseeable Future Actions:** The main activity that could affect fisher habitat would be timber harvest. No other large-scale timber harvests are proposed on Forest Service lands in this area. A planned post and pole sale on approximately 40 acres in Bird Creek and proposed precommercial thinning on approximately 100 acres will not occur in potential fisher habitat.

❑ *Alternative 1*

**Direct and Indirect Effects:** This alternative would have no impact on fisher habitat because no vegetation would be altered.

**Cumulative Effects:** This alternative would have no cumulative effects on fisher habitat because vegetation would not change.

❑ *Alternative 2*

**Direct and Indirect Effects:** This alternative would have no impact on fisher habitat because no vegetation would be treated.

**Cumulative Effects:** This alternative would have no cumulative effects on fisher habitat because vegetation would not change.

❑ *Alternative 4*

**Direct and Indirect Effects:** Under this alternative, about 400 acres of potential fisher habitat would be treated out of 44,630 acres of potential habitat in the project area. This would be less than one percent of the potential fisher habitat. Snag retention guidelines would be followed to maintain structure and woody debris and no vegetative treatments would occur within Riparian Habitat Conservation Areas. Refer To Map 4.13.22 in Appendix A. Because of the small amount of potential habitat treated, this alternative would have **no impact** on fishers.

**Cumulative Effects:** This alternative would decrease the amount of potential habitat by one percent. Because of the small amount of habitat

treated, this alternative would have no cumulative effects on fisher habitat.

#### □ *Alternative 5*

**Direct and Indirect Effects:** This alternative would treat about 1030 acres out of 44,630 acres of potential fisher habitat within the project area. This would be about two percent of the potential habitat in the project area. Snag retention guidelines would be followed to maintain structure and woody debris and no vegetative treatments would occur within Riparian Habitat Conservation Areas. Refer to Map 4.13.23 in Appendix A. Because of the small amount of potential habitat treated, this alternative would have **no impact** on fishers.

**Cumulative Effects:** This alternative would decrease the amount of potential habitat by two percent. Because of the small amount of habitat treated, this alternative would have no cumulative effects on fisher habitat.

#### ■ **Wolverine**

Effects on wolverine habitat are measured by big game habitat quality, shown by elk security, and open road density, which affects trapping pressure.

#### □ *Effects Common to All Alternatives*

No prescribed burning is proposed for the winter range areas in the fire perimeters under any alternative. Some site preparation burning treatments may overlap slightly with winter range. Because there would be no prescribed burning in big game winter range, all of the alternatives would have no effect on winter range.

Because there no proposed activities near cirques, this project would have no effect on potential denning habitat.

#### □ *Cumulative Effects Common to All Alternatives*

**Past to Present:** Trapping and increased road access has probably had an impact on wolverine populations. Information on wolverine habitat, home range, and feeding is extremely scarce. Presently there are seven published studies on wolverine, only one of them from Montana (Banci 1994). The other studies are from

Alaska, Yukon, and British Columbia and may not be very applicable to this region. One study was started in Idaho, but now has been stopped because of lack of funding. The Rocky Mountain research station has an ongoing study on wolverine habitat use in the Bitterroot Mountains.

Remaining information on wolverines falls somewhere between anecdotes and folklore.

**Foreseeable Future Actions:** Activities that could change elk security include timber harvest and road construction. No other large-scale timber harvests are proposed on Forest Service lands in this area. A post and pole sale on approximately 40 acres would not change elk security. Precommercial thinning of approximately 100 acres would also not change elk security because of proximity to open roads and small size of individual stands. There are no known proposals for new road construction so open road density will not increase. There are several proposals that would improve big game winter range. Under the Big Game Winter Range and Burned Area Weed Management EIS, herbicide treatment will be done on winter range within the Post Burn project area. In addition, there is about 1000 acres of winter range burning proposed in the lower Trout Creek drainage that will benefit forage production. These beneficial treatments will improve forage production on winter range and may increase the prey base for wolverines.

#### □ *Alternative 1*

**Direct and Indirect Effects:** This alternative would have **no impact** on wolverine habitat because there would be no change in elk security or open road density (refer to Tables 4.13.1 and 4.13.2, above, and Map 3.18.2 in Appendix A).

**Cumulative Effects:** This alternative would have no cumulative effects on wolverines because vegetation and open road density would not change.

#### □ *Alternative 2*

**Direct and Indirect Effects:** Under this alternative, elk security would remain the same in the Sunrise elk herd unit and would increase in the other herd units (refer to Table 4.13.1, above, and Map 4.13.1 in Appendix A). The open road density would remain the same in the Sunrise and Johnson herd units and would

decrease in the other two herd units (refer to Table 4.13.2). This would provide an overall improvement in wolverine habitat and thus Alternative 2 would have **no impact** on wolverine habitat.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve wolverine habitat because elk security would remain the same or increase and open road density would remain the same or decrease in all elk herd units. This may improve habitat for prey species and reduce the probability of human contact.

#### □ *Alternative 4*

**Direct and Indirect Effects:** This alternative would have **no impact** on wolverine habitat because elk security would increase and open road density would decrease within all the elk herd units (refer to Tables 4.13.1 and 4.13.2, above, and Map 4.13.2 in Appendix A). The gains in elk security would be from road closures or seasonal restrictions. Vegetation treatments in the Johnson and Upper Ninemile herd units could reduce cover on about 120 acres in the Johnson herd unit and about 50 acres in the Upper Ninemile herd unit. The cover reductions would be scattered across many small areas and would not change the overall percentage of elk security.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve wolverine habitat because elk security would increase and open road density would decrease in all elk herd units. This may improve habitat for prey species and reduce the probability of human contact.

#### □ *Alternative 5*

**Direct and Indirect Effects:** This alternative would have **no impact** on wolverine habitat because elk security in the elk herd units would remain the same or increase and the open road densities would remain the same or would decrease (refer to Map 4.13.3 in Appendix A). This alternative would provide an increase in potential prey populations and a decrease in potential trapping pressure.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve wolverine habitat because elk security

would remain the same or increase and open road density would remain the same or decrease in all elk herd units. This may improve habitat for prey species and reduce the probability of human contact.

#### ■ **Boreal toad**

##### □ *Alternative 1*

Because no activities would occur within riparian areas, this alternative would have **no impact** on boreal toads. This alternative would have no direct, indirect or cumulative effects on boreal toads.

##### □ *Alternatives 2, 4 and 5*

**Direct and Indirect Effects:** The Lolo National Forest operates under the guidelines of the Inland Native Fish Strategy, which includes buffering areas within 300 feet of fish bearing streams, 150 feet of non-fish bearing streams and 50 to 150 feet near wetlands. These measures maintain cover and limit disturbance in the riparian area and should adequately protect habitat for these toads.

Under these alternatives, in-stream habitat improvement work, including a small dam removal and placer mine reclamation, would be completed. These locations are not likely habitat for boreal toads because of the previous disturbance. These in-stream projects would cause a short-term disturbance but would produce long-term benefits for the aquatic habitat.

Because of the riparian buffers and the long-term benefits of the in-stream habitat improvement projects, these alternatives would have **no impact** on boreal toads.

**Cumulative Effects:** None of the alternatives would contribute to the cumulative effects on this species. Because of fisheries and streamside mitigation and mine reclamation on the Lolo National Forest, there would probably be little cumulative impact on habitat for these toads.

#### ■ **Northern leopard frog**

##### □ *Alternative 1*

Because no activities would occur within riparian areas, this alternative would have **no**

**impact** on northern leopard frogs. This alternative would have no direct, indirect or cumulative effects on northern leopard frogs.

#### □ *Alternatives 2, 4 and 5*

**Direct and Indirect Effects:** The Lolo National Forest operates under the guidelines of the Inland Native Fish Strategy, which includes buffering areas within 300 feet of fish bearing streams, 150 feet of non-fish bearing streams and 50 to 150 feet near wetlands. These measures maintain cover and limit disturbance in the riparian area and should adequately protect habitat for these frogs.

Under these alternatives, in-stream habitat improvement work, including a small dam removal and placer mine reclamation, would be completed. These locations are not likely habitat for northern leopard frogs because of the previous disturbance. These in-stream projects would cause a short-term disturbance but would produce long-term benefits for the aquatic habitat.

Because of the riparian buffers and the long-term benefits of the in-stream habitat improvement projects, these alternatives would have **no impact** on northern leopard frogs.

**Cumulative Effects:** None of the alternatives would contribute to the cumulative effects on this species. Because of fisheries and streamside mitigation and mine reclamation on the Lolo National Forest, there would probably be little cumulative impact on habitat for these frogs.

#### ■ **Peregrine falcon**

##### □ *Effects Common to All Alternatives*

Because no activities would take place near the nest site, all alternatives would have **no impact** on peregrine falcons. All alternative would have no direct, indirect or cumulative effects on peregrine falcons.

#### □ **4.13.3 Management Indicator Species**

##### ■ **Pileated Woodpecker**

Effects on potential pileated woodpecker habitat are be measured by potential snag loss from

harvesting and potential snag production from prescribed burning.

##### □ *Cumulative Effects Common to All Alternatives*

Removal of snags during harvesting, fire suppression, and extensive salvage programs have impacted pileated woodpecker habitat. Harvesting can remove snags, and fire suppression reduces the number of snags created in a landscape.

There is no historic information on pileated woodpecker populations for the project area. The Landbird project has given some general “presence and absence” data but nothing that could be considered population data (Hutto and Young 1999). With no historic population information for comparison, habitat conditions are the next factor to examine. Information on historic vegetation conditions is also fairly generalized. Losensky’s (1997) work has some information on the historical vegetation in Montana. The table below shows the percentages of all the cover types in different age classes. This project area overlaps three climatic sections in his report (refer to Table 4.13.5a).

The Forest Service has harvest records back to about the 1950s. The following table shows the approximate acres of regeneration harvest by decade for the project area (refer to Table 4.13.5b).

This gives a total of about 14,560 acres less than 50 years old in the project area. There are also about 700 acres that are non-stocked (recently burned, no seedlings established) that would give a total of about 15,260 acres of non-stocked and young stands. The project area contains about 127,000 acres. If Losensky shows 40 to 50 percent of the area as less than 60 years old that would mean that historically 50,800 to 63,500 acres were in this age class. Before the fires, there were less than half the acres of young stands as shown in Losensky (1997).

The 2000 fires burned about 14,460 acres at high to moderate/high severity, which moved these stands back to non-stocked stands. Adding these acres to the regeneration acres would total about 29,720 acres of young and non stocked stands and this is still less than the 50,800 to 63,500 acres of young stands that Losensky shows. The estimate of about 29,720 acres of young and

non-stocked stands is a little high because some of the stands that burned at high severity were already young stands.

The potential old growth in the EMAs ranges from 17 to 34 percent. The low percentage (17 percent) in the Trout Creek EMA is a reflection of not having information for the roadless and proposed wilderness stands. The other EMAs, at 23 and 34 percent potential old growth, fall into the same range as Losensky’s (1997) of 22 to 26 percent potential old growth. Even with all of the timber harvesting that has been done during the last 100 years, the amount of potential old growth habitat is still close to Losensky’s (1997) estimates.

The design criteria for wildlife in the Post Burn Project states that no live, old growth trees, as defined by Region 1 Old Growth Criteria, would be harvested or cut.

**Foreseeable Future Actions:** The main activity that could change pileated habitat would be timber harvest. No other large-scale timber harvests are planned on Forest Service lands in the area. A post and pole sale on about 40 acres in Bird Creek and precommercial thinning on approximately 100 acres would not change pileated woodpecker habitat.

**Table 4.13.6. Acres and Percent of Pileated Woodpecker Habitat in Project Area Treated by Alternative**

|                                                                                                 | <b>Alternative 1</b> | <b>Alternative 2</b> | <b>Alternative 4</b>  | <b>Alternative 5</b> |
|-------------------------------------------------------------------------------------------------|----------------------|----------------------|-----------------------|----------------------|
| <b>Acres of Existing Pileated Woodpecker Habitat within the Project Area</b>                    | 30, 140              | 30, 140              | 30, 140               | 30, 140              |
| <b>Acres and Percent of Pileated Woodpecker Habitat Treated (Potential Snag Loss)</b>           | 0                    | 0                    | 575<br>(less than 1%) | 1040<br>(3%)         |
| <b>Acres and Percent of Pileated Woodpecker Habitat to be Underburned (Potential Snag Gain)</b> | 0                    | 0                    | 750<br>(2%)           | 750<br>(2%)          |

❑ *Alternative 1*

**Direct and Indirect Effects:** This alternative would have **no impact** on pileated woodpecker habitat because there would be no changes in the vegetation.

**Cumulative Effects:** This alternative would have no cumulative effects on pileated woodpecker habitat because the vegetation would not change.

❑ *Alternative 2*

**Direct and Indirect Effects:** This alternative would have **no impact** on pileated woodpecker habitat because there would be no changes in the vegetation.

**Cumulative Effects:** This alternative would have no cumulative effects on pileated woodpecker habitat because vegetation would not change.

❑ *Alternative 4*

**Direct and Indirect Effects:** This alternative would treat about 575 acres of potential old growth within the fire perimeters. Any live trees that meet the Region One old growth criteria would be left in the stands. There would be some potential for snag loss during the timber harvest but snag mitigation measures would be followed which should minimize possible losses. About one percent of the pileated woodpecker habitat would have the potential for snag loss during timber harvest (refer to Table 4.13.6 and Map 4.13.20a and 4.13.20b in Appendix A. In addition, approximately 750 acres of

underburning is proposed which may create new snags. Because of the small percentage of habitat treated where snag loss may occur, snag mitigation measures designed to minimize snag loss and the potential snag gain from underburning, this alternative would have **no impact** on pileated woodpecker habitat.

**Cumulative Effects:** All vegetation treatments in old growth would be designed to enhance old growth characteristics. This alternative would have the potential to reduce snags on less than one percent of the pileated woodpecker habitat in the project area. The planned underburning would have the potential to produce snags on about two percent of the project area. Because of the small amount of habitat with the potential for snag loss and the offsetting potential for snag gain from underburning, this alternative would have no cumulative effects on pileated woodpecker habitat.

#### ❑ *Alternative 5*

**Direct and Indirect Effects:** This alternative would treat about 1040 acres of potential old growth within the fire perimeters. Any live trees that meet the Region 1 old growth criteria would be left in the stand. There would be some potential for snag loss during timber harvest, but the snag mitigation measures would be followed which should minimize possible losses. About three percent of the pileated woodpecker habitat would have the potential for snag loss during timber harvest (refer to Table 4.13.6 and Map 4.13.25 in Appendix A). Also approximately 750 acres of underburning is proposed which may create new snags. Because of the small percentage of habitat treated where snag loss may occur, snag mitigation measures designed to minimize snag loss and the potential snag gain from underburning, this alternative would have **no impact** on pileated woodpeckers.

**Cumulative Effects:** All vegetation treatments in old growth would be designed to enhance old growth characteristics. This alternative would have the potential to reduce snags on approximately three percent of the pileated woodpecker habitat in the project area. The planned underburning would have the potential to produce snags on about two percent of the project area. Because of the small amount of habitat with the potential for snag loss and the offsetting potential for snag gain from underburning, this alternative would have no

cumulative effects on pileated woodpecker habitat.

#### ■ **Big Game**

Effects to elk are measured by changes in elk security.

#### ❑ *Effects Common to All Alternatives*

Summer elk habitat features such as springs, wallows and licks were located and mapped during planning for this project. No activities are proposed near these locations. All alternatives would have no impact on summer elk habitat.

No prescribed burning is proposed for the winter range areas in the fire perimeters under any alternative. Some site preparation burning treatments may overlap slightly with winter range. Because there would be no prescribed burning in big game winter range, all of the alternatives would have no effect on winter range.

After 10 to 15 years, both the severely burned areas as well as old clearcuts would again provide hiding cover and elk security would increase in all the herd units.

#### ❑ *Cumulative Effects Common to All Alternatives*

**Past to Present:** Few early records exist about elk or other wildlife species in Mineral County. Koch (1941) believed that few elk existed in Mineral, Sanders and Lincoln Counties prior to settlement, although elk were fairly abundant in the Missoula and Bitterroot valleys. Elk were stocked in Mineral County five times between 1912 and 1937 (Henderson 1994). Elk had become well established in Mineral County by 1960, and private landowners began filing depredation complaints.

Timber harvest on federal and corporate land increased dramatically in the 1960s and 1970s. The roads built for logging increased access for hunters, and hunter numbers increased as well. Concerns were soon raised about declining elk populations. During the 1970s, antlerless elk hunting seasons were repeatedly shortened until antlerless harvest was restricted to permit holders in 1980 (Henderson 1994). During this same decade, research was starting to show the

importance of areas with hiding cover and limited road access for bull elk survival during the hunting season (Lyon et al. 1985). These areas would later be referred to as elk security (Hillis et al. 1991). Elk security consists of areas of hiding cover greater than 250 acres and more than 1/2 mile from any road open during hunting season (Hillis et al. 1991). The first road closures were implemented on the Lolo National Forest in the 1970s to improve bull elk survival. Because of limited improvement in elk numbers, elk were once again stocked in Mineral County between 1981 and 1985 (Henderson 1994).

During the 1980s and 1990s, elk populations increased and depredation complaints also increased (Henderson 1994). Elk management goals and standards were included in the Lolo Forest Plan in 1986, and the Montana elk management plan was published in 1992. These documents helped standardize elk management on the national forest.

During the 1990s, elk populations in Mineral County appeared to stabilize as timber harvest on the national forest declined and roads were closed to improve elk security. A winter range improvement burning program was started on the Superior ranger district and is still continuing. Since 1990, over 9,000 acres of big game winter range have been prescribed burned in this ranger

district. In this county in 1996, harvest was restricted to brow-tined bulls in order to increase the number of mature bull elk in the population. The severe winter of 1996 impacted the local elk herds and reduced elk calf survival. The following mild winters and low elk harvest appear to have improved the elk population and number of mature bulls in Mineral County.

**Foreseeable Future Actions:** Activities that could change elk security include timber harvest and road construction. No other large-scale timber harvests are proposed on Forest Service lands in this area. A post and pole sale on approximately 40 acres in Bird Creek will not change elk security. Precommercial thinning of approximately 100 acres also will not change elk security because of the proximity to open roads and small size of individual stands. There are no known proposals for new road construction in the area, so open road density will not increase. Under the Big Game Winter Range and Burned Area Weed Management EIS, herbicide treatment will be done on winter range within the Post Burn project area. In addition, there is about 1000 acres of winter range burning proposed in the lower Trout Creek drainage that will benefit forage production. These beneficial treatments will improve forage production on winter range, which would improve elk habitat.

**Table 4.13.7. Percent of Elk Security Within the Herd Units After Cover Regrowth by Alternative**

| Herd Unit                                  | Alternative 1 | Alternative 2 | Alternative 4 | Alternative 5 |
|--------------------------------------------|---------------|---------------|---------------|---------------|
| Sunrise                                    | 46%           | 46%           | 50%           | 46%           |
| Van Ness                                   | 49%           | 50%           | 52%           | 50%           |
| Johnson                                    | 26%           | 28%           | 33%           | 28%           |
| Upper Ninemile<br>(Forest Service portion) | 45%           | 52%           | 52%           | 52%           |

Refer to Table 4.13.1 for percent of existing elk security within the herd units.

☐ **Alternative 1**

**Direct and Indirect Effects:** Under this alternative, there would be no change in elk security and no opportunity to immediately increase elk security (refer to Map 3.18.2 in Appendix A). Because there are no changes in existing conditions, this alternative would have **no impact** on elk habitat.

**Cumulative Effects:** This alternative would have no cumulative effects on big game because

vegetation and open road density would not change.

☐ **Alternative 2**

**Direct and Indirect Effects:** Under this alternative, elk security would remain the same in the Sunrise elk herd unit and would increase in the other herd units (refer to Tables 4.13.1 and 4.13.7, above, and Map 4.13.1 in Appendix A). This alternative would have additional gains in elk security because of road closures in burned areas that will not provide hiding cover for

several years. This alternative would provide an overall improvement in elk habitat and therefore would have **no impact** on elk habitat.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve elk habitat because elk security would remain the same or would increase in all herd units.

**Alternative 4**

**Direct and Indirect Effects:** Under this alternative, elk security would increase in all herd units (refer to Tables 4.13.1 and 4.13.7, above, and Map 4.13.2 in Appendix A.). The gains would be from road closures or seasonal restrictions. Vegetation treatments in the Johnson and Upper Ninemile herd units may reduce cover on about 120 acres in the Johnson herd unit and about 50 acres in the Upper Ninemile herd unit. The cover reductions would be scattered across many small areas and would not change the overall percentage of elk security.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve elk habitat because elk security would increase in all herd units.

**Alternative 5**

**Direct and Indirect Effects:** Under this alternative, elk security would remain the same in the Sunrise elk herd unit and would increase in the other herd units (refer to Table 4.13.1, above, and Map 4.13.3 in Appendix A). Vegetation treatments in the Johnson and Upper Ninemile herd units may reduce cover on about 240 acres in the Johnson herd unit and about 230 acres in the Upper Ninemile herd unit. The elk security gains would be from road closures and would offset the loss of cover from timber harvest.

**Cumulative Effects:** This alternative would have no cumulative effects and may slightly improve elk habitat because elk security would remain the same or would increase in all herd units.

**4.13.4 Forest Land Birds**

**Effects Common to All Alternatives**

The data from the landbird program is quite complex but it has not shown steep declines in any of the species. It does show the wide adaptability of native bird species because almost any change in vegetation benefits some species at the expense of others. Post-fire habitat had the greatest concentration of black-backed woodpeckers but no pileated woodpeckers were found in those habitats. Winter wrens appeared to avoid harvested forest while Williamson's sapsuckers were most abundant there (Hutto and Young, 1999). The effects of any action, from timber harvest to fire suppression, would be an improvement for some species and detrimental for others. Selected bird species with restricted habitat needs are discussed in separate sections in this Wildlife section. All alternatives would likely have little effect on these birds, considering the small extent of the habitat treatments compared with the fire effects.

**4.13.5 Fragmentation, Corridors and Linkages**

At the project scale, elk security as a measure of hiding cover and open roads are the factors used to display the effects to fragmentation, corridors and linkages. Refer to Tables 4.13.1 and 4.13.2 for displays of elk security and open road density by Herd Unit

**Cumulative Effects Common to All Alternatives**

**Foreseeable Future Actions:** Activities that could alter elk security include timber harvest and road construction. No other large-scale timber harvests are planned on Forest Service lands in the area. A post and pole sale on approximately 40 acres in Bird Creek will not change elk security. Precommercial thinning of approximately 100 acres will also not change elk security because of proximity to open roads and small size of individual stands. There are no known proposals for new road construction in the area so open road density will not increase.

**Alternative 1**

**Direct and Indirect Effects**

Under Alternative 1, there would be no change in hiding cover or open road density (refer to Tables 4.13.1 and 4.13.2). There would be no opportunity to decrease the open road density.

Because cover and open roads would not change, this alternative would have little effect on fragmentation, corridors or linkages.

#### *Cumulative Effects*

This alternative would have no cumulative effects because vegetation and open road density would not change.

#### ■ **Alternative 2**

#### *Direct and Indirect Effects*

Under this alternative, elk security would remain the same in the Sunrise elk herd unit and would increase in the other herd units (refer to Table 4.13.1). The open road density would remain the same in the Sunrise and Johnson herd units and would decrease in the other two herd units (refer to Table 4.13.2). This alternative would provide an increase in hiding cover and a decrease in open road density, which may make it easier for some species to move across the landscape. Because there would be no change in vegetation and the open road density would decrease, this alternative would have little effect on fragmentation, corridors or linkages.

#### *Cumulative Effects*

This alternative would have no cumulative effects and may slightly improve habitat because elk security would remain the same or would increase and open road density would remain the same or would decrease in all elk herd units.

#### ■ **Alternative 4**

#### *Direct and Indirect Effects*

This alternative is designed to have the greatest increase in elk security and the largest decrease in open road density. This alternative would produce the most area with hiding cover and the lowest miles of open roads (refer to Tables 4.13.1 and 4.13.2, above, and Map 4.13.2 in Appendix A). Because elk security would increase and the open road density would decrease, this alternative would have little effect on fragmentation, corridors or linkages.

#### *Cumulative Effects*

This alternative would have no cumulative effects and may slightly improve habitat because

elk security would increase and open road density would decrease in all elk herd units.

#### ■ **Alternative 5**

#### *Direct and Indirect Effects*

Under this alternative, elk security would remain the same in the Sunrise elk herd unit and would increase in the other herd units (refer to Table 4.13.1, above, and Map 4.13.3 in Appendix A). Gains would be made through road closures, which would offset any loss of cover from timber harvest. The miles of open roads would decrease in all herd units, even though the average open road density would remain the same. This alternative would have little effect on fragmentation, corridors and linkages.

#### *Cumulative Effects*

This alternative would have no cumulative effects and may slightly improve habitat because elk security would remain the same or would increase and open road density would remain the same or would decrease in all elk herd units.

### **4.13.6 Biodiversity**

#### ■ **Effects Common to All Alternatives**

Grizzly bears are probably the only species absent from the project area, but a grizzly bear entered the Ninemile valley in 2001. Managing human attractants on private land will eventually determine if grizzly bears can live in the Ninemile area.

Overall, the biodiversity of the project is generally within the natural range of variation. Some of the lower elevation ponderosa pine stands probably burned at higher intensity and experienced more overstory tree mortality because of the understory of encroaching Douglas-fir trees that thrives under fire suppression.

None of the alternatives propose forest type conversion or introducing exotic species. None of the forest would be permanently changed to another vegetation type. Noxious weed treatment is planned for the project area. A large percentage of the burned forest would not be harvested. Considering the factors above, all

alternatives would not reduce biodiversity within the project area.

## 4.14 Fish and Aquatic Resources

Quantitative indicators were identified and are the primary basis to evaluate the effects of the different alternatives on fisheries resources. These indicators include:

### **Sediment yield from roads and proposed harvest (tons of sediment per year)**

Ton of sediment/year delivered to stream channels was used as a primary indicator to evaluate the effects of roads and timber harvest on fisheries. By evaluating trends in this indicator, qualitative inferences can be made about changes to other fish habitat features such as the riparian management objectives (RMOs). LOLOSED, a predictive model, was used to predict sediment delivery to stream channels. The duration of sediment contribution is also evaluated.

Fishery professionals have demonstrated that elevated levels of sediment in stream gravels pose a threat to bull trout (Shepard et al., 1984 as cited in Reiman and McIntyre, 1993; Weaver and White 1985; Fraley and Shepard, 1989) and other aquatic species. This can have biological consequences that affect virtually all components of stream ecosystems as well as each life history component of salmonid life cycles (Furniss et al. 1991).

Fine sediment alters fish habitat by decreasing stream stability. Stream stability is defined as "allowing the stream to develop a stable dimension, pattern, and profile such that, over time, channel features are maintained and the stream system neither aggrades nor degrades. For a stream to be stable it must be able to consistently transport its sediment load, both in size and type, associated with local deposition and scour" (Rosgen 1996). Increased sediment fills pool habitats (reduced quality) and the spawning gravel interstices, and increases streambank erosion, and stream channel width/depth ratios. These factors combined,

result in less habitat complexity and a reduction in fish production capacity of a given watershed.

The most common direct effect of elevated sediment on fish populations occurs during egg incubation and fry emergence. Elevated fine sediment (less than 6.4 mm) in spawning gravels can lead to a reduction in egg survival (Reiman and McIntyre 1993) and emergence success of both bull and westslope cutthroat trout (Weaver and White 1985 as cited in Reiman and McIntyre 1993). It may also limit access to substrate interstices that are important cover during rearing and over-wintering (Goetz 1994, Jakober et al. 2000), and decrease the pool habitat quality, an essential rearing and cover component, especially for bull trout, but for westslope cutthroat trout as well.

### **Road density by watershed (miles of road per square mile of watershed)**

Road Density Assumptions: A road that contributes to existing condition road density in this evaluation is designated as any system or non-system road that has a Closure Level of 0, 1 or 2 (refer to Table 4.9.4 in the Infrastructure and Improvements section for road closure definitions). Road density classifications presented in Quigley et al. (1996) were used to compare project watershed and drainage road densities. They list densities in the range of 0.1-0.7 miles/mile<sup>2</sup> as LOW; 0.7-1.7 miles/mile<sup>2</sup> as MODERATE; and 1.7- 4.7 miles/mile<sup>2</sup> as HIGH. These classes also roughly correspond to the Section 7 consultation checklist for fish population and habitat indicators of 1) "Functioning Appropriately", 2) "Functioning at Risk", and 3) Functioning at Unacceptable Risk. These classes were used in the Middle Clark Fork Section 7 Consultation watershed baseline analysis (Hendrickson and Cikanek 2000).

### **Stream crossing density (number of times a road crosses a stream per square mile of watershed)**

Schnackenberg and McDonald (1998) in north central Colorado and Eaglin and Hubert (1993) on the Medicine Bow National Forest, Wyoming documented the relationship between increasing stream crossing density within a watershed and percent surface fines found in streams within a drainage. Linking these evaluations to Riggers et al. (1996) who looked at the percent surface fines in disturbed and undisturbed watersheds on

the Lolo National Forest provides the basis for indicator classes for road stream crossing density used in this EIS to evaluate proposed alternatives. These classes are: 0-0.5 crossings/mile<sup>2</sup> indicate low stream crossing densities and resultant percent surface fines; 0.51-1.5 crossings/mile<sup>2</sup> indicate a moderate range for stream crossing density and resultant percent surface fines; and crossing densities greater than 1.5 /mile<sup>2</sup> indicate a high stream crossing density and percent surface fines. These indicator classes are not definitive and are based on other regional relationships between the indicator and fish habitat and populations, but these are some of the only available data from which to draw.

**Road density within 300 feet of stream channels (miles of road per square mile)**

The road density indicator for roads within 300 feet of stream channels provides an opportunity to look at how much of the road system is within a distance of the stream channel where the effects on fisheries resources may be more direct and possibly greater. This is, in part, from shorter travel distances for road-derived sediment to reach the stream channel (Ketcheson and Megahan 1996), and the potential for road prisms to directly confine and impair channel processes and to disrupt large woody debris recruitment. Mature, large woody debris recruitment is critical to stream stability, complexity and productivity (Furniss et al. 1991).

**The number of fish passage barriers improved and the amount of suitable habitat made available to previously excluded fish population segments**

To fully occupy and utilize needed habitats (e.g., cool water temperatures, high quality pools, and good spawning habitat), both bull trout and westslope cutthroat trout require unimpeded access within and among watersheds. Migratory corridors provide the needed connection between trout spawning, juvenile rearing, sub-adult rearing, adult over-wintering and foraging areas (Rieman and McIntyre 1993). Movement is believed to be important to the persistence and interaction of local salmonid populations within larger sub-populations (Rieman and McIntyre 1993). Functional migratory corridors for bull and westslope cutthroat trout are needed at multiple spatial scales to facilitate the refounding

of populations, to provide fish access to refugia, and to allow for genetic exchange among fish populations segments. Factors that prevent migratory corridors from being fully functional include: large mainstem dams, road culverts, water diversion and other small head dams, and habitat degradation including thermal barriers and aggraded sections of stream channels. This analysis focused on culverts because of their sheer number and prevalence on National Forest land within this project area.

A physical description of channel and water conditions at inventoried road culverts was used to determine if a road culvert acted as a fish passage barrier. In general, any culvert with 1) an inlet or outlet water velocity of six feet/second or greater, 2) an outlet perch of six inches or greater, 3) an inlet channel alignment exceeding ten degrees, or 4) a width that was less than one half of the bankfull channel width was classified as a fish barrier.

**□ 4.14.1 Effects Common To All Alternatives**

**■ Effects of the 2000 Wildfires**

Briefly summarized, those impacts caused by fire include:

- Increased snow accumulation in openings and faster melt-off.
- Increased peak flow magnitudes, earlier flow peaks, and increased annual water yield.
- Increased surface runoff in response to high-intensity, short-duration rainstorms.
- Increased vulnerability of stream channels to destabilization, and increased delivery of sediment to channels from bank failure, due to increased peak flows and loss of riparian vegetative root strength.
- Rise in water tables and development of new seeps due to decrease in transpiration by plants.
- Increased upland erosion and sediment delivery to stream channels.
- Increased water temperatures due to vegetation removal.
- Increased nutrient levels in water bodies.
- Increased potential for pulsed large woody material to stream channels

- Increased potential for landslides that can result in direct mortality or displacement of fish population segments.

Sediment production (as estimated with the LOLOSED model) from the 2000 fires had different relative effects on streams and fisheries among project drainages. Fire-related sediment will have the greatest effect on project fisheries during the first four years (2000-2004) after the fires. The fires have had the largest short-term effect on three drainages: Ninemile Creek, Idaho Gulch and Johnson Creek (Figures 4.14.1, 4.14.2 and 4.14.3). In the Ninemile drainage, fire-derived sediment is two times greater than that from natural sources in the short-term, and in Johnson Creek and Idaho Gulch drainages it is 1.9 and 1.4 times greater, respectively. In the remaining drainages, fire effects are less, although still substantial in the Flat Creek and Trout Creek drainages. Fire had a much smaller effect in the Siegel Creek and First Creek drainages (see Section 4.6.3).

The greatest effect from fire-derived sediment will occur through 2003 and then taper off in most instances. However, in the Ninemile drainage the fire effects will have a more sustained effect (Figures 4.14.1, 4.14.2 and 4.14.3). The fire effects in this drainage could affect several year classes of native trout, especially in the most heavily burned watersheds that include, Big Blue, Camp, Soldier and Burnt Fork Creeks. The primary mechanism for potential reduced salmonid production in these watersheds is increased fine sediment deposition in spawning and rearing habitats (Rieman and McIntyre 1993). This will reduce the survivability of native fish that spawn throughout these watersheds.

The Johnson Creek drainage was heavily impacted by the mudslide that occurred mid-way up this drainage in 2000, just after the fires. The mudslide displaced or killed most of the fish residing in or below the site of the mudslide. Thus, Johnson Creek fish habitats will be far less impacted from post fire sediment production relative to this other factor. In addition, stream water temperatures are likely to remain elevated for the next several years. This may also contribute to a short-term reduction in bull trout production potential because of unfavorable spawning and rearing temperatures.

Residual effects of fire suppression activities will influence fish habitat features in drainages where the greatest amount of suppression work occurred, especially if this included fire line construction near or across stream channels. In the Ninemile drainage, watersheds most affected by suppression activity include Beecher (1.5 mile of fire line within 300 feet of stream channel and 1 major stream crossing), Burnt Fork Creek (1.1 mile of fire line within 300 feet of stream and 2 major stream crossings), Soldier Creek (1.4 mile of fire line and 1 major stream crossing), Camp Creek (1.3 miles of fire line), St. Louis Creek (1.1 mile of fire line and 2 major stream crossings) and Marion Creek (2.4 miles of fire line).

In the First Creek Drainage 2.2 mile of fire line were constructed within 300 feet of stream and there was one major stream crossing. In the Trout Creek drainage, the two watersheds most affected by fire suppression activities were Cement Creek (1.3 miles of fire line constructed within 300 feet of stream channel) and Windfall Creek (1.1 mile of fire line constructed within 300 feet of stream channels).

Efforts to rehabilitate these areas occurred shortly after the fires. However, recovering suppression areas will likely contribute to an increase in sediment delivery to some stream channels over the next several years. There may be potential for local increases in stream temperatures from stream crossing and fireline vegetation removal as well. However, temperature monitoring in both St. Louis and Beecher Creek watersheds suggest that there was little negative effect on summer and fall stream temperatures in these watersheds (Section 3.19-Fisheries- ).

There was one retardant base in the Ninemile Drainage during the 2000 fires (USDA, Burn Area Assessment, Appendix G 2001). The base was located away from floodplains. Resource advisor observations suggest that while drops had no observed or reported effects on aquatic habitats, "there is the possibility that minimal nutrient addition to streams may have occurred, they are expected to have no long-term effects on populations of fish or aquatic insects."

Longer-term beneficial effects will also result from the fires, especially in the Ninemile drainage. The primary benefit will be a pulse of large woody debris that will be added to streams

over the next ten years as fire-killed tree fall into streams. Added large woody debris will help stabilize stream channels, store both fine and coarse bed materials, and create better new and higher quality pools for improved rearing conditions. In addition, with increased instability in near channel areas, new sources of gravel will be delivered to streams and will provide for longer-term gravel needs and fish habitat maintenance. These beneficial effects should last longer than the short-term detriments of the fires and should help counteract some of the negative effects from increased fine sediment delivery to stream channels.

Natural recovery of burned watersheds in the project area will continue along similar patterns to those described in Appendix G of the Lolo National Forest Burned Area Assessment (USDA, Lolo National Forest 2001).

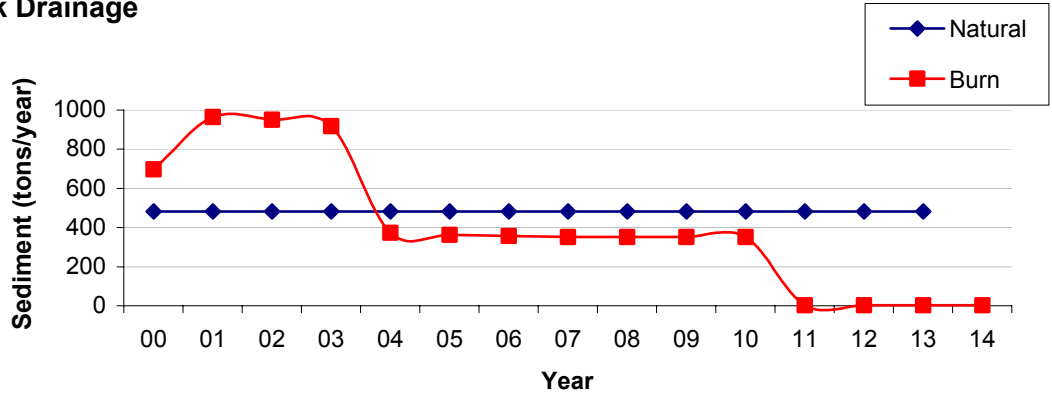
#### ■ BAER Work

Rehabilitation measures implemented under BAER and measures implemented to offset the impacts of fire suppression activities from 2000 will be ongoing regardless of alternative, and would help reduce the magnitude of some of the erosion-related impacts (Lolo National Forest-BAER effectiveness monitoring reports 2000). Fisheries habitat will improve considerably because of these activities. For instance, four primary fish passage barriers and undersized culverts were remedied in the Ninemile drainage on the Foothills Road in 2001. This will improve fish population connectivity throughout Big Blue, Camp, Soldier, and Burnt Fork Creeks. These culvert replacements will allow these crossings to effectively pass 100-year flood events and will reduce the level of fine sediment recruited to fisheries habitat downstream. These improvements reduce the potential for future catastrophic failure of road fill that would have been more likely with the pre-existing undersized culverts. It will also reduce chronic long-term channel disturbance and sediment

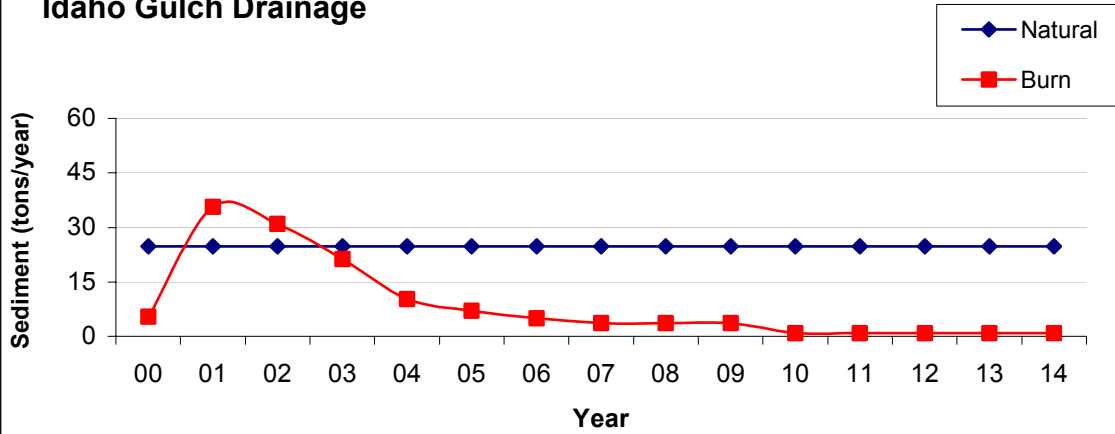
recruitment that occurs from undersized culverts. In 2002, at least four more culverts on the lower end of these same systems will be replaced. These activities will fully reconnect fish populations in these watersheds to those in the mainstem Ninemile Creek and allow for the immigration of both bull and westslope cutthroat trout into these watersheds.

In addition to the long-term improvements that have and will be made under BAER, there have also been some short-term problems associated with this work (Project Files: USDA Forest Service, Lolo National Forest 2002, Upper Ninemile Fire Complex Burned Area Emergency Rehabilitation monitoring). Most of these problems are sediment related. Three jammer road fill crossings on an unnamed tributary in the Burnt Fork watershed were not completely excavated which caused substantial sediment to be delivered to this intermittent channel in the spring of 2002- rough estimate of 25 cubic yards of material. Additionally, two culverts on the foothills road, one on the same intermittent tributary mentioned above, partially failed and will require replacement. This also resulted in added sediment delivery to intermittent channels. Although it may take time before this material is remobilized and transported to fish bearing reaches downstream in the Burnt Fork, the potential exists for added impact on fish and fish habitat in the lower Burnt Fork watershed. Impacts will largely be associated with elevated fine sediment stored in spawning and rearing habitats that will contribute to a reduction in egg to emergence survival of all salmonids in this reach and reduce the rearing habitat quality in pools. Work in other Ninemile watersheds (Camp, Big Blue and Soldier creeks) and other project drainages (Johnson Creek and Idaho Gulch) appears to be performing well with only small sediment related impacts from local stream channel adjustments observed in 2002. Local problems will be addressed in 2002. The overall effect on fisheries in the BAER watersheds will be long-term benefits via sediment reduction.

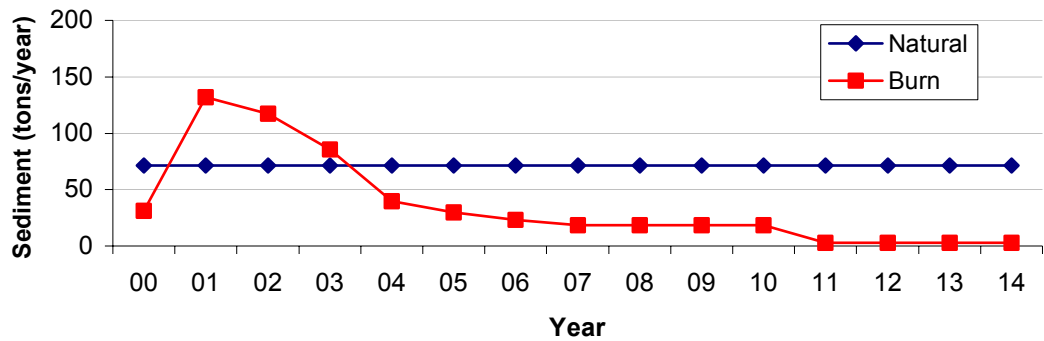
**Figure 4.14.1. Comparison of burn and natural derived sediment yield - Ninemile Creek Drainage**



**Figure 4.14.2. Comparison of burn and natural derived sediment yield - Idaho Gulch Drainage**



**Figure 4.14.3. Comparison of burn and natural-derived sediment yield - Johnson Creek Drainage**



**4.14.2 Effects Common To Alternatives 2, 4 and 5**

**Removal of Fish Passage Barriers and Sediment Contributing Culverts**

Under Alternatives 2, 4 and 5, 26 fish passage barriers would be remedied. In the Ninemile drainage, 21 fish passage barriers would be remedied (Table 4.14.1, Appendix A, Map 4.14.1a and 4.14.1b), which would make approximately 15 miles of habitat accessible to downstream fish populations .

**Table 4.14.1. Number of existing fish passage barriers, number proposed for removal or replacement under Alternatives 2, 4 and 5, and the miles of habitat made available to downstream fish population segments after removal of barriers**

| Road crossing | Watershed      | Bull trout subpopulation (Project Drainage) | Structure treatment (same for alternatives 2, 4 and 5) | Species affected | Miles of increased habitat |
|---------------|----------------|---------------------------------------------|--------------------------------------------------------|------------------|----------------------------|
| Rd 17432      | St. Louis Cr   | Upper Ninemile                              | Remove                                                 | Wct <sup>a</sup> | 0                          |
| Rd 412        | St. Louis Cr   | Upper Ninemile                              | Replace                                                | Wct              | 0.5                        |
| Rd 17432      | St. Louis Cr   | Upper Ninemile                              | Replace                                                | Wct              | 0                          |
| Rd 34297      | Sawpit Cr      | Upper Ninemile                              | Remove                                                 | Wct              | 1.6                        |
| Rd 5500       | Pine Cr        | Upper Ninemile                              | Remove                                                 | Wct              | 0.1                        |
| Rd 5500       | Pine Cr        | Upper Ninemile                              | Remove                                                 | Wct              | 0.7                        |
| Rd 17825      | Mattie V Cr    | Upper Ninemile                              | Remove                                                 | Wct              | 0.4                        |
| Rd 16833      | Mattie V Cr    | Upper Ninemile                              | Remove                                                 | Wct              | 0.6                        |
| Rd 16832      | Mattie V Cr    | Upper Ninemile                              | Remove                                                 | Wct              | 0.2                        |
| Rd 4256       | Mattie V Cr    | Upper Ninemile                              | Replace                                                | Wct              | 0.6                        |
| Rd 5500       | Little Blue Cr | Upper Ninemile                              | Replace                                                | Wct              | 0.7                        |
| Rd 16833      | Little Bear Cr | Upper Ninemile                              | Remove                                                 | Wct              | 1.0                        |
| Rd 5520       | Little Bear Cr | Upper Ninemile                              | Replace                                                | Wct              | 0.5                        |
| Rd 4256       | Little Bear Cr | Upper Ninemile                              | Replace                                                | Wct              | 1.1                        |
| Rd 16831      | Little Bear Cr | Upper Ninemile                              | Replace                                                | Wct              | 0                          |
| Rd 18013      | Burnt Fork Cr  | Upper Ninemile                              | Replace                                                | Wct              | 0.9                        |
| Rd 5520       | Bird Cr        | Upper Ninemile                              | Replace                                                | Wct              | 0.3                        |
| Rd 5520       | Bird Cr        | Upper Ninemile                              | Replace                                                | Wct              | 3.1                        |
| Rd 18104      | Beecher Cr     | Upper Ninemile                              | Remove                                                 | Wct              | 0.7                        |
| Rd 5498       | Beecher Cr     | Upper Ninemile                              | Replace                                                | Wct              | 0.7                        |
| Rd 5498       | Beecher Cr     | Upper Ninemile                              | Replace                                                | Wct              | 0.9                        |
| Rd 250        | Deep Cr        | Trout Creek                                 | Replace                                                | Wct              | 1.1                        |
| Rd 16937      | Deep Cr        | Trout Creek                                 | Remove                                                 | Wct              | 1.2                        |
| dam           | Deep Cr        | Trout Creek                                 | Leave                                                  | Wct              | ----                       |
| Rd 16972      | Johnson Cr     | Johnson Creek                               | Replace                                                | Wct              | 1.6                        |
| Rd 536        | First Cr       | First Creek                                 | Replace                                                | Wct              | 5.2                        |
| dam breach    | Flat Cr        | Flat Creek                                  | Breach                                                 | Wct              | 2.7                        |

<sup>a</sup> Wct = Westslope cutthroat trout

In the Trout Creek drainage, two fish passage barriers would be removed in the Deep Creek watershed, which would open up approximately one mile of additional stream habitat.

Within the remaining Clark Fork composite drainages, three fish passage barriers have been

identified: one on Johnson Creek, one on Flat Creek and one on First Creek (Table 4.14.1). Removal of these fish passage barriers would provide substantial benefits to native westslope cutthroat trout populations. Improvement to all three barriers is critical because these systems currently lack connection to the Clark Fork

River, so there can be no fish migration from outside these drainages.

Removing the passage barrier on a tributary to the East Fork of Johnson Creek would provide additional rearing and refugia habitat in the Johnson Creek drainage. Removal of the Flat Creek dam would reconnect westslope cutthroat trout populations in the lower segment of the stream, providing fish access to higher quality habitat and refugia in the face of downstream disturbance, such as the debris flow that occurred during the September 2000 storms following the fires. Lastly, replacement of the large culvert on the main First Creek road would reconnect upper and lower watershed sections and population segments, and would provide fish access to an additional 5.2 miles of habitat in this drainage.

Removing these fish passage barriers in the project area, combined with strategic improvements to other factors that limit trout populations (road and mining effects), would help provide added insurance of persistence of local population segments. It would also set the stage for and contribute to additional population improvements. These actions would most likely benefit existing populations of westslope cutthroat trout. However, based on the existing potential habitat conditions, bull trout populations may also benefit in systems such as Deep, Beecher, Pine and St. Louis Creeks.

Removal or replacement of these fish passage barriers would result in a short-term increase in sediment delivery downstream, and a short-term negative local affect on fish habitat directly below the barrier areas. Effects on fish would result from an increase in sediment deposited in downstream spawning and rearing areas. However, long-term benefits to population persistence and expansion in the project area are expected to accrue and to be substantial.

#### ❑ *Population Effects*

There is a small potential for a negative fish population response from reconnecting habitat. This could occur where a culvert acts as a physical barrier between downstream exotic salmonids and upstream populations of native fish. The barrier removal would eliminate the physical basis for population segregation and would open up the opportunity for biological interactions that could be negative. However, this appears to be a larger concern with

westslope cutthroat populations on the east side of the Continental Divide, where populations and genetic diversity are not as abundant (Brian Riggers, Lolo National Forest Fish Program Manager 2001). On Forests such as the Lolo, establishment appears to be influenced by stream size, gradient and habitat conditions. Leary et al. (1996) found high genetic diversity and purity for 22 westslope cutthroat trout populations on the Lolo National Forest, even in the absence of dispersal barriers. Adams et al. (2002) investigated brook trout invasion over a 25-year period in the South Fork Salmon River, Idaho. They found minimal invasion by brook trout into upstream habitats that were accessible, and concluded that brook trout invasion is not continuously progressing throughout this drainage

In the Post Burn Project Area, the potential for negative effects from non-native fish invasion is considered small in most project watersheds, based on fish community observations in 2001. Many of the passage barriers that would be fixed are located in the mid or upper segments of watersheds. Data from 2001 indicate that there is a general community composition shift from a mixed native/non-native fish community in downstream segments toward a native fish community in upstream reaches. This especially applies in the Ninemile drainage that is substantially invaded by three non-native salmonids (brown trout, rainbow trout and brook trout). Upper fish bearing reaches in most project watersheds tend to be dominated by westslope cutthroat trout, whereas the lower ends of these streams closest to the mainstem Ninemile Creek were more mixed in fish community composition. This segregation occurs in systems where there are no barriers to physically maintain fish population segregation. Providing access to upper portions of watersheds would benefit native westslope cutthroat, and in some cases resident bull trout by providing additional refugia, higher quality habitat, and increased population connectivity that should all contribute to increased population productivity and persistence (Rieman and McIntyre 1993). It appears that even in watersheds that have been disturbed by past road and harvest activity, native westslope cutthroat trout may still maintain dominance over non-native salmonids in the upper watershed stream segments.

### ■ Culvert Removal or Replacement

Under Alternatives 2, 4 and 5, 108 surveyed culverts would be replaced or removed. Seventy-five culverts (Appendix A, Map 4.14.1a and 4.14.1b) on perennial and intermittent stream channels would be replaced. Fifteen of these are on fish bearing streams and replacement would improve/restore fish passage). Thirty-three culverts would be removed, 10 from fish bearing streams where fish passage would be improved or restored (Table 4.14.1). In addition to these 108 surveyed culverts, an additional 146 culverts/crossings were identified for potential restoration. They were identified using a GIS procedure that looked at all intersections of streams with roads that fell on a proposed road closure level of 3 or greater and were not evaluated in the field. The 146 culvert/crossings estimate is a maximum estimate. Most of these crossings are on non-fish bearing sections of stream and include ephemeral draws, intermittent channels, and ditch relief culverts.

Long-term benefits to stream channel habitat include reduced levels of chronic fine sediment input and increased channel stability, and improved spawning and rearing habitat downstream from reductions in sediment inputs. Unavoidable, yet minimal, short-term effects are expected to impact fisheries resources in ways similar to those documented in the studies that are referenced below.

#### □ *Sediment Effects (culverts)*

A monitored culvert replacement effort on the Bitterroot National Forest provides insight into the short-term sediment effects of this activity (Jakober 2002). The culvert replaced was 24-inch diameter by 48 feet, and was replaced with a 54-inch diameter pipe to accommodate the 100-year flow. Road depth fill over the culvert averaged about five feet. Replacement work was done under base flow conditions. The investigator estimated about 1.1 cubic yards of sediment was suspended and transported and deposited downstream from the replacement site (Jakober 2002). The primary area of impact, based on turbidity measures and bed sediment observations, was up to 40 feet downstream from the replacement site. It took less than 24 hours for suspended sediment levels to return to pre-disturbance level. The majority of sediment recruited (approximately 94 percent) to the stream channel occurred during the first hour

after the stream diversion was removed and water flowed back through the original channel and the new culvert.

A Lolo National Forest study revealed short-term sediment impacts during a 72-inch culvert removal and stream channel stabilization project on Siegel Creek (Lolo National Forest 1999). Results of this monitoring effort were similar to those on the Bitterroot National Forest. Total sediment yield to the stream as a result of the unavoidable disturbance from the work was one to two cubic yards of material. The majority of this sediment was stored in the stream in the first 150 feet downstream from this activity, and suspended sediment levels had returned to pre-disturbance levels with 24 hours. Fish passage was successfully restored at this site.

With both of these activities, it is likely that small amounts of additional sediment entered the streams during rain events the first year after the work, until vegetative cover restabilized the site. Based on the findings discussed above, the short-term (1-2 years) effects of increased sediment recruitment to downstream fish habitats would be negligible. Spawning habitat may experience a short-term increase in fine sediment.

#### □ *Temperature Effects (culverts)*

Where culverts are removed on de-compacted/obliterated roads on perennial and intermittent stream crossings, exposure to sunlight would increase. There are 33 known culvert sites where this would occur. However, because only a small surface area of water would be exposed to sunlight and because remaining areas of riparian vegetation would remain in place, this activity is expected to contribute minimally, if at all, to increased water temperatures in potential bull trout and cutthroat trout production habitat. The minor losses of shade at these road crossings would continue for 5-10 years, until riparian shrubs colonize the site and grow to heights, which would shade the streams. In the long-term, the shade provided by riparian vegetation, passage and improved channel function would be much more beneficial to bull trout and bull trout habitat than the shade provided by a culvert.

### ■ Mine Site Restoration

Four mine sites in the project area are proposed for reclamation: The Joe Waylett Mine site in St.

Louis Creek watershed, Lower Mattie V mine site near the confluence with Ninemile Creek, Eustache Creek floodplain restoration; and Windfall Creek watershed mine site reclamation. Each is discussed below.

#### ❑ ***St. Louis Creek (Joe Waylett) Mine Site Restoration***

Reclamation of this mine would extensively benefit westslope cutthroat trout as well as provide some benefit to bull trout. This upper part of the St. Louis watershed already supports a moderate number of westslope cutthroat trout. Improving this site, restoring function to this section of stream, and eliminating water quality impacts would make this upper section of St. Louis Creek quality fish habitat. Improving stream stability and allowing the stream to return to a more natural form and function may encourage use in this system by bull trout. However, given the extremely low numbers of bull trout in the upper Ninemile drainage, this may be limited initially. Improved connectivity from road closure and culvert removal would also open up additional fishery habitat.

There may be a short-term increase in stream temperature from removing streamside vegetation (primarily shrubs) from the mine tailings. Earth moving activity and stream diversion during construction would also substantially increase short-term inputs of fine sediment, but is unavoidable if this section of stream is to be improved. However, using silt fences to contain loose transportable material, and diverting the stream if needed so that channel reconstruction work was not done in the water would help reduce these impacts. Likely the greatest increase in fine sediment inputs to the stream channel would occur when the stream was re-introduced to the new unconsolidated channel and during the following several spring runoff periods when the channel would actively adjust and before riparian vegetation would stabilize the site. This work would be done in the summer during the low flow period to minimize the direct effects of reconstruction.

#### ❑ ***Mattie V Creek Mine Site Restoration***

Mattie V Creek is not functionally connected to Ninemile Creek for fish passage because of the dredge pond configuration and subsurface flow between the two systems.

Restoration activities would reconnect the mouth of Mattie V Creek to Ninemile Creek, which would benefit native westslope cutthroat trout production. The upper portions of Mattie V Creek currently support a small mixed westslope cutthroat and brook trout community. The lower section of Mattie V Creek near the dredge ponds is dominated by brook trout, and unless restored, would continue to be a node for brook trout production and expansion. The combination of mine reclamation with the multiple road closures, culvert removals and restoration of stream crossing drainages proposed by Alternatives 2, 4 and 5 would help move this small second order stream to a more functional state that should favor westslope cutthroat trout production over that of other non-native salmonids over time. Removing large ponded areas that receive maximum solar exposure would improve stream temperatures. Releasing the stream from its currently confined state would greatly improve instream habitat features conducive to westslope cutthroat trout production.

The potential negative effects from vegetation removal and ground disturbance activity would be very similar to that described for the mine reclamation in St. Louis Creek. However, disturbance at this site should be less because it is smaller.

#### ❑ ***Eustache Creek Mine Site Restoration***

The Eustache Creek watershed in the Upper Ninemile drainage has a legacy of valley bottom placer mining that has reduced its capacity to produce native westslope cutthroat and bull trout. In spite of its limitations, Eustache Creek is one of the few watersheds in the Ninemile drainage that appears to produce westslope cutthroat trout in substantial numbers. In addition, Eustache Creek is the only Ninemile drainage tributary where resident bull trout have been recently documented. The character of Eustache Creek in this area is different than most other habitats in watersheds tributary to Ninemile Creek. It has a moderate gradient of two to three percent and has a relatively wide meadow and shrub valley bottom.

Approximately ¼ mile of Eustache Creek would be reconstructed. Reference site conditions would be used as a template for channel grade and configuration. The intent would be to create a template for the stream to function and form

habitat due to natural process over time as it adjusts back to a more natural and productive state. Benefits to native westslope cutthroat and bull trout production would be improved habitat conditions and a reconnection of the watershed to fish emigration and immigration. This mine reclamation work combined with the closure and restoration of about one mile of riparian road at the lower end of Eustache Creek would help move this important Ninemile tributary to a more functional state that should favor and improve westslope cutthroat trout production. It may also help re-establish bull trout in this section of the Ninemile drainage.

There would be a direct sediment effect from reconstruction and likely several years of elevated sediment inputs to downstream fish habitats until the site stabilizes and begins the process of long-term recovery. Recovery would include long-term sediment reduction and improvement of instream fish habitats. Best management practices for erosion control would be implemented during construction to reduce direct impacts of the reconstruction activity. Increases in stream temperature at this site may also occur from removal of streamside shrubs during and after the construction process. Long-term benefits to this watershed's fishery are anticipated to outweigh the short-term impacts of reconstructing this site.

#### ❑ *Windfall Creek Mine Site Restoration*

The Windfall mine site restoration would occur in the Windfall Creek watershed of the Trout Creek drainage. Trout Creek is identified by the State of Montana as a priority bull trout recovery stream. Windfall Creek is an important westslope cutthroat trout production tributary to Trout Creek, and could also have the potential to produce bull trout.

Because of the highly confined nature of this disturbed area and the amount of loose unconsolidated material that needs to be removed or reworked, reclamation of this site would increase potential for short-term negative effects than the other proposed mine reclamation projects. In addition, there are few options to divert the stream during construction. Much of the confining material is very sparsely vegetated and very unstable. However, without treatment, this area poses an even larger and long-term threat to downstream habitat and fish populations due to the large volume of fine material that

would be available for erosion transport and deposition. Under the status quo there is no potential for fisheries resource gain. During and shortly after construction there would be increased turbidity and sediment deposition. As the source for excess bed material and fine sediment was eliminated by this action, any additional fine sediment entering the stream from construction should begin to be transported out of the system as the sediment budget begins to balance. Projected benefits of implementing this restoration activity are very good for native salmonids in a stream that appears not to have been invaded by non-native salmonids.

#### ■ **Other Restoration Activities**

Under Alternatives 2, 4 and 5, other restoration activities would include 38 acres of riparian planting in high severity burned areas in the Ninemile drainage, about one mile of trail stabilization in the Burnt Fork watershed in the Ninemile drainage, and about 1,300 acres of soil stabilization in the Ninemile, First, Johnson and Flat Creek drainages.

Riparian planting would benefit fisheries habitat by providing stream shade, which would reduce water temperature after several years.

Trail stabilization on the first mile of Trail #418 that crosses an unnamed tributary to West Burnt Fork Creek would help reduce sediment recruitment to the stream channel. Waterbars would be extended or replaced, drainage would be improved and the stream trail crossing would be armored. Riparian vegetation would be planted to facilitate vegetative recovery of the stream channel area. Seed and mulch would be added to disturbed areas near the trail to provide ground cover during the first few years after construction to minimize erosion from the trail cut and fill areas. This action may contribute small amounts of fine sediment to this small perennial non-fish bearing channel in the short term, but would result in a long-term reduction in sediment.

Approximately 1,300 acres of steep burned slopes and unstable soils would be treated to enhance stability in these areas. Treatment activities would include: seeding and planting areas with a high potential for erosion, mulching of exposed soils, contour felling of standing trees to create sediment barriers, installing check dams and sediment traps in gullied areas, and placing

woody debris (tops and limbs) to improve ground cover. These activities would benefit the watershed by improving soil productivity and stability, and reducing near term recruitment of sediment to stream channels. It is not anticipated that these activities would have a negative effect on fisheries resources.

■ **Gravel Source Site Development**

A local gravel source would be required to meet the gravel needs for surfacing some existing roads to bring them up to BMP standards. The proposed source site is located near the confluence of Mattie V and Ninemile Creeks. Extensive past placer mining has occurred at this site. Gravel removal would not go below the existing grade of the reclaimed mine site and a pit would not be created.

Removal of gravel material would not have a long-lasting effect on the area nor would it have an adverse effect on fish or aquatic habitat. The site is over 300 feet from Ninemile and Mattie V Creeks with no apparent surface hydraulic connection to either. Development and reclamation of the site would occur over a two-year period at the 40-acre site. Piled deposits would be removed to grade. Erosion control would be implemented to minimize the potential for long-range transport of sediment over this low gradient area. Washing of material would not occur at the site and disturbance or disruption to ground water is not anticipated. Once gravel operations were complete, the site would be graded to a natural contour, seeded with native

grasses, and planted with brush and tree species appropriate to the site.

The Forest will develop a Pit Reclamation Plan for this site. This Plan specifies final reclamation activities, including surface topography requirements, surface drainage flow requirements, replacement of topsoil and woody debris, seeding and fertilization, and weed treatments. Pit reclamation is assured because it is contractually part of opening and using the source material.

□ **4.14.3 Alternative 1**

■ **Direct and Indirect Effects**

Under Alternative 1, road density, near channel road density and stream crossing density would not change. Therefore, road conditions on the landscape would continue to exert stress on project drainages and their existing native trout populations by delivering fine sediment to instream habitats. Refer to Table 4.14.2 for the anticipated short-term and long-term sediment yield from roads under Alternative 1. The road sediment peaks in 2001 for most drainages would be reduced substantially by the end of the model period as roads rehabilitate, stabilize, and recover from their post-fire treatments. This is in large part a result of recovery from road disturbance and reconstruction after the fires in 2000. Even with these long-term reductions, roads would still be the dominant sediment source for all project drainages in the long-term. See Section 4.6.3.

**Table 4.14.2. The short and long-term sediment yield by drainage (percent over natural) from roads for Alternative 1.** *Short-term values are for 2001 and long-term values are for 2015. Natural sediment sources in LOLOSED are estimated using landscape features such as soil types and erodability and stability, slope, and average precipitation. Other disturbance based sediment sources are accounted for by the fire, harvest and road components of the model. Mine site disturbances are not accounted for in the model and are treated in a qualitative manner.*

| <b>Drainage</b> | <b>Annual Natural Sediment (tons/year)</b> | <b>Short-term yield from roads (% over natural)</b> | <b>Long-term yield from roads (% over natural)</b> |
|-----------------|--------------------------------------------|-----------------------------------------------------|----------------------------------------------------|
| First Creek     | 37                                         | 671                                                 | 338                                                |
| Ninemile Creek  | 482                                        | 85                                                  | 36                                                 |
| Siegel Creek    | 72                                         | 72                                                  | 67                                                 |
| Flat Creek      | 119                                        | 256                                                 | 172                                                |
| Johnson Creek   | 72                                         | 932                                                 | 504                                                |
| Idaho Gulch     | 25                                         | 708                                                 | 603                                                |
| Trout Creek     | 492                                        | 126                                                 | 72                                                 |

The effects of elevated sediment levels from road sources on fisheries would continue under this alternative. This would contribute to the maintenance of the generally poor fish habitat quality and impaired fish population in several watersheds. Percent fine sediment in spawning and rearing habitats would remain elevated, and pool quality and stream width to depth ratios would continue to be poor and may decrease further over time. The result would be little if any improvement in the production capacity of bull and westslope cutthroat trout populations in project drainages.

Native trout habitat and populations would remain in a state similar to existing conditions. Improvement in fish passage or the connectedness of fish habitat and fish population segments would not occur. Fish populations would continue to be impaired and at some degree of risk because of the lack of connectedness among population segments, especially in the Ninemile drainage. Instream habitat features would not significantly change from the existing condition. In general, riparian management objectives (RMOs) such as pool quality would remain at a low level, and possibly degrade further under existing road conditions; amounts of large woody debris in most project watersheds would continue to be higher than the INFISH RMO but lower than that for undisturbed watersheds on the Lolo National Forest (Riggers et al. 1998). Percent surface fines in all projects watersheds would likely remain at existing levels, or potentially increase over time from ongoing influence of roads.

Continued reduction of instream habitat quality from elevated levels of fine sediment would afford non-native salmonids that are already present, the ability to increase in relative abundance, which would reduce native salmonid productivity due to competition and hybridization. In the long term, local westslope cutthroat trout population segments could be irretrievably lost to invasion and competition with brook trout. If reductions, loss, and replacement occur, it would be difficult for westslope cutthroat trout to regain dominance or presence once they have been replaced (Griffith 1986). However, it is generally thought that the optimal westslope cutthroat habitat occurs in high-gradient upper portions of tributaries, and that westslope cutthroat trout in these habitats are better able to withstand competitive pressures

from non-native salmonids (Griffith 1986, and supported by post burn data 2000).

#### ■ Cumulative Effects

Sediment-derived effects of roads on aquatic systems are a past, present and, ongoing feature, but the effects can vary greatly depending on road condition, location and maintenance.

Road maintenance will continue on the Forest. Because Forest Best Management Practices (BMP) would continue to be implemented, it is not likely that aquatic habitat conditions would worsen substantially from the existing condition. This is supported in the percent decrease over time in road-derived sediment (Table 4.14.2). No new road construction in the project area is planned.

There may be additional use of the Foothills Road in 2002 if the mushroom crop can support commercial and recreational efforts. Effects of possible increased road use would, in large part, depend on early and mid summer weather conditions. If the number of pickers are similar to those in 2001, and it is a wet summer, this could result in short-term increases in sediment delivery to channels, but this would not be expected to be a considerable impact. Additional impacts could result from dispersed camping, especially if this occurs near stream channels. In 2001, dispersed camping along the main Ninemile Creek resulted in removal of streamside vegetation and ground compaction, all of which could contribute to increased sediment delivery to instream habitats.

Other projected sediment sources from road activities include completed and ongoing BAER watershed restoration work in heavily burned areas of the Ninemile drainage. The Burnt Fork watershed in the Ninemile drainage is an area where extensive jammer road and crossing removals and culvert replacements has already occurred under BAER. In the spring of 2002, runoff events resulted in several areas of increased erosion at stream-road crossings at, and above the Foothills Road. This resulted from incomplete compaction of fill material or where jammer fills were not completely removed from channels. This resulted in small headcuts and failure of culvert fills that recruited additional sediment to an intermittent Burnt Fork channel. This has created the potential for

additional sediment transport and delivery to fish bearing sections downstream. Additional short-term sediment increases may occur from additional road improvements in this watershed, culvert replacement, and jammer road fill removal. This will likely continue to elevate sediment yield over the next two years in the Ninemile Drainage.

Residual sediment inputs produced by the 2000 fire suppression activities, and future suppression actions have the potential to contribute to a sediment yield cumulative effect, especially in the Ninemile drainage. However, since rehabilitation efforts have occurred, they are beginning to stabilize and this will result in reduced sediment related impacts compared to those that likely occurred in years 2000 and 2001.

The legacy of past mining activities in Eustache, St. Louis, Mattie V, Sawpit, Martina, and Marion, Flat Creek, Windfall and Deep Creeks will continue to be fish and fish habitat stress due to increased sediment delivery, channel confinement and modification, and water quality alterations. Mine site disturbance sediment yield is not accounted for in LOLOSED modeling, and is qualitatively considered.

Table 4.6.8 in the Water and Hydrology Resources section of this chapter displays the implications of vegetation removal due to the 2000 wildfires and past and proposed timber harvest using the Equivalent Clearcut Area/Acres (ECA). The ECA indicator estimates and standardizes the effects of past vegetation removal into a unit of watershed effect that is equivalent to that for one acre of clearcut land. ECA values suggest that in the Ninemile drainage there are several watersheds with a greater potential for altered hydrology due to the 2000 wildfires and past timber harvest. They are Beecher Creek (ECA=37 percent), Big Blue Creek (ECA=78 percent), Burnt Fork Creek (ECA=31 percent), Camp Creek (ECA=56 percent), Little Blue Creek (ECA=42 percent), Martina Creek (ECA=43 percent), Ninemile Face 2 (ECA=38 percent), Ninemile Face 3 (ECA=43 percent), Soldier Creek (ECA=57 percent), and St. Louis Creek (ECA=44 percent). Burnt Fork, Martina, and Nugget Creek watersheds have nearly 30 percent of their ECAs accounted for by past harvest. This indicator does not account for disturbed land that is a result of past or ongoing mining activities. In

this light, St. Louis Creek, site of the Joe Waylett mine, will have a greater potential for increased peak runoff, sediment recruitment, and fish habitat degradation because of the mine site disturbance in the middle of the watershed.

Idaho Gulch has an ECA of 44 percent (30 percent of this value is contributed by private timber harvest); and Welch Gulch has an ECA of 46 percent. In Trout Creek, Lo Face 1 and Lo Face 4 watersheds have high ECAs (74 percent and 40 percent, respectively).

Implications of altered hydrology for fish are increases in peak flow and temporal acceleration of runoff patterns that can affect channel stability and instream habitat. As channels become unstable, of the potential for scouring eggs in spawning redds increases and additional fine sediment that can be delivered to stream channel and degrade pool habitat and reduce spawning habitat quality.

The Shapes and Feathers Timber Sale, ongoing in the upper Ninemile drainage, will contribute to cumulative effects. The sale contract was issued for this project in 2001 and work will likely occur over the next several years. Harvest is focused on three watersheds in the Ninemile drainage: Sawpit (85 acres), Eustache (59 acres), and Nugget (70 acres). Treatments include commercial thinning, shelterwood cuts, and individual tree selection. Harvest under these sales in Sawpit and Nugget watersheds contribute to the ECAs that are over 30 percent (Table 4.6.8). Under this alternative, the Shapes and Feathers sale would not add substantial sediment to watersheds where the sale will occur, or to the mainstem Ninemile. No harvest will occur in Riparian Habitat Conservation Areas (RHCAs), and this sale has road closures that will provide additional sediment reduction benefits. Under the Post Burn project, there would be no added increase in ECA in these watersheds as a result of this alternative. Timber harvest activities under the Post Burn project would not have a direct effect on fish habitat nor contribute to cumulative effects on fish populations or habitat in the aforementioned watersheds.

Prescribed burning to improve big game winter range and reduce fuels would continue in both the Ninemile and Trout Creek drainages. The magnitude and disturbance of these activities would not likely affect fish habitat as long as

activities, including firelines, occur outside RHCAs.

Weed spraying would occur in project drainages in 2002. However, mitigation measures to avoid water bodies would minimize the potential for adverse affects to fisheries and riparian resources; See Lolo National Forest Big Game Winter Range and Burned Area Weed Management EIS (USDA Forest Service 2001b).

In the mainstem Ninemile Creek, sediment generated from fires and other existing conditions on Forest land will combine with sediment generated from private activities such as grazing, agriculture, and housing development in the valley bottom and upper floodplain terraces. These private land activities are likely to persist for some time and will never be completely eliminated. The Ninemile Drainage is listed as an impaired water body by Montana. Division of Environmental Quality. This classification requires that a water quality restoration plan be established to remedy some of the sediment and thermal effects of private and public land management activities. A joint effort will soon be underway between the DEQ, and Federal and private land managers to develop this plan and to identify total allowable maximum daily loads of pollutants such as fine sediment. This effort is expected to contribute to a long-term reduction in potential fisheries stressors such as fine sediment and temperature. This will lead to an incremental improvement in the condition of the mainstem Ninemile that will provide for better migratory, spawning and rearing conditions for native salmonids.

Multiple mine sites (see Chapter 3 fisheries input) will continue to stress fisheries. Key areas of impairment in the project area include the upper mainstem Ninemile, St. Louis Creek, Eustache Creek, St. Louis Creek in the upper Ninemile drainage; and the mainstem Trout Creek, Windfall Creek and Deep Creeks mined areas in the Trout Creek drainage. These sites contribute to local degradation of fish habitats on site via the modified channel and vegetation features. They also pose migratory barriers in some cases (Mattie V, Eustache and Windfall Creek mined areas). This results in degraded rearing and spawning habitat from channel excavation and confinement, and channel areas of excessive degradation and aggradation. These sites also provide habitat nodes for non-native

fish production and are a source of elevated sediment delivery downstream.

On a larger scale, a big impediment to improving bull trout population productivity is habitat and subsequent population fragmentation. Middle Clark Fork River bull trout populations are fragmented and isolated by five hydroelectric dams (Hendrickson and Cikanek 2000). Three of these dams (Cabinet Gorge, Noxon, and Thompson Falls) are on the mainstem Clark Fork River and completely eliminate migration of fluvial bull and westslope cutthroat trout from significant downstream production areas. Exchange among populations from within the same river system is increasingly recognized as key life history strategy for the long-term persistence and health of bull trout populations (Rieman and McIntyre 1993).

As mainstem Clark Fork dams continue to fragment bull trout population segments at regional scales, there is the potential that bull trout productivity will continue to decline. Lack of exchange among population segment can lead to reduced productivity of the population (Remain and McIntyre 1993) that may be difficult to recover. This combined with other stressors such as degraded habitat, as well as local population fragmentation, puts populations of bull trout in the project area at further risk of long-term loss.

#### ■ Determination of Effects

Alternative 1 would not be consistent with Forest Plan standards as amended by INFISH. For westslope cutthroat trout, this alternative **will impact individuals or habitat with a consequence that the action may contribute toward federal listing or result in reduced viability for the population or species.**

Alternative 1 would result in a continued trend in degradation of bull trout habitat from the existing situation. This alternative **may affect, likely to adversely affect bull trout.** Refer to Appendix F for the matrix of effects on bull trout.

□ **4.14.4 Alternative 2**

■ **Direct and Indirect Effects**

□ **Road Closure- General**

Under Alternative 2, approximately 279 miles of roads would be reconstructed to BMP standards and nearly 225 miles of road would be closed. Of the proposed road closures, 52 miles would be fully recontoured (Closure Level 5; refer to Table 4.14.3). These closures would be the most disruptive in the short-term but would provide the most long-term benefits to watershed and fisheries resources. These Level 5 closures would ensure that 70 to 100 percent of the road impacts are mitigated through mechanical and natural restoration processes. After an initial disturbance, in many cases the functional recovery to a near-natural state after several years should occur where Closure Level 5 is

implemented (Hickenbottom 2000). Proposed road closures should lead to substantial improvement in road-related effects on watersheds.

There would also be 11 miles of roads designated for seasonal closures in St. Louis and Eustache watersheds of the Ninemile drainage. Season closures would provide some benefit to watersheds and fisheries but not to the extent of full road closures. Seasonal restrictions keep the road prism in place and are drivable during open periods, but reduce sediment impacts from rutting and subsequent delivery to stream channels during wetter, more susceptible periods. These seasonal closures would provide some indirect fisheries benefits due to reduced sediment delivery to streams, but these benefits would not be as great as those that result from road closure.

**Table 4.14.3. Miles of Road Closure Types by Drainage for Alternatives 2, 4 and 5.** *Level 5 closures would be the same among Alternatives 2, 4 and 5. The only difference in Level 3 closures among these alternatives would be in the Ninemile drainage where there would be 4 fewer miles closed under Alternatives 4 and 5.*

| <b>Drainage</b> | <b>Proposed Closure Level 5 (miles)</b> | <b>Proposed Closure Level 3 (miles)</b> |
|-----------------|-----------------------------------------|-----------------------------------------|
| Trout           | 23.5                                    | 47.1                                    |
| Ninemile        | 18.7                                    | 104.4                                   |
| Siegel          | 3.3                                     | 2.7                                     |
| First           | 2.6                                     | 4.9                                     |
| Flat            | 2.6                                     | 3.9                                     |
| Johnson         | 1.4                                     | 8.1                                     |
| Idaho Gulch     | 0.0                                     | 2.4                                     |

Negative effects of road closure activity are difficult to quantify because of the distance that often separates roads from stream channels and because the conditions and processes that can lead to erosion and sediment delivery to stream channels are often not direct. It is expected that increased erosion would occur from road obliteration (Hickenbottom 2000) and lesser closure levels initially. Short-term impacts from increased sediment delivery to streams, at least during the first year after construction, would be expected due to the combination of increased onsite erosion and reduced infiltration

(Hickenbottom 2000). Some of these effects would be mitigated by the use of ground stabilizing practices such as straw mulch and coarse surface cover. After this time, stabilizing benefits from young vegetation, and increased soil cover should reduce future impacts to stream channels from fine sediment. Over the long term, removal of the road prisms or scarification, seeding of the road surfaces, and removal of stream crossings would allow longer-term benefits to watershed and stream channel stability and improved stream habitat for fish.

Some expected short-term changes to several Riparian Management Objectives (RMOs) would likely occur in all project drainages as a result of road restoration. This would most likely affect habitat quality indicators of pool quality (width to depth ratio and residual pool volume) and percent surface fines or substrate embeddedness. These effects are expected to be short-term and negligible, when the long-term expected benefits of overall sediment yield reductions for most project drainages are considered.

Drainages with the greatest bull trout production potential at this time include Ninemile and Trout Creek drainages. Because increases in bull trout production would not be expected to occur immediately in these drainages, potential short-term impacts would not likely long-term increases, or potential for increases, in bull and westslope cutthroat trout production. Reductions in road related effects combined with other restoration activities in currently important fish production watersheds such as Eustache, St. Louis, and Beecher Creek watersheds in the Ninemile drainage, and Windfall Creek watershed in the Trout Creek drainage would help further build the native fish production capability in these systems.

The specific time frame for predicted biological response to reduced disturbance from roads is difficult to quantify because of the long-term chronic “press” effects that roads have had (Yount and Niemi 1990). Recovery response in

part depends on the temporal pattern of natural disturbance regimes that local fish populations have historically been exposed to at multiple spatial scales (Poff and Ward 1990). Aquatic macroinvertebrate abundance and diversity, as well as spawning success, should increase as bed fine sediment levels decline (Waters 1995 and Reiser and White 1988). This should benefit native salmonid production potential. Long-term gradual improvement in pool habitat quality and complexity would occur as streams move toward balancing fine sediment loads and experience gradual increases in large woody debris recruitment over time as near channel roads were eliminated. These factors combined should help contribute to the increase in, and maintenance of, native westslope cutthroat and bull trout fisheries, especially in the Ninemile and Trout Creek drainages.

**❑ Road Effects (LOLOSED and Density Indicators)**

The LOLOSED model predicts that roads are the single greatest contributor of sediment yield in each project drainage over the period modeled (2000-2015). In each project drainage, LOLOSED modeled results demonstrate that Alternative 2 would provide the greatest long-term reduction in road-derived sediment. However, in many cases the differences in road-derived sediment reduction among Alternatives 2, 4, and 5 would be small over the long-term (Tables 4.14.4 and 4.14.5; Section 4.6.3).

**Table 4.14.4. Modeled long-term sediment yield from roads (percent over natural) by drainage and alternative. This estimate sums sediment generated by roads by drainage for each alternative from 2000 to 2015 and compares it to modeled sediment from natural sources summed over the same period**

| Drainage     | Annual Natural Sediment (tons/year) | Road Sediment (percent over natural) |               |               |               |
|--------------|-------------------------------------|--------------------------------------|---------------|---------------|---------------|
|              |                                     | Alternative 1                        | Alternative 2 | Alternative 4 | Alternative 5 |
| First Creek  | 37                                  | 383                                  | 317           | 331           | 330           |
| Ninemile     | 482                                 | 45                                   | 23            | 28            | 24            |
| Siegel Creek | 72                                  | 69                                   | 35            | 33            | 34            |
| Flat Creek   | 119                                 | 183                                  | 157           | 174           | 170           |
| Johnson Cr   | 72                                  | 553                                  | 484           | 481           | 506           |
| Idaho Gulch  | 25                                  | 615                                  | 603           | 599           | 594           |
| Trout Cr     | 492                                 | 79                                   | 56            | 65            | 65            |

LOLOSED results demonstrate that in each drainage, Alternatives 2, 4, and 5 would provide

varying degrees of long-term benefits from road sediment reduction when compared to

Alternative 1 (Table 4.14.5). Because these differences are relative, it is difficult to state to what degree the greater percent reductions in road sediment would benefit fish habitat. However, it is expected that over the long-term, sediment reduction from road closures would help improve pool and spawning habitat quality, and instream stability for each alternative, with alternative 2 generally providing a slightly greater degree of benefit. These reductions

should contribute to a gradual improvement in native trout production capability in project drainages. Qualitatively, road related sediment for Alternative 2 compared to Alternatives 4 and 5 is expected to be even less than LOLOSED predictions because of the increased road use that would occur under alternatives 4 and 5 as a result of harvest related road use.

**Table 4.14.5. Long-term reductions in road derived sediment from LOLOSED modeled data for Alternatives 2, 4, and 5 compared to Alternative 1, the no action baseline in 2015. Sediment estimates for alternatives 2, 4 and 5 are the summed estimated total sediment generated from roads from 2000 to 2015 compared to the total for Alternative 1.**

| Drainage     | Percent Reduction in Road Sediment from the No-Action Baseline in 2015. |               |               |
|--------------|-------------------------------------------------------------------------|---------------|---------------|
|              | Alternative 2                                                           | Alternative 4 | Alternative 5 |
| First Creek  | 14%                                                                     | 11%           | 11%           |
| Ninemile     | 15%                                                                     | 12%           | 15%           |
| Siegel Creek | 21%                                                                     | 21%           | 21%           |
| Flat Creek   | 9%                                                                      | 3%            | 5%            |
| Johnson Cr   | 11%                                                                     | 11%           | 7%            |
| Idaho Gulch  | 2%                                                                      | 2%            | 3%            |
| Trout Cr     | 13%                                                                     | 8%            | 8%            |

**Ninemile Drainage:** Nearly 125 miles (Table 4.14.3) would be decommissioned. There would also be extensive road improvement and culvert removal/replacement activity as part of the proposed road reconstruction. Slightly greater sediment reduction benefits would be expected in this drainage under Alternative 2 than the other action alternatives because Alternative 2 would close nearly four additional miles of road (Table 4.14.5).

Road densities would be reduced considerably in the Ninemile drainage (Table 4.14.6 and Figure 4.14.4). The road density would decrease from 3.0 to 1.4 miles/mile<sup>2</sup>. This would change the drainage road density classification from high to moderate. Fewer impacts to native trout populations over time would be expected as closed roads stabilize and re-vegetate and site and watershed processes recover and improve. Similarly, the near-channel road density for this drainage would be reduced by nearly half, from 0.7 miles roads/mile<sup>2</sup> to 0.4 miles of road/mile<sup>2</sup> (Table 4.14.6 and Figure 4.14.7). Stream

crossing density would be reduced from 2.4/mile<sup>2</sup> to 1.3/mile<sup>2</sup> (Table 4.14.6 and Figure 4.14.8). Road closures, coupled with proposed barrier removals, should provide substantial benefits to westslope cutthroat trout populations by restoring much of the hydrologic function and opening additional habitat in the watershed to fish access and production.

Under Alternatives 2, 4 and 5, 1.6 miles of riparian road in the Eustache watershed would be obliterated and recontoured. This section of Road #97 is on the lower end of Eustache Creek and would eliminate vehicle access to the watershed from the lower end. Closure should benefit the watershed by reducing long-term sediment inputs to the lower section of stream and improving the integrity of hydrologic processes that are impaired by the presence of the road prism in this important native trout fishery.

Alternatives 2, 4 and 5 should have similar temporal patterns of short-term sediment

increases followed by long-term reductions in sediment below the no action baseline (Figure 4.14.9). Short-term increases in sediment yield in 2001 and 2002 would result from extensive BAER road closure and culvert removal activity in Big Blue, Camp, Soldier and Burnt Fork drainages and about 58 miles of BMP road upgrades and reconstruction. Three smaller disturbance episodes and sediment yield spikes (2004, 2007, and-2009), from the phased closure and reconstruction would be expected for Alternatives 2, 4 and 5 before the lowered long-term baseline is achieved. Disturbance and recovery, and the overall decline in sediment delivered to stream channels could be protracted under Alternative 2 because funds may not be as readily available to complete roadwork. The greatest sediment increase would be expected to occur one year after road restoration work was complete, with a diminishing effect over the next one to two years (USDA Forest Service 2000, Hickenbottom 2000, Figure 4.14.9).

The greatest potential negative affect to fish populations in the Ninemile drainage would be in the next several years, as sediment yields to fish habitats remain high from post fire, suppression, and BAER effects (see hydrology and fisheries sections in Chapter 3 of this EIS and Section 4.14.1 above), combined with the first phase of road closure and reconstruction.

The elevated sediment yield from this work would have the potential to negatively affect fish by disturbing spawning and rearing conditions for several years before longer-term fisheries benefits would begin to accrue. Watersheds of concern include St. Louis, Beecher and Burnt Fork because of existing important fish populations.

Road closures and reconstruction of roads to BMP standards in the Ninemile drainage would play an important role in long-term improvements to the fishery resource in this drainage. Improvements would include long-term reduction of instream sediment. Pool habitat quality would be expected to improve slowly from reduced sediment delivery and storage. Spawning habitat quality and quantity would increase from reduced fine sediment delivery and storage. Improved stream channel stability should also help sustain long-term habitat formation and maintenance processes.; Reducing channel instability would also benefit fish production during critical egg incubation periods and improve rearing habitat quality. Important existing fisheries in this drainage would benefit substantially in the long-term from road closure-based habitat improvements. These would include: St. Louis, Eustache, Beecher, Soldier, Burnt Fork, Mattie V and Pine Creeks.

**Table 4.14.6. Road Indicators for Project Drainages for All Alternatives.** *Indicators include total road density for drainage, near-channel road density, and stream crossing density.*

| Drainage Name | Indicator 2: Road density (mi/mi <sup>2</sup> ) and (miles of road) |             | % reduction | Indicator 3: Near channel road density (mi/mi <sup>2</sup> ) and (miles of road) |             | % reduction | Indicator 4: Stream crossing density no./mi <sup>2</sup> ) and (number) |             | % reduction |
|---------------|---------------------------------------------------------------------|-------------|-------------|----------------------------------------------------------------------------------|-------------|-------------|-------------------------------------------------------------------------|-------------|-------------|
|               | Alt 1                                                               | Alt 2, 4, 5 |             | Alt 1                                                                            | Alt 2, 4, 5 |             | Alt 1                                                                   | Alt 2, 4, 5 |             |
| Ninemile      | 3.0 (215.2)                                                         | 1.4 (95.6)* | 56          | 0.7 (52.9)                                                                       | 0.4 (26.6)  | 50          | 2.4 (169)                                                               | 1.3 (90)    | 47          |
| Trout Creek   | 2.1 (149.0)                                                         | 1.2 (82.5)  | 45          | 0.6 (44.8)                                                                       | 0.4 (31.0)  | 31          | 2.3 (166)                                                               | 1.3 (94)    | 43          |
| Siegel Creek  | 1.2 (17.9)                                                          | 1.0 (14.5)  | 19          | 0.6 (8.1)                                                                        | 0.5 (7.7)   | 4           | 1.9 (28)                                                                | 1.5 (21)    | 25          |
| First Creek   | 4.3 (34.8)                                                          | 3.5 (28.6)  | 18          | 0.9 (7.3)                                                                        | 0.8 (6.1)   | 16          | 4.7 (38)                                                                | 3.7 (30)    | 21          |

| Drainage Name | Indicator 2: Road density (mi/mi <sup>2</sup> ) and (miles of road) |             | % reduction | Indicator 3: Near channel road density (mi/mi <sup>2</sup> ) and (miles of road) |             | % reduction | Indicator 4: Stream crossing density no./mi <sup>2</sup> and (number) |             | % reduction |
|---------------|---------------------------------------------------------------------|-------------|-------------|----------------------------------------------------------------------------------|-------------|-------------|-----------------------------------------------------------------------|-------------|-------------|
|               | Alt 1                                                               | Alt 2, 4, 5 |             | Alt 1                                                                            | Alt 2, 4, 5 |             | Alt 1                                                                 | Alt 2, 4, 5 |             |
| Johnson Creek | 4.1 (56.5)                                                          | 3.4 (46.2)  | 18          | 0.9 (12.7)                                                                       | 0.8 (11.4)  | 10          | 4.2 (58)                                                              | 3.9 (53)    | 9           |
| Idaho Gulch   | 2.6 (17.2)                                                          | 2.3 (14.8)  | 14          | 1.7 (5.9)                                                                        | 1.5 (5.3)   | 10          | 2.8 (10)                                                              | 2.5 (9)     | 10          |
| Flat Creek    | 2.6 (42.2)                                                          | 2.3 (36.4)  | 14          | 0.8 (12.9)                                                                       | 0.7 (11.4)  | 12          | 2.4 (44)                                                              | 2.4 (38)    | 4           |

- In the Ninemile drainage, Alternatives 4 and 5 would have a slightly higher road density due to differences of proposed closures of Road #18102 in Soldier Creek and Road #18102 in Burnt Fork. Under Alternative 2, portions of these roads would be closed with a Closure Level 3. Under Alternative 4, these roads would be closed yearlong with a gate. Under Alternative 5, these roads would be seasonally closed from October 15 to June 15.

**Trout Creek Drainage:** In Trout Creek, approximately 71 of 150 miles of open road would be closed. Nine out of 14 watersheds in the Trout Creek drainage would have road closures that would reduce road densities from a high classification down to moderate and low density classifications (Table 4.14.6 and Figure 4.14.5). Near-channel road densities for this drainage would be reduced from 0.6 to 0.4 miles/mile<sup>2</sup> (Table 4.14.6 and Figure 4.14.7). Finally, stream crossings in this drainage would be reduced from 166 crossings to 94, resulting in a total road crossing density of 1.3/mile<sup>2</sup> (Table 4.14.6 and Figure 4.14.8).

Like Ninemile, the Trout Creek drainage experienced a substantial spike in sediment yield in 2001 and 2002 from nearly 48 miles of BMP road upgrades and reconstruction that have recently been completed under BAER (Figure 4.14.10)

Watersheds most affected by this work include Lower Trout, Trout Headwaters, Deep, Cement, and Van Ness Creeks.

Considerable sediment yield reduction would occur under Alternatives 2, 4 and 5; however, Alternative 2 would show the greatest reduction (Table 4.14.5 and Figure 4.14.10). This may in part be from less road reconstruction. As with the Ninemile drainage, each alternative would include several road closures between 2002 and 2008, resulting in smaller sediment spikes before the new baseline was achieved. Restoration-

based disturbance could be protracted over a longer period for Alternative 2 if funds were not readily available to complete all of the required closure work. Nearly one third of the 75 miles of that would be closed under Alternatives 2, 4 and 5 would be a level 5 closure (Table 4.14.3)

Reduced sediment delivery from road sources would contribute to improved fish habitat quality by reducing sediment levels in spawning habitats and improving rearing habitat quality via increased pool depth and width to depth ratios. Cement, Eagle Rock, Windfall, Deep and, to a lesser extent Van Ness, watersheds have important fisheries that would benefit from proposed road closure activities. Eagle Rock Creek and Cement Creek, in the Trout Creek drainage, would have low road densities such that over time these systems could become important “refugia-type” watersheds for cutthroat and bull trout as future human-induced disturbance is limited.

**Middle Clark Fork Composite Drainages (Siegel, First, Johnson, Idaho Gulch, and Flat):** Of 170 miles of road, 32 miles would be closed in these drainages. Middle Clark Fork Composite drainages would benefit from road closures, but not as much as the Ninemile or Trout Creek drainages. Only Siegel Creek would have a road density considered favorable for the watershed (Table 4.14.6 and Figure 4.14.6). Flat Creek would be the only other drainage where road density would approach a

moderate level (Table 4.14.6 and Figure 4.14.6). The remaining drainages would have road densities greater than 3 miles/mile<sup>2</sup> (Table 4.14.6). Near-channel road density would be reduced in all Middle Clark Fork Composite drainages (Table 4.14.6 and Figure 4.14.7). Stream crossing density would also be reduced in all of these drainages except Flat Creek (refer to Table 4.14.6 and Figure 4.14.8).

Fisheries benefits from road closure differ among drainages by alternative (Table 4.14.5). Alternative 2 would provide the greatest road-related sediment reduction except in Idaho Gulch, where Alternative 5 would reduce road-derived sediment slightly more (Table 4.14.5). Siegel Creek would show the greatest percent reduction (21 percent) in road sediment of all project drainages (Table 4.14.5 and Figure 4.14.11), which would benefit an important westslope cutthroat trout population. Factors that limit these systems are major riparian roads in the lower end of Flat Creek and along much of Siegel Creek.

Idaho Gulch would show very little sediment reduction benefit compared to other project drainages (Table 4.14.5). Predicted sediment reductions would also be considerable in First Creek drainage (another important westslope cutthroat trout production area) and moderate in Flat and Johnson Creek drainages (Table 4.14.5). In these drainages a long-term sediment reduction trend with two to three intervening sediment spikes above the Alternative 1 baseline would occur coincident with road closures.

The Johnson Creek drainage (and Flat Creek drainage to a lesser extent) was severely impacted by a mudslide in 2000 just after the fires. As a result, measured instream fine sediment levels are the highest of any project drainage in Johnson Creek (Table 3.19.5), and fish production was drastically reduced as a result. However, the additional short-term increases in sediment yield from road closure would not substantially hinder short-term fishery recovery processes any more than has already occurred. In addition, the longer-term benefits of

having roads closed in the Johnson Creek drainage should have long-term benefits.

#### ■ Cumulative Effects

Cumulative effects under Alternative 2 would be similar to those described for Alternative 1, except that restoration activities, including mine site reclamation and road closure and reconstruction would cause short-term increases in sediment production that would interact with other past, ongoing, and predicted sediment sources described under cumulative effects for Alternative 1. However, a net positive effect would occur from reduced long-term sediment yield to streams within the project area. Because the long-term reduction in road-derived and mine-site sediment yield would help offset sediment inputs from other cumulative effect sources in all drainages, this is not expected to be detrimental to production of native fish species in project drainages. Removal of fish passage barriers would increase habitat connectedness and combine with these other watershed improvements to provide for the long-term improvement and maintenance of native fish populations.

#### ■ Determination of Effects

The restoration activities proposed under Alternative 2 would have a greater long-term positive effect on fisheries RMOs and fish population dynamics and persistence than Alternatives 1, 4, and 5. This alternative **may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or reduced viability for the population or species.**

Alternative 2 **may affect, likely to adversely affect** bull trout. Restoration activities would cause short-term disturbance and degradation of some bull trout habitat features. However, these shorter-term effects are not anticipated to further threaten or jeopardize bull trout subpopulations over the long-term and the net effect would be positive. Refer to Appendix F for the matrix of effects on bull trout.

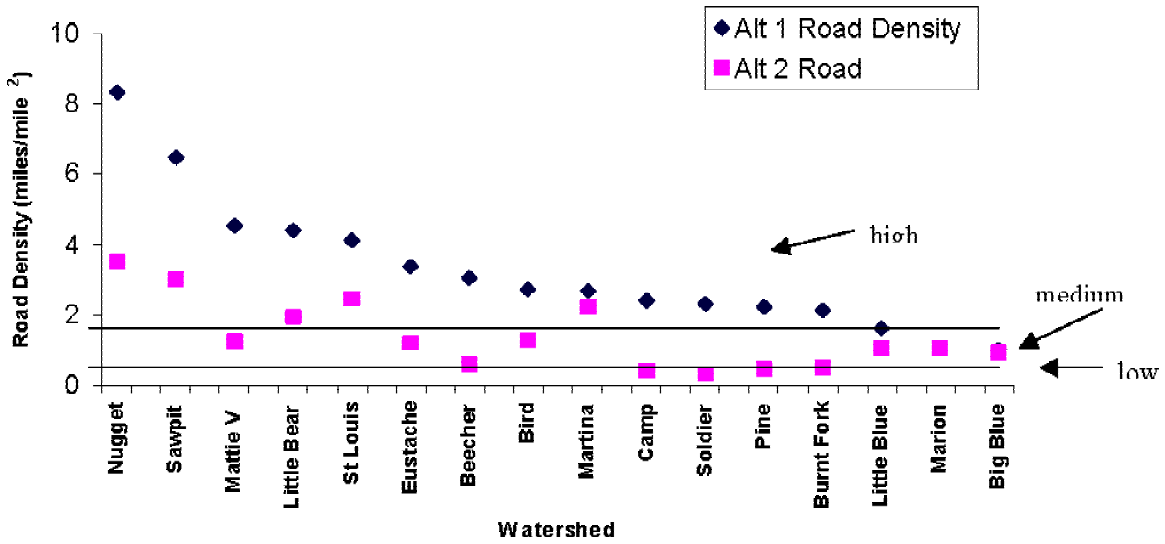


Figure 4.14.4. Road density comparison between Alternative 1 and Alternative 2 for watersheds in the Ninemile Drainage (horizontal lines are divisions of low, moderate and high road densities per Quigley et. al. 1996). Road densities for Alternatives 4 and 5 would be the same as those in Alternative 2, except in Burnt Fork and Soldier Creeks where road densities would be reduced to 0.9 miles/mile<sup>2</sup> and 0.7 miles/mile<sup>2</sup>, respectively.

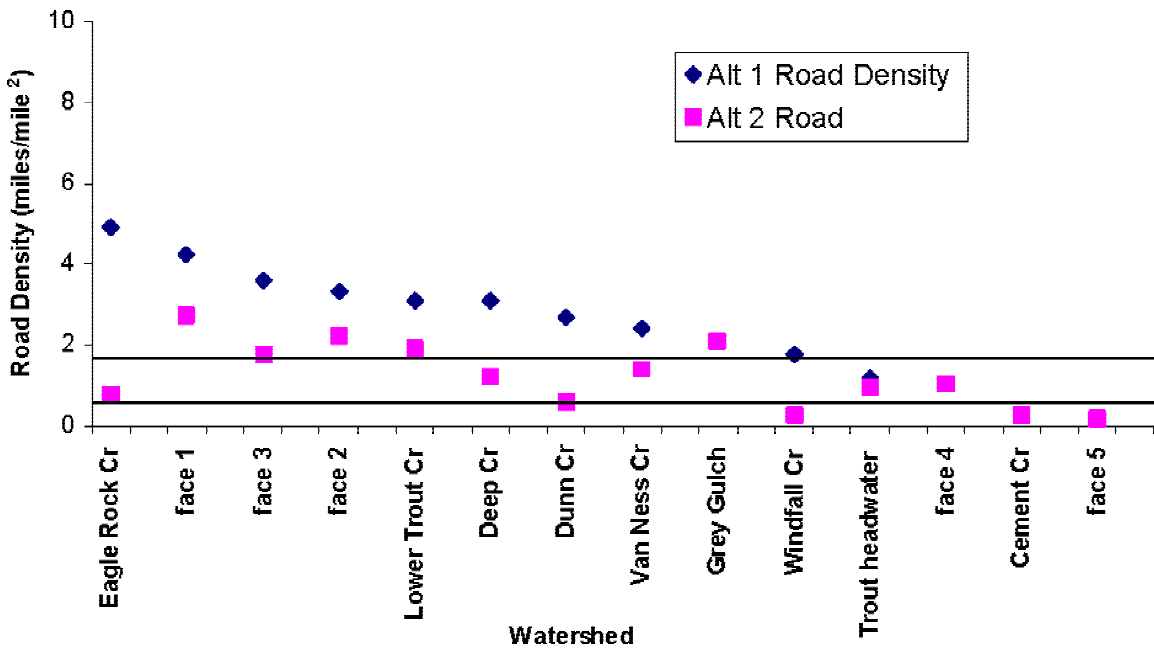


Figure 4.14.5. Road density comparison between Alternative 1 and Alternative 2 for watersheds in the Trout Creek Drainage. Road densities for Alternatives 4 and 5 would be the same as those in Alternative 2.

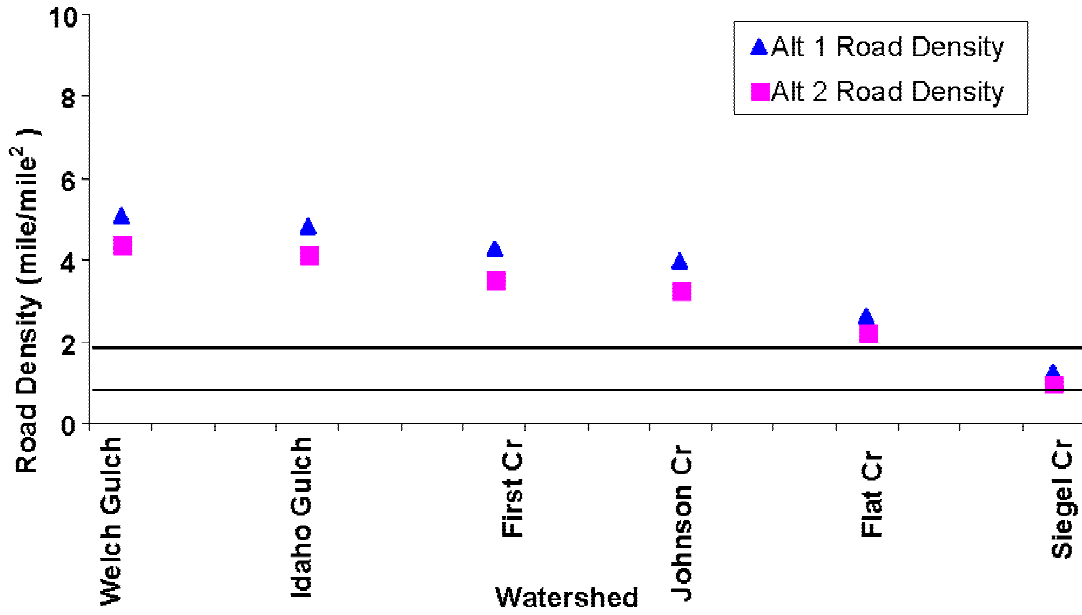


Figure 4.14.6. Road density comparison between Alternative 1 and Alternative 2 for watersheds in the Middle Clark Fork Composite drainages. Road densities in Alternatives 4 and 5 would be the same as those in Alternative 2.

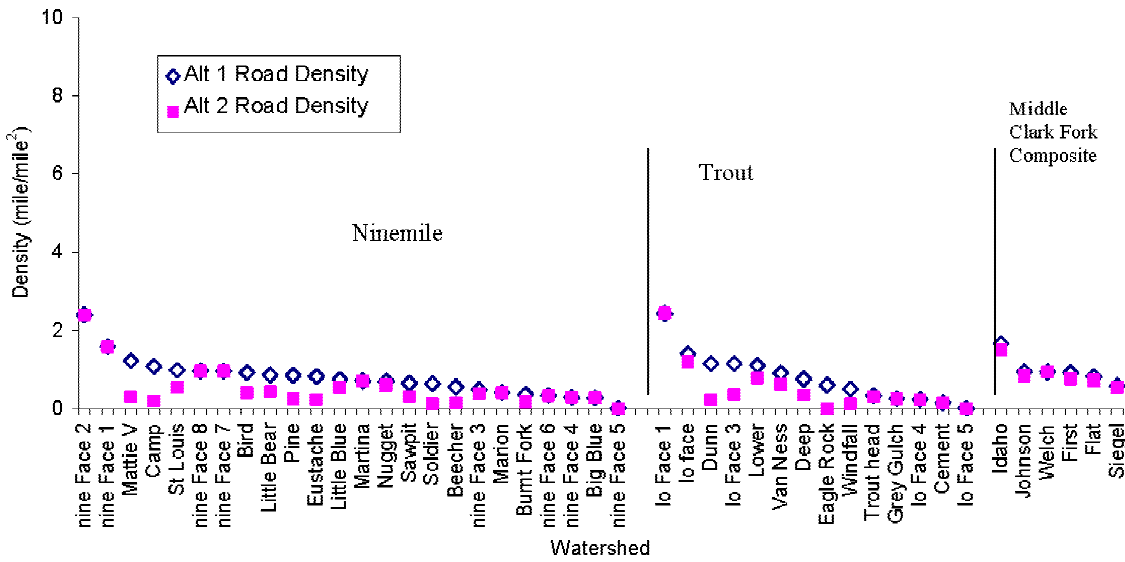


Figure 4.14.7. Road density within 300 feet of stream channel comparison between Alternative 1 and Alternative 2 for all project drainages and watersheds. Road density within 300 feet of stream channels for Alternatives 4 and 5 would be the same as in Alternative 2.

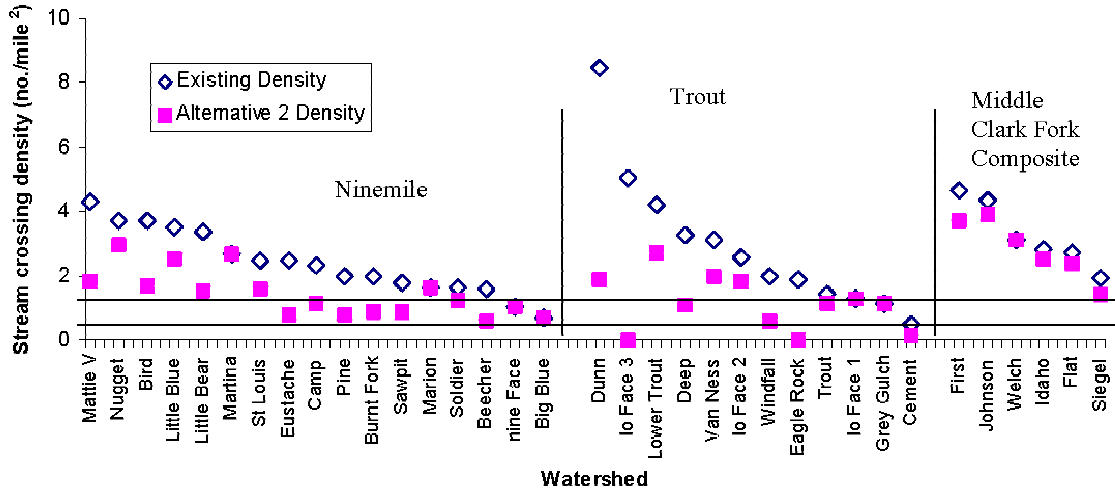


Figure 4.14.8. Comparison of Alternative 1 and 2 stream crossing densities for Ninemile, Trout, and middle Clark Fork Composite and Cutoff drainages. Crossing densities for Alternatives 4 and 5 would be the same as Alternative 2.

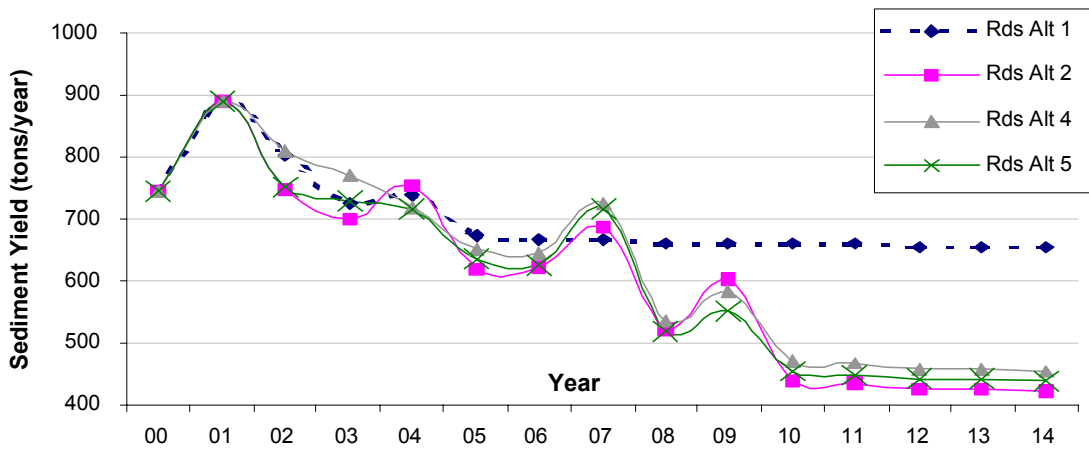


Figure 4.14.9 Comparison of road-derived sediment yield by alternative- Ninemile Creek Drainage

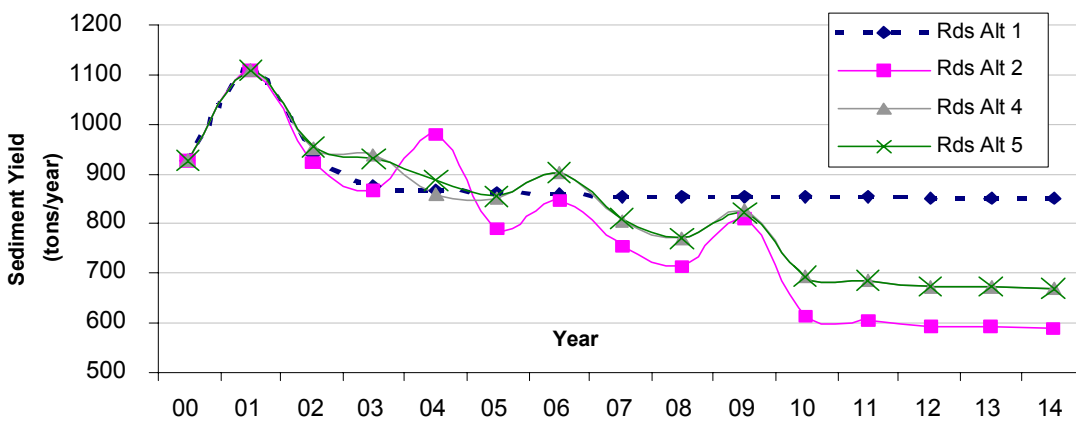


Figure 4.14.10 Comparison of road-derived sediment yield by alternative- Trout Creek Drainage

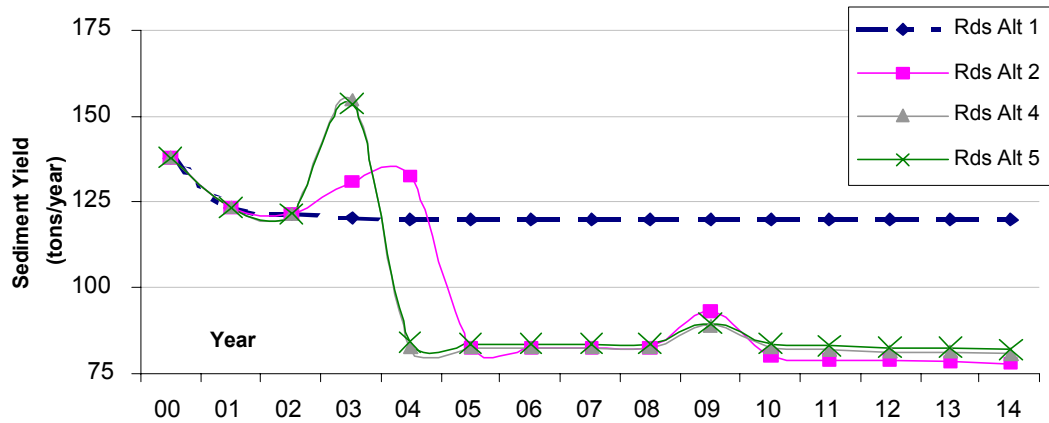


Figure 4.14.11. Comparison of road-derived sediment yield by alternative- Siegel Creek Drainage

#### 4.14.5 Alternative 4

##### Direct and Indirect Effects

##### Roads

Under Alternative 4, approximately 298 miles of roads would be reconstructed to BMP standards and nearly 225 miles of road would be closed. Of the proposed road closures, 52 miles would be fully recontoured (Closure Level 5; Table 4.14.3). Alternative 4 would close essentially the same roads as proposed in Alternative 2, except approximately 20 miles of year-round road closures are proposed for wildlife security. A year-round gated closure does not constitute a “closed” road from a watershed benefits perspective, because it would only mitigate approximately 35 percent of the road impacts. However, vegetation would establish on these gated road surfaces and would provide some hydrologic stability and watershed benefit.

All road densities would be the same as Alternative 2, except that road densities would be slightly higher in Burnt Fork and Soldier Creek watersheds under Alternative 4 (Table 4.14.6). Watershed road densities would be 0.9 miles/mile<sup>2</sup> in Burnt Fork Creek and 0.7 miles/mile<sup>2</sup> in Soldier Creek, slight increases compared to Alternative 2. This is due to changing a level 3 closure to a year-round gated closure on Road #18102 in both watersheds.

Near-channel road densities and stream crossing densities would be the same as Alternative 2 (Table 4.14.6). The short-term road-related

sediment increase, and overall long-term sediment reduction below the Alternative 1 baseline would be similar, although not quite as great in most project drainages as in Alternative 2 (Table 4.14.5). Under Alternative 4, there would be no substantial differences to fish populations and RMOs from Alternative 2 except perhaps in the Soldier and Burnt Fork watersheds. Because Road #18102 would be closed yearlong with a gate instead of a Level 3 Closure, Alternative 4 might not have the extent of benefits as Alternative 2 for these watersheds. Effect differences among these closures for these two watersheds would not likely occur at the drainage scale.

##### Harvest

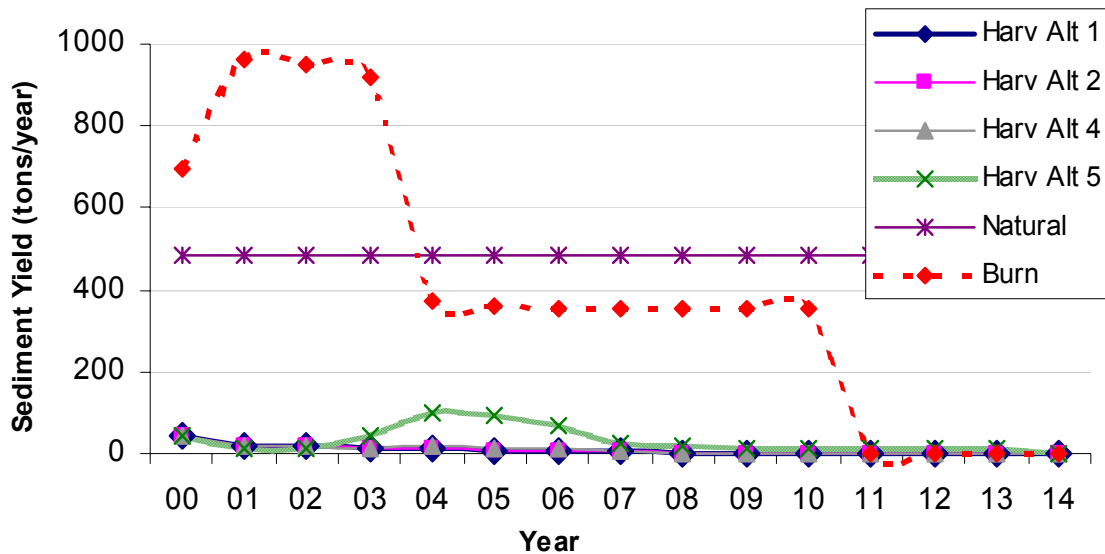
Sediment increases from harvest activities predicted by LOLOSED for this alternative are small compared to other sources (roads, natural, and fire) in most project drainages. See Section 4.6.3 for relative contributions of sediment from harvest. Peaks in harvest-generated sediment would be well below two percent of predicted annual natural sediment baseline for all drainages except Ninemile and Flat Creek (Figures 4.14.12 and 4.14.13). In those drainages, predicted peak annual sediment yield from harvest would be 4.3 percent and 2.9 percent, respectively, of the predicted annual natural sediment baseline. Primary harvest sediment effects would last roughly three years before tapering back toward sediment levels predicted for Alternative 1. In most drainages, small elevations in sediment levels would occur

between 2003 and 2005, following harvest activities in years 2002-2004

Direct effects on fish habitat due to increases in sediment production from harvest would be expected to be minimal. Probably the greatest fisheries concern would be from indirect sediment effects in the Ninemile drainage. Here, interactions among sediment production from high burn severity areas, roads, road reconstruction, and closures, and past harvest activities could amplify the short-term effects of sediment yield from harvest on fish habitats before the beneficial effects of other restoration activities accrue. This could be especially true for watersheds with ECAs greater than 30 percent. Important fisheries watersheds in the Ninemile drainage with existing high ECAs

include Burnt Fork, Beecher and St. Louis Creeks. ECAs in these watersheds suggest that they increased potential for altered hydrological patterns that could lead to added channel instability and sediment delivery and degradation to important fish habitats. Approximately 170 acres, 61 acres, and 54 acres, respectively, would be harvested in the Burnt Fork, Beecher and St. Louis Creek watersheds.

NOTE: In Figures 4.14.12 and 4.14.13, the harvest-derived sediment displayed for Alternatives 1 and 2 comes from the ongoing Shapes and Feathers in Ninemile Creek and recently completed timber sale in Flat Creek. No timber harvest is proposed for Alternatives 1 and 2 in the Post Burn project.



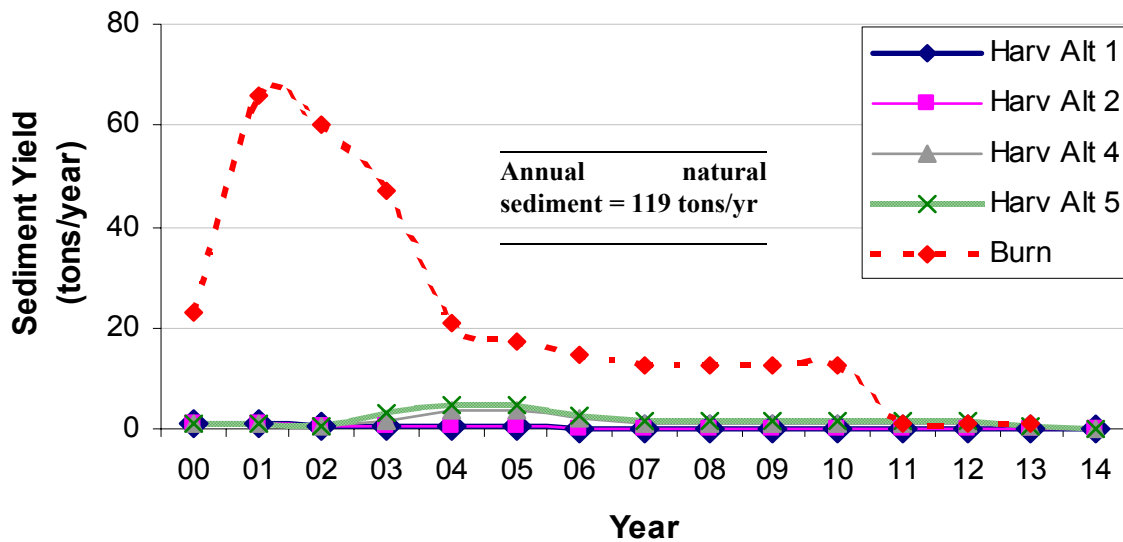
**Figure 4.14.12. Comparison of harvest-derived sediment yield by alternative- Ninemile Creek Drainage**

Two helicopter landings are proposed in Riparian Habitat Conservation Areas (RHCA). One would be in the lower Flat Creek watershed near the mouth of Club Gulch. This landing would serve Unit 180 at the lower end of Flat Creek. There is the potential that some increases in sediment generated from landing sites could reach the stream. However, it is not anticipated that the landing site would cause undue stress on this lower section of stream or its fishery. The main road (Road #194), probably the largest

stressor on the fishery in this section of stream, is within 300 feet of the stream. The helicopter landing would be on the hill slope side of the road away from the stream. The landing site would not result in added loss of large woody debris recruitment to the stream, nor would there be a loss of shading to the stream. In 2001, very few native westslope cutthroat trout were observed in the lower end of this stream. Montana Fish Wildlife and Parks (FWP) also found very few fish in this lower section of

stream (USDA, Forest Service, Project File 2001). The greatest numbers of westslope cutthroat trout were further up in this system above the effects of the road. No bull trout were found in this system in 2001 studies, nor have they been documented as present in the FWP

sampling. Mitigation requirements would ensure that this site was scarified, planted, and that erosion prevention practices were implemented once the operation was complete. No other feasible landing sites would be available.



**Figure 4.14.13. Comparison of harvest-derived sediment yield by alternative- Flat Creek Drainage**

One RHCA helicopter landing is proposed in the Trout Creek watershed. This landing would be located just downstream from the Cement Creek confluence with Trout Creek and would serve Units 700 and 708 in the Cement and Dunn Creek watersheds. This proposed landing site was cleared as a safety zone during fire suppression efforts in the 2000 wildfires. Only the upper half of the landing nearest the road would be used. The lower end of the landing would be approximately 100 feet from the active stream channel. Much of the large woody debris that has been scattered on the site would be piled between the landing and the stream, and a slash filter windrow and silt fence would be installed during the logging operation. Once logging was complete, the site would be scarified, some slash would be redistributed with the majority hauled off site to eliminate the need for burning, and the site would be seeded and mulched. After the operation, a two-track road off Road #250 would be recontoured. This would also eliminate future stream-side camping and disturbance and allow riparian vegetation and adjacent floodplain

surfaces to recover. This disturbance would set back some early recovery, but it is not anticipated that the disturbance would prevent long-term attainment of Riparian Management Objectives. The elimination of the access road to this site and a culvert would provide some long-term benefits to Riparian Management Objectives.

■ **Cumulative Effects**

Cumulative effects would be similar to those described in Alternatives 1 and 2.

Fisheries habitats in many project drainages are recovering from prior disturbance. Under Alternative 4, short-term disturbances from road closures, combined with that from harvest activities, would increase short-term sediment yield before the drainages would begin the longer-term process of recovery. In most cases, project drainages could sustain fisheries during this short-term disturbance without long-term harm. However, in the Ninemile drainage, the

magnitude of cumulative effects would be greater because of the quantity of past mining, timber harvest and road development, which may prolong the recovery process. This could extend the duration of effects on the fisheries resource. The effects of past mining in the St. Louis Creek watershed combined with the effects of fire and past harvest, and proposed harvest and mine site restoration would likely combine for a longer-term effect. This could result in reduced stream stability, and pool and spawning habitat quality.

In the Burnt Fork Creek watershed, the effects on fisheries would be similar to those in St. Louis Creek because of sediment yield from the 2000 wildfires and riparian harvest on private property. The St. Louis and Burnt Fork watersheds have ECAs that suggest that they currently have a greater potential of increased flow and channel instability. However, proposed harvest would have little effect on the existing ECA condition. Short-term sediment related cumulative effects would be minimally greater than those for alternative 2 because of land disturbance from timber harvest.

#### ■ Determination of Effects

Although this alternative would contribute to short-term project effects, since it would be combined with restoration activities, it should not hinder the long-term attainment of RMOs. If there is little future management-based disturbance in project areas (e.g., harvest or additional road construction) over the course of this project, long-term recovery should continue. Long-term sediment reductions benefits would not be as great as those described for Alternative 2, but would still be substantial when compared to Alternative 1.

**Alternative 4 may impact individual westslope cutthroat trout or habitat, but would not likely result in a trend toward federal listing or reduced viability or the population or species.**

**Alternative 4 may affect, likely to adversely affect bull trout.** Restoration and harvest activities would cause short-term disturbance and degradation of some bull trout habitat features. However, these shorter-term effects are not anticipated to further threaten or jeopardize bull trout subpopulations over the long-term and the net effect would be positive. Refer to Appendix F for the matrix of effects on bull trout.

### □ 4.14.6 Alternative 5

#### ■ Direct and Indirect Effects

##### □ Roads

Under Alternative 5, approximately 286 miles of roads would be reconstructed to BMP standards and nearly 225 miles of road would be closed. Of the proposed road closures, 52 miles would be fully recontoured (Closure Level 5; refer to Table 4.14.3). Alternative 5 would close essentially the same roads as proposed in Alternative 2. Unlike Alternative 4, there would be no year-round closures in this alternative.

In addition, there would be approximately 1.7 miles of temporary road constructed to access some timber harvest units. This road would be fully rehabilitated immediately after use. Because these short road segments would be temporary and located on ridge tops or on very shallow slopes, they should have minimal effect on sediment delivery to fish habitat.

All road densities would be the same as Alternative 2 except road densities would be slightly higher for Burnt Fork and Soldier Creek watersheds under Alternative 5 (Table 4.14.6). Watershed road densities would be 0.9 miles/mile<sup>2</sup> in Burnt Fork and 0.7 miles/mile<sup>2</sup> in Soldier Creek under Alternative 5 compared to road densities of 0.5 and 0.3 miles/mile<sup>2</sup> for these watersheds, respectively, under Alternative 2. These road densities would vary due to differences of proposed closures of Road #18102. Under Alternative 2, this road would be closed with a Closure Level 3. Under Alternative 5, this road would be seasonally closed from October 15 to June 15.

Near-channel road densities and stream crossing densities would be the same as Alternative 2 (Table 4.14.6). The short-term sediment increase and long-term sediment reduction would be similar to Alternative 2 (Table 4.14.5). There is actually a greater percent reduction in road-derived sediment in the Ninemile Drainage for Alternative 5 compared to Alternative 4 (Table 4.14.5). Alternative 5 would not differ substantially from Alternative 2 in effects on fish populations and RMOs except in the Soldier Creek and Burnt Fork Creek watersheds. Because Road #18102 would be seasonally closed with a gate instead of a Level 3 Closure,

Alternative 5 might not have the same extent of benefits as Alternative 2 for these watersheds.

**□ Harvest**

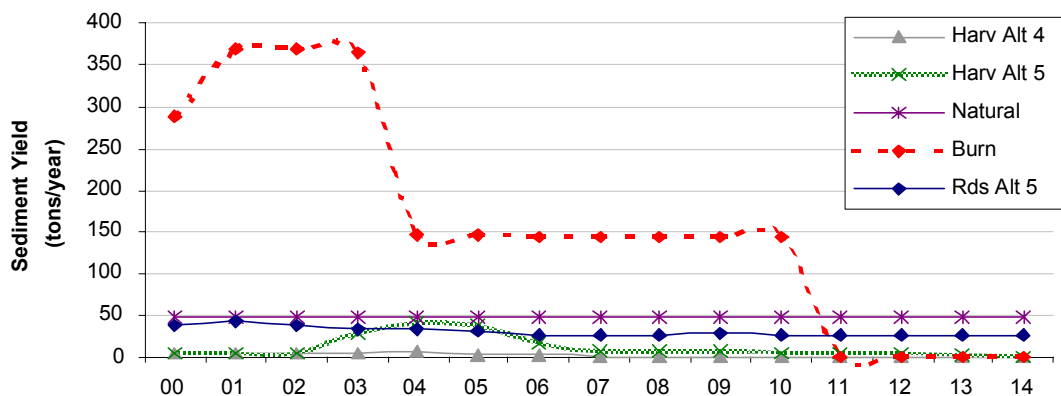
Predicted sediment delivery from harvest activities would be greater than from Alternative 4; however, inputs would still be small compared to fires, roads and natural sediment in most project drainages (Section 4.6.3). The greatest annual peaks in harvest-generated sediment for Siegel, Johnson, and Idaho Gulch drainages would be less than two percent of the predicted annual natural sediment baseline for these drainages. The greatest annual peaks in harvest-generated sediment for Trout, First and Flat Creek drainages would range from three to four percent of the predicted annual natural sediment baseline for these drainages. In the Ninemile drainage, harvest-generated sediment would increase to just over 20 percent of the predicted natural sediment baseline in 2004 (Figure 4.14.12). This increase would likely have the greatest potential for short-term (2-3 year) negative effects on fisheries habitat in watersheds where the greatest amount of harvest would occur (e.g., Burnt Fork and Beecher Creek watersheds). The temporal trends in sediment yield from harvest-based activities for Alternative 5 would mirror those described for Alternative 4.

The effects of helicopter landings would be similar to those described under Alternative 4. Added disturbance at these sites could occur as a result of added harvest and use of the landing under Alternative 5.

A considerable amount of the total timber harvest in Ninemile is proposed in three watersheds with important existing fisheries resources. These watersheds are Burnt Fork, Beecher, and St. Louis Creeks. Approximately 400 acres, 280 acres, and 240 acres, respectively, would be harvested in these watersheds. In Burnt Fork, sediment yield from harvest from 2003 to 2006 would approach that from natural sources. This harvest-based yield would occur coincident with the first step reduction in fire-based sediment sources, which is still considerably greater than harvest-derived yields in this watershed (Figure 4.14.14). Sediment yield from roads would be greater than that from harvest. A near identical trend in sediment yield from harvest versus fire and natural sources would occur in Beecher Creek (Figure 4.14.15).

In the St. Louis Creek watershed, sediment yield from harvest activity would be considerably less than that derived from natural and road sources compared to Burnt Fork and Beecher Creek (Figure 4.14.16). In addition, the contribution to total sediment from fire in St. Louis Creek is not nearly as great in the Burnt Fork and Beecher Creek watersheds.

Additional input of sediment yield would have a deleterious effect on fish resources in Burnt Fork, Beecher, and St. Louis Creek watersheds. The amount of instream fine sediment could increase over the short term in these systems and have the potential to reduce survival and growth of cutthroat trout as sediment accumulates in spawning riffles and rearing habitat such as pools.



**Figure 4.14.14. Comparison of harvest-derived sediment yield by alternative- Burnt Fork Creek Watershed, Ninemile Drainage**

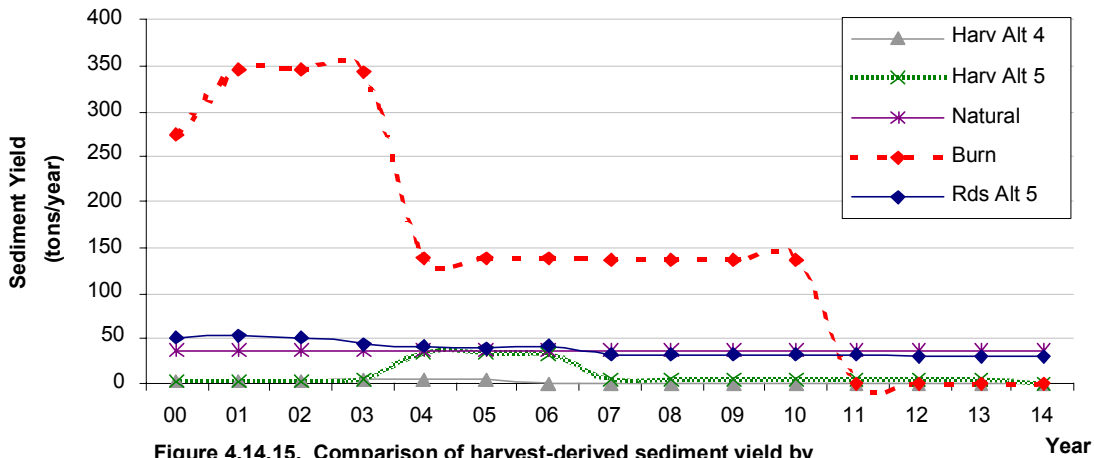


Figure 4.14.15. Comparison of harvest-derived sediment yield by alternative- Beecher Creek Watershed, Ninemile Drainage

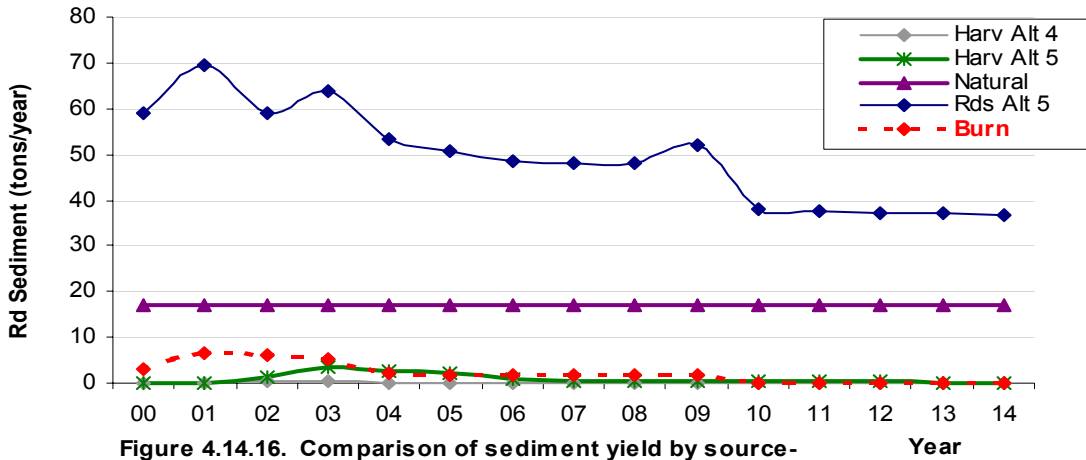


Figure 4.14.16. Comparison of sediment yield by source- St. Louis Creek Watershed, Ninemile Drainage

Sediment yield from harvest for the project under Alternative 5 would be about 2.7 times greater than that for Alternative 4. However, in just the Burnt Fork, Beecher, and St. Louis watersheds, Alternative 5 harvest is estimated to generate roughly 5.6 times more sediment than that for Alternative 4. However, as mentioned in the roads discussion above, the Ninemile drainage experiences a greater percent sediment reduction from road closures than that for Alternative 4.

■ **Cumulative Effects**

The cumulative effects would be similar to those described for Alternative 4. However, there would be additional cumulative effects associated with the Shapes and Feathers timber

sale in the Ninemile drainage under this alternative. Under Alternative 5, about 300 acres would be salvaged in the Sawpit watershed. While no increase in ECA should result from this activity, the existing ECA in this watershed is already high (32 percent), with 22 percent resulting from past timber harvest. This indicates the watershed has a greater potential for alteration in hydrology, which could indirectly affect fish habitat through increased sediment delivery. Also, under this alternative, sediment-related cumulative effects would be greater than those described in Alternative 4 because of the greater level of harvest that would occur, especially in Ninemile drainage watersheds. Negative cumulative effects from elevated sediment yield under this alternative should be

short term, and not irreversibly detrimental to fish habitat or populations. As road-related restoration benefits accrue at the drainage scale, a new, and lower sediment baseline would be established in all projects drainages .

■ **Determination of Effects**

Alternative 5 would have greater short-term sediment related effects on fish habitats and populations than Alternatives 2 and 4, although the long-term benefits in sediment reduction would be substantial. Although harvest activities associated with this alternative would contribute to added short-term project effects, the associated restoration activities would provide substantial overall sediment reduction benefits to fish habitat. This alternative would not hinder the long-term attainment of RMOs if future management-based disturbance (i.e., road building or harvest) in the watersheds within the project is minimized over the duration of this project. Alternative 5 **may impact individual westslope cutthroat trout or habitat, but will not likely contribute to a trend toward federal listing or reduced viability for the population or species.**

Alternative 5 **may affect, likely to adversely affect** bull trout. Restoration and harvest activities would cause short-term disturbance and degradation of some bull trout habitat features. However, these shorter-term effects are not anticipated to further threaten or jeopardize bull trout subpopulations over the long-term and the net effect would be positive. Refer to Appendix F for the matrix of effects on bull trout.

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■ **4.15 Recreation**

□ **4.15.1 Effects Common to All Alternatives**

■ **Recreation Use Patterns**

The broader scale patterns and types of recreation uses would not change appreciably under any of the alternatives. Relatively low density recreation uses such as driving for pleasure, dispersed camping, firewood gathering, hunting, cross country skiing, snow shoeing, berry picking, hiking and horseback riding would continue to occur across all of the fire

areas. There would be no change to the designated Recreation Opportunities Spectrum (ROS) for any of the affected areas. The Ninemile, Flat, and Landowner Fire areas would continue to offer mostly roaded natural recreation opportunities, while the Alpine Fire area would provide mostly semi-primitive, motorized opportunities. On the Lolo National Forest, off highway vehicle (OHV) travel off system roads or designated trails is already prohibited. Through a 1999 Forest Supervisor’s Order, Management Areas 11 and 12 are closed to snowmobile use off designated routes. This accounts for about 15,656 acres of land within the analysis area.

■ **Recreation Safety**

Standing fire-killed trees will present a safety concern for recreationists and a continuing maintenance problem along certain trails. This is particularly true of segments of the Reservation Divide (#98), Burnt Fork (#418), Ninemile Divide (#51), Idaho Gulch (#157), and Landowner Mountain (#621) Trails.

■ **Firewood Gathering**

The popularity of firewood gathering is likely to increase under all alternatives. So long as fire-killed trees remain near open roads, there are likely to be increased levels of firewood collection. This is expected to diminish after several years, when the supply is depleted near roads.

■ **Hunting**

Increased forage production may increase deer and elk numbers in the burned areas somewhat in coming years. It is likely that this and the more open nature of the stands may increase big game hunting opportunities.

■ **Forest Plan**

Though no Forest Plan standards specifically apply to this project, implementation of any of the alternatives would be consistent with the broad goals and objectives of the Lolo National Forest Land and Resource Management Plan. In a general way, those goals of the Forest Plan that relate to providing a pleasing and healthy environment for Forest visitors would be better met in Alternatives 2, 4 and 5, which propose restoration activities.

## 4.15.2 Alternative 1

### ■ Direct and Indirect Effects

Under Alternative 1, the current system of open, closed, and seasonally restricted roads would remain in place. Within the analysis areas, approximately 321 and 40 miles are open yearlong and seasonally to motorized use, respectively. However, of this total road mileage, about 22 miles are impassible due to dense vegetation encroachment.

On the Lolo National Forest, OHV travel off system roads or designated trails is prohibited. Snowmobile use would continue to be allowed or restricted as it currently is. Approximately 16,839 acres within the analysis area are currently closed to snowmobile use. For the most part, current snowmobile routes are located on existing roads. In some locations, the 2000 fires have reduced tree densities to the extent that snowmobiling is beginning to occur off roads in burned areas. In the short term, this is likely to expand as other snowmobilers learn about the areas, but will diminish in coming years as forest regrowth makes travel difficult.

## 4.15.3 Alternative 2

### ■ Direct and Indirect Effects

In this alternative, approximately 279 miles of road in the analysis area would have reconstruction/BMP work done. As a by-product of this work, recreationists would find roads less rutted and in better driving condition than they now sometimes are. In order to achieve the land restoration objectives of this alternative, about 224 miles of road would be decommissioned and closed to public motorized use. Of this total, roughly one-half are currently not drivable due to vegetation encroachment. Most of the road closures would occur in the Ninemile and Trout Creek drainages. Included among these is the Eustache Creek Road (#97). To help provide alternate road access, Forest Road #9920, which is currently gated and closed yearlong, would be re-opened on a seasonal basis for a driving connection between the Ninemile and Flat Creek drainages. In addition, about 11 miles of road that are currently open yearlong to motorized travel would be gated and closed seasonally for resource protection.

In implementing Alternative 2, the restriction of OHVs to open roads would be expanded to include snowmobiles. This would be done in order to reduce the potential for noxious weed spread, to minimize soil erosion, and to lessen disturbances to wildlife. In total, about 34,613 acres of non-road areas would be closed to snowmobile use.

Under this alternative, about one mile of the Burnt Fork Trail (#418) would be stabilized. This drainage improvement work would be done to help reduce erosion and sedimentation.

## 4.15.4 Alternative 4

### ■ Direct and Indirect Effects

In most respects, this alternative is very similar to Alternative 2 in terms of its effects on the recreation resource. Only those items that differ are noted below.

Alternative 4 would involve reconstruction/BMP work on about 298 miles of system roads. In order to meet wildlife objectives, gated seasonal closures would be instituted on about 14 miles of roads, and gated, yearlong closures would occur on about 20 miles of road.

## 4.15.5 Alternative 5

### ■ Direct and Indirect Effects

This alternative is also very similar to Alternative 2 with respect to its effects on recreation. Again, only those effects that differ from Alternative 2 are noted below.

Alternative 5 would involve reconstruction/BMP work on about 286 miles of system roads. Implementation of this alternative would also provide for gated seasonal closure of about 14 miles of roads that are currently open.

## 4.15.6 Cumulative Effects of All Alternatives

The major past effect that continues to affect the recreation opportunities in the analysis area is the relatively extensive network of roads. Consequently, recreation opportunities are and will continue to be of a more developed nature (semi-primitive, motorized and roaded natural

ROS). Approximately 15,656 acres within the project area, allocated as Management Areas 11 or 12, is closed to snowmobiles operating off roads and designated trails. These restrictions are in addition to the closure that would be implemented under Alternatives 2, 4, or 5. Present and reasonably foreseeable future effects include a general increase in recreation use as the population in surrounding areas continues to grow.

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## ■ 4.16 SocioEconomic Setting

### □ 4.16.1 Introduction

This section displays the economic information for each alternative. Present Net Value (PNV) is used as an indicator of economic efficiency. Present Net Value combines benefits and costs that occur at different times and discounts them into an amount that is equivalent to all economic activity occurring in a single year. Other economic indicators are: timber volume harvested; proportion of harvest by yarding system; sale value of the timber stumpage and costs of various restoration treatments. Economic impacts are displayed as employment and employee compensation estimated to result from implementation of each alternative.

#### ■ Economic Efficiency

Economic efficiency considers the benefits and costs associated with implementing each alternative. This analysis displays market costs and benefits, although there are many non-market benefits and costs that are not assigned dollar values. Examples of non-market benefits that are not included in this analysis are watershed and wildlife habitat restoration, application of Best Management Practices (BMPs) to project area roads, and activities to reduce the spread of noxious weeds. Examples of non-market costs are erosion, visual quality degradation, and invasion of weeds onto National Forest land. This section focuses on the market costs and benefits of implementing the alternatives and relies on the various other resource sections of this chapter to identify the non-market benefits and costs that implementation would produce. For example, under Alternatives 2, 4 and 5, noxious weed

management would cost \$133,800. The other resource sections in this chapter discuss the qualitative non-market benefits of this activity while this economic report shows the market costs. Table 4.16.1 displays the Present Net Value (PNV) of each category of activities included in each alternative, and the Total PNV for each alternative. The cost of environmental document preparation is assigned to each alternative, including the Alternative 1, because those costs are incurred regardless of the final alternative chosen in the Record of Decision.

Management of the forest is expected to yield positive benefits, but not necessarily financial benefits. Economic effects are assessed within the managerial context of the Lolo National Forest Plan, as a part of an integrated approach to multiple-use management. Net public benefits represent the sum of priced outputs (PNV) plus the net benefit of non-priced outcomes. Net public benefits cannot be expressed as a dollar value because many of the outcomes of management are not quantifiable in monetary terms (USDA Forest Service, 1987a)

#### ■ Economic Impacts

Economic impacts in this analysis are displayed in Table 4.16.2 as employment and employee compensation estimated to result from the implementation of each alternative. Estimates of job and income impacts were made with IMPLAN Input-Output models (IMPLAN, 1999). IMPLAN estimates combine direct, indirect and induced effects into the total impact. The measure for “jobs” includes both full and part-time jobs. The measure for “income” is employee compensation. Impact areas (the counties affected by implementation) were based on U.S. Department of Commerce, Bureau of Economic Analysis, Economic Areas (Johnson, 1995). These areas are defined as functioning economies based on commuting patterns. Each economic area includes, as far as possible, both the place of work and the place of residence of the labor force. For this study, the impact area is approximately western Montana, comprised of the ten counties surrounding the cities of Missoula, Hamilton, Kalispell and Polson. These counties include Flathead, Granite, Lake, Lewis and Clark, Lincoln, Mineral, Missoula, Powell, Ravalli, and Sanders. The job and income estimates reflect the level of economic activity in the impact area if all of the management activities included in the alternative

were to occur in a single year. Most of the activity would actually take place over a period of three to five years, but some of the activities may extend beyond this time frame. While useful for comparison from one alternative to another, the actual job and income activity in the impact area would be much less in any given year than the figure displayed in Table 4.16.2. For example, Alternative 5 forest management related economic activity may peak in year 2004 at 250 to 300 jobs and then taper off until all activities were completed sometime after year 2006. The employment figure of 927 shown in the table would be the total of both full and part-time jobs spread over the entire implementation period. Table 4.16.3 shows job and income impacts associated with each category of activity included with each alternative.

#### 4.16.2 Analysis Methods

The analysis displays the project-level financial attributes (predicted costs and revenues) of each alternative. Alternatives 4 and 5 would include timber harvest. The appraisal system (TSPAS) estimates the predicted stumpage value of timber sales as if the sales were sold in June of 2002. The actual appraised value of forest products will change between now and the time any projects were actually advertised for bids because of constant changes in stumpages market prices.

Costs for various vegetation and road management activities are based on experienced costs and professional judgment. Non-harvest costs are included in the PNV analysis, but they are not included in appraised timber value.

Non-commodity values were not included in this analysis because these resources are evaluated under each specific resource section. Title 40, Code of Federal Regulations for NEPA (40 CFR 1502.23) indicated "For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations". Effects on resources are documented in individual resource sections in this chapter.

Additional information on unit costs and sale revenues used to develop PNV estimates, TSPAS spreadsheets and spreadsheets to summarize IMPLAN employment and income impacts are included in the Project File.

#### 4.16.3 Effects Common to All Alternatives

The estimated cost of environmental document preparation, \$1,000,000, is applied to each alternative because whichever alternative is implemented; those costs will have been incurred. By comparing the cost of each management activity with the level of outcomes and the description of effects in each resource section of this chapter, the reader can get a sense of any tradeoffs associated with the activity. Timber harvest is the only proposed activity that has a revenue component as well as costs. Proposed reforestation, road and habitat improvements, and other activities only have a cost component.

State and local economies would be directly and indirectly affected by the monetary inputs this project represents. Timber products provided to the raw material markets through direct timber sales would contribute to the continuing operation of regional lumber and veneer mills. This would add directly and indirectly to the local and state economies through employment and tax revenues. This project represents opportunity for input to local and regional economies because of the proposed harvest, road, and restoration activities. Employment opportunities in the wood products industries would be available. Employment would also be available in the reforestation, road and weed spraying projects, watershed restoration and abandoned mine and heritage site restoration activities.

#### **Changes Between Draft and Final EIS**

Between the Draft and Final EIS, additional site specific information was provided on estimated fuel treatment costs that would be necessary following timber harvest, primarily in the Nine Mile drainage. The estimated costs were lower than those used in the draft, and as a result, stumpage price estimates shown in Tables 4.16.4a and b and 4.16.5a and b are now higher.

#### 4.16.4 Alternative 1

Alternative 1 would produce no economic outputs. There would be no return on the \$1,000,000 cost of environmental study. The

\$19,200 cost of mushroom permitting and monitoring would be incurred regardless of alternative. No timber volume is harvested in this alternative, and no acres treated for reforestation. Present Net Value of the project is - \$1,000,000 that includes stand exams, transportation planning and analysis and documentation, all in preparation of the environmental document. Economic impacts are minimal when compared to other alternatives.

**4.16.5 Alternative 2**

Alternative 2 would accomplish some of the same management activities as Alternatives 4 and 5, with the exception of timber harvest and a small difference in total road restoration work. The total PNV for this alternative is estimated at -\$7,575,000 (refer to Table 4.16.1) and the impact would be 184 jobs and \$2,526,000 in employee compensation (refer to Table 4.16.2).

**4.16.6 Alternative 4**

Alternative 4 would include restoration activities and timber harvest. An estimated 24,976 CCF (11,353 MBF) of timber volume would be offered for sale. If all of the offered timber volume were sold, this alternative would provide an estimated 515 jobs and \$7,540,000 in employee compensation (refer to Table 4.16.2). Although this represents a 180 percent increase in employment over Alternative 2, the employee compensation would be a 198 percent increase because the additional jobs associated with timber harvesting and processing are higher paying jobs than those in Alternative 2. Detailed sale information in Table 4.16.4a and b, shows that under current market conditions, June 2002, the estimated stumpage value for the three largest sales would be negative. An estimated negative stumpage value is an indication that the sale may not have any bids when offered, depending on market conditions at the time the sales were offered. The high proportion of helicopter yarding (64 percent) is one important reason for the negative stumpage value estimate on the three sales. While helicopter yarding is

usually a more expensive way to harvest timber, it is often done to provide a higher level of resource protection than conventional land-based yarding systems such as tractor or skyline. An estimated \$69,300 of timber revenue would be available to pay part of the \$1,391,200 in road restoration cost for Alternative 4. The PNV for this alternative is estimated to be -\$10,183,000 (refer to Table 4.16.1), \$2,608,000 more negative than Alternative 2, largely because of a - \$825,700 PNV for the timber sales and 2,003,000 in costs for reforestation.

**4.16.7 Alternative 5**

Alternative 5 would include restoration activities and timber harvest. An estimated 81,076 CCF (36,853 MBF) of timber volume would be offered for sale. If all the timber volume were sold and harvested, this alternative would provide an estimated 927 jobs and \$16,992,000 in employee compensation (refer to Table 4.16.2). This represents an 80 percent increase in employment and 125 percent increase in employee compensation over Alternative 4. Detailed sale information for Alternative 5 in Table 4.16.5a and b shows that under current market conditions the estimated stumpage value for the Landowner sale would be slightly negative at -\$2.40/CCF. The estimated negative stumpage values with this alternative are less negative than those in Alternative 4. The proportion of volume harvested by helicopter, 38 percent, would be much less with this alternative than Alternative 4. An estimated \$1,579,000 in timber revenue would be available to pay part of the \$1,693,000 in road restoration cost for Alternative 5. The PNV for this alternative is estimated to be -\$9,229,000, \$1,654,000 more negative than Alternative 2, and \$953,000 less negative than Alternative 4 (refer to Table 4.16.1). The timber harvest proposals in this alternative would be more efficient than those proposed in Alternative 4, and this is reflected in the fact that the estimated PNV for all timber sales is \$148,000, \$973,000 more positive than Alternative 4.

**Table 4.16.1. Economic Efficiency Comparison of Alternatives**

| <b>Timber Sale</b>    | <b>Alternative 1</b> | <b>Alternative 2</b> | <b>Alternative 4</b> | <b>Alternative 5</b> |
|-----------------------|----------------------|----------------------|----------------------|----------------------|
| <b>Upper Ninemile</b> |                      |                      |                      |                      |
| Acres                 | 0                    | 0                    | 596                  | 1,127                |

| <b>Timber Sale</b>          | <b>Alternative 1</b> | <b>Alternative 2</b> | <b>Alternative 4</b> | <b>Alternative 5</b> |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|
| Volume (CCF)                | 0                    | 0                    | 7,885                | 18,279               |
| Percent Helicopter Yarding  | 0                    | 0                    | 79%                  | 51%                  |
| Predicted High Bid (\$/CCF) | 0                    | 0                    | -\$51.49             | -\$6.67              |
| Total Timber Value (\$1000) | 0                    | 0                    | -\$406.0             | -\$122               |
| Total Sale PNV (\$1000)     | 0                    | 0                    | -\$593.3             | -\$587.8             |
| <b>Alpine</b>               |                      |                      |                      |                      |
| Acres                       | 0                    | 0                    | 91                   | 972                  |
| Volume (CCF)                | 0                    | 0                    | 1,776                | 20,138               |
| Percent Helicopter Yarding  | 0                    | 0                    | 0%                   | 17%                  |
| Predicted High Bid (\$/CCF) | 0                    | 0                    | \$46.40              | \$49.53              |
| Total Timber Value (\$1000) | 0                    | 0                    | \$82.4               | \$997                |
| Total Sale PNV (\$1000)     | 0                    | 0                    | \$33.5               | \$440.7              |
| <b>St. Louis</b>            |                      |                      |                      |                      |
| Acres                       | 0                    | 0                    | 41                   | 79                   |
| Volume (CCF)                | 0                    | 0                    | 589                  | 1,092                |
| Percent Helicopter Yarding  | 0                    | 0                    | 0%                   | 0%                   |
| Predicted High Bid (\$/CCF) | 0                    | 0                    | \$19.56              | \$16.04              |
| Total Timber Value (\$1000) | 0                    | 0                    | \$11.5               | \$18                 |
| Total Sale PNV (\$1000)     | 0                    | 0                    | -\$4.1               | -\$11.3              |
| <b>Siegel</b>               |                      |                      |                      |                      |
| Acres                       | 0                    | 0                    | 34                   | 278                  |
| Volume (CCF)                | 0                    | 0                    | 316                  | 3,839                |
| Percent Helicopter Yarding  | 0                    | 0                    | 0%                   | 0%                   |
| Predicted High Bid (\$/CCF) | 0                    | 0                    | \$14.44              | \$46.24              |
| Total Timber Value (\$1000) | 0                    | 0                    | \$4.6                | \$178                |
| Total Sale PNV (\$1000)     | 0                    | 0                    | -\$3.8               | \$71.9               |
| <b>Pine</b>                 |                      |                      |                      |                      |
| Acres                       | 0                    | 0                    | 0                    | 50                   |
| Volume (CCF)                | 0                    | 0                    | 0                    | 330                  |
| Percent Helicopter Yarding  | 0                    | 0                    | 0                    | 0%                   |
| Predicted High Bid (\$/CCF) | 0                    | 0                    | 0                    | -\$11.06             |
| Total Timber Value (\$1000) | 0                    | 0                    | 0                    | -\$4                 |
| Overall PNV (\$1000)        | 0                    | 0                    | 0                    | -\$12.0              |
| <b>Sunrise</b>              |                      |                      |                      |                      |
| Acres                       | 0                    | 0                    | 0                    | 19                   |
| Volume (CCF)                | 0                    | 0                    | 0                    | 390                  |
| Percent Helicopter Yarding  |                      |                      | 0                    | 0%                   |

| <b>Timber Sale</b>                                       | <b>Alternative 1</b> | <b>Alternative 2</b> | <b>Alternative 4</b> | <b>Alternative 5</b> |
|----------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|
| Predicted High Bid (\$/CCF)                              | 0                    | 0                    | 0                    | \$26.00              |
| Total Timber Value (\$1000)                              | 0                    | 0                    | 0                    | \$10                 |
| Total Sale PNV (\$1000)                                  | 0                    | 0                    | 0                    | -\$0.3               |
| <b>Landowner</b>                                         |                      |                      |                      |                      |
| Acres                                                    | 0                    | 0                    | 341                  | 654                  |
| Volume (CCF)                                             | 0                    | 0                    | 3,718                | 9,346                |
| Percent Helicopter Yarding                               | 0                    | 0                    | 68%                  | 71%                  |
| Predicted High Bid (\$/CCF)                              | 0                    | 0                    | -\$3.87              | -\$2.40              |
| Total Timber Value (\$1000)                              | 0                    | 0                    | -\$14.4              | -\$22                |
| Total Sale PNV (\$1000)                                  | 0                    | 0                    | -\$109.5             | -\$262.1             |
| <b>Flat Creek</b>                                        |                      |                      |                      |                      |
| Acres                                                    | 0                    | 0                    | 830                  | 1,666                |
| Volume (CCF)                                             | 0                    | 0                    | 10,692               | 27,662               |
| Percent Helicopter Yarding                               | 0                    | 0                    | 82%                  | 53%                  |
| Predicted High Bid (\$/CCF)                              | 0                    | 0                    | -\$16.66             | \$27.27              |
| Total Timber Value (\$1000)                              | 0                    | 0                    | -\$178.2             | \$754                |
| Total Sale PNV (\$1000)                                  | 0                    | 0                    | -\$446.5             | \$13.3               |
| <b>Alternative Totals</b>                                |                      |                      |                      |                      |
| Acres                                                    | 0                    | 0                    | 1,933                | 4845                 |
| Volume (CCF)                                             | 0                    | 0                    | 24,976               | 81,076               |
| Total Timber Sale Revenue (\$1000)                       | 0                    | 0                    | -\$500.1             | \$1,809              |
| Total Sale PNV (\$1000)                                  | 0                    | 0                    | -\$189.6             | \$2324.0             |
| Reforestation Cost PNV (\$1000)                          | 0                    | 0                    | -\$2,003.0.0         | \$2,003.0            |
| Watershed Restoration/Mine Site Reclamation PNV (\$1000) | 0                    | -\$1,510             | -\$1,510             | -\$1,510             |
| Heritage Protection PNV (\$1000)                         | 0                    | -\$50.2              | -\$50.2              | -\$50.2              |
| Road Rehabilitation PNV (\$1000)                         | 0                    | -\$4,088.9           | -\$3,868.2           | -\$3,888.1           |
| Noxious Weed Management PNV (\$1000)                     | 0                    | -\$123.7             | -\$123.7             | -\$123.7             |
| Mushroom Permitting and Monitoring PNV (\$1000)          | -\$19.2              | -\$19.2              | -\$19.2              | -\$19.2              |
| Planning (NEPA) costs (\$1000)                           | -\$1000              | -\$1000              | -\$1000              | -\$1000              |
| <b>Overall PNV for Alternative (\$1000)</b>              | <b>-\$1000</b>       | <b>-\$7,575</b>      | <b>-\$10,182</b>     | <b>-\$9,229</b>      |

**Table 4.16.2. Economic Impacts Comparison of Alternatives**

|                               | Alternative 1 | Alternative 2 | Alternative 4 | Alternative 5 |
|-------------------------------|---------------|---------------|---------------|---------------|
| <b>Employment<sup>1</sup></b> |               |               |               |               |
| Private Sector                | 0             | 152           | 466           | 855           |
| Forest Service                | 15            | 33            | 48            | 72            |
| <b>Total</b>                  | 15            | 184           | 515           | 927           |
| <b>Employee Compensation</b>  |               |               |               |               |
| Private Sector                | \$0           | \$2,002,000   | \$6,763,000   | \$15,827,000  |
| Forest Service                | \$242,000     | \$525,000     | \$778,000     | \$1,165,000   |
| <b>Total</b>                  | \$242,000     | \$2,526,000   | \$7,540,000   | \$16,992,000  |

<sup>1</sup>Employment includes both full and part-time jobs

**Table 4.16.3 Job and Income Impacts by Management Activity**

| ECONOMIC IMPACTS                                       | Alternative 1  |                | Alternative 2  |                | Alternative 4  |                | Alternative 5  |                |
|--------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                                                        | Forest Service | Private Sector | Forest Service | Private Sector | Forest Service | Private Sector | Forest Service | Private Sector |
| <b>Forest Products</b>                                 |                |                |                |                |                |                |                |                |
| <b>Jobs</b>                                            | 0.0            | 0.0            | 0              | 0              | 12             | 173            | 35             | 559            |
| <b>Employee Compensation (\$1000)</b>                  | \$0.0          | \$0.0          | \$0            | \$0            | \$179          | \$4,024        | \$562          | \$13,057       |
| <b>Road Restoration-BMPs, Culverts &amp; Surfacing</b> |                |                |                |                |                |                |                |                |
| <b>Jobs</b>                                            | 0.0            | 0.0            | 10             | 63             | 10             | 62             | 10             | 63             |
| <b>Employee Compensation (\$1000)</b>                  | \$0.0          | \$0.0          | \$162          | \$1,146        | \$158          | \$1,123        | \$163          | \$1,153        |
| <b>Reforestation</b>                                   |                |                |                |                |                |                |                |                |
| <b>Jobs</b>                                            | 0.0            | 0.0            | 0              | 0              | 5              | 143            | 5              | 143            |
| <b>Employee Compensation (\$1000)</b>                  | \$0.0          | \$0.0          | \$0            | \$0            | \$82           | \$760          | \$82           | \$760          |
| <b>Watershed Restoration</b>                           |                |                |                |                |                |                |                |                |
| <b>Jobs</b>                                            | 0.0            | 0.0            | 4              | 63             | 4              | 63             | 4              | 63             |
| <b>Employee Compensation (\$1000)</b>                  | \$0.0          | \$0.0          | \$57           | \$472          | \$57           | \$472          | \$57           | \$472          |
| <b>Invasive Plant Treatment</b>                        |                |                |                |                |                |                |                |                |
| <b>Jobs</b>                                            | 0.0            | 0.0            | 1              | 6              | 1              | 6              | 1              | 6              |
| <b>Employee</b>                                        | \$0.0          | \$0.0          | \$13           | \$32           | \$13           | \$32           | \$13           | \$32           |

| ECONOMIC IMPACTS               | Alternative 1  |                | Alternative 2  |                | Alternative 4  |                | Alternative 5  |                |
|--------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                                | Forest Service | Private Sector | Forest Service | Private Sector | Forest Service | Private Sector | Forest Service | Private Sector |
| Compensation (\$1000)          |                |                |                |                |                |                |                |                |
| Abandoned Mine Restoration     |                |                |                |                |                |                |                |                |
| Jobs                           | 0.0            | 0.0            | 3              | 18             | 3              | 18             | 3              | 18             |
| Employee Compensation (\$1000) | \$0.0          | \$0.0          | \$41           | \$335          | \$41           | \$335          | \$41           | \$335          |
| Heritage Site Restoration      |                |                |                |                |                |                |                |                |
| Jobs                           | 0.0            | 0.0            | <1             | 1              | <1             | 1              | <1             | 1              |
| Employee Compensation (\$1000) | \$0.0          | \$0.0          | \$4            | \$18           | \$4            | \$18           | \$4            | \$18           |
| Environmental Document Prep.   |                |                |                |                |                |                |                |                |
| Jobs                           | 15.0           | 0.0            | 15             | 0              | 15             | 0              | 15             | 0              |
| Employee Compensation (\$1000) | \$242.0        | \$0.0          | \$247          | \$0            | \$247          | \$0            | \$247          | \$0            |
| <b>ALTERNATIVE TOTAL</b>       |                |                |                |                |                |                |                |                |
| Jobs                           | 15.0           | 0.0            | 33             | 152            | 48             | 466            | 72             | 855            |
| Employee Compensation (\$1000) | \$242.0        | \$0.0          | \$525          | \$2,002        | \$778          | \$6,763        | \$1,165        | \$15,827       |

Table 4.16.4a Alternative 4 – Sale Detail

| Sale Name         | Acres Harvested | Total CCF Vol. | Total MBF Vol. | High Bid \$/CCF | % HELI by Volume | Fuel Treat Post Har \$/CCF | Road Mtce. \$/CCF | Total Road Mtce \$1000 |
|-------------------|-----------------|----------------|----------------|-----------------|------------------|----------------------------|-------------------|------------------------|
| 1. Upper Ninemile | 596             | 7,885          | 3,584          | -\$26.24        | 76%              | \$0.47                     | \$6.88            | \$54,249               |
| 2. Alpine         | 91              | 1,776          | 807            | \$46.40         | 0%               | \$0.53                     | \$4.97            | \$8,827                |
| 3. St. Louis      | 41              | 589            | 268            | \$19.56         | 0%               | \$26.13                    | \$5.81            | \$3,422                |
| 4. Siegel         | 34              | 316            | 144            | \$14.44         | 0%               | \$2.15                     | \$36.71           | \$11,600               |
| 5. Pine           | 0               | 0              | 0              |                 |                  |                            |                   | \$0                    |
| 6. Sunrise        | 0               | 0              | 0              |                 |                  |                            |                   | \$0                    |
| 7. Landowner      | 341             | 3,718          | 1,690          | -\$3.87         | 66%              | \$2.83                     | \$7.50            | \$27,885               |

| Sale Name     | Acres Harvested | Total CCF Vol. | Total MBF Vol. | High Bid \$/CCF | % HELI by Volume | Fuel Treat Post Har \$/CCF | Road Mtce. \$/CCF | Total Road Mtce \$1000 |
|---------------|-----------------|----------------|----------------|-----------------|------------------|----------------------------|-------------------|------------------------|
| 8. Flat Creek | 830             | 10,692         | 4,860          | -\$6.24         | 72%              | \$1.32                     | \$4.11            | \$43,944               |
| <b>TOTAL</b>  | <b>1,933</b>    | <b>24,976</b>  | <b>11,353</b>  |                 | <b>64%</b>       |                            |                   | <b>\$149,927</b>       |

Table 4.16.4b Alternative 4 - Sale Detail, continued

| Sale Name         | Avg. dbh | % Defect | Total Timber Value \$1000 | Total Sale PNV \$1000 | Sale Funds Available for BMPs, etc. | BMPs, Culverts, Surfacing Costs \$1000 | Net Funding Needed- BMPs, etc. \$1000 |
|-------------------|----------|----------|---------------------------|-----------------------|-------------------------------------|----------------------------------------|---------------------------------------|
| 1. Upper Ninemile | 12       | 24%      | -\$206.9                  | -\$401.9              | \$0.0                               | \$516.1                                | \$516.1                               |
| 2. Alpine         | 13       | 25%      | \$82.4                    | \$33.5                | \$59.7                              | \$145.9                                | \$86.2                                |
| 3. St. Louis      | 11       | 22%      | \$11.5                    | -\$4.1                | \$7.2                               | \$0.5                                  | \$0.0                                 |
| 4. Siegel         | 11       | 22%      | \$4.6                     | -\$3.8                | \$2.4                               | \$107.0                                | \$104.6                               |
| 5. Pine           |          |          |                           |                       |                                     |                                        |                                       |
| 6. Sunrise        |          |          |                           |                       |                                     |                                        |                                       |
| 7. Landowner      | 15       | 24%      | -\$14.4                   | -\$109.5              | \$0.0                               | \$349.2                                | \$349.2                               |
| 8. Flat Creek     | 13       | 26%      | -\$66.8                   | -\$339.4              | \$0.0                               | \$272.5                                | \$272.5                               |
| <b>TOTAL</b>      |          |          | <b>-\$189.6</b>           | <b>-\$825.2</b>       | <b>\$69.3</b>                       | <b>\$1,391.2</b>                       | <b>\$1,328.6</b>                      |

Table 4.16.5a Alternative 5 – Sale Detail

| Sale Name         | Acres Harvested | Total CCF Vol. | Total MBF Vol. | High Bid \$/CCF | % HELI by Volume | Fuel Treat Post Har \$/CCF | Road Mtce. \$/CCF | Total Road Mtce \$1000 |
|-------------------|-----------------|----------------|----------------|-----------------|------------------|----------------------------|-------------------|------------------------|
| 1. Upper Ninemile | 1,127           | 18,279         | 8,309          | \$12.88         | 42%              | \$0.41                     | \$4.66            | \$85,180               |
| 2. Alpine         | 972             | 20,138         | 9,154          | \$51.13         | 18%              | \$0.58                     | \$1.64            | \$33,026               |
| 3. St. Louis      | 79              | 1,092          | 496            | \$17.65         | 0%               | \$25.84                    | \$6.72            | \$7,338                |
| 4. Siegel         | 278             | 3,839          | 1,745          | \$46.24         | 0%               | \$1.29                     | \$7.40            | \$28,409               |
| 5. Pine           | 50              | 330            | 150            | \$26.82         | 0%               | \$3.03                     | \$3.64            | \$1,201                |
| 6. Sunrise        | 19              | 390            | 177            | \$26.00         | 0%               | \$0.97                     | \$27.43           | \$10,698               |
| 7. Landowner      | 654             | 9,346          | 4,248          | -\$2.40         | 76%              | \$3.09                     | \$2.99            | \$27,945               |
| 8. Flat Creek     | 1,666           | 27,662         | 12,574         | \$31.30         | 43%              | \$0.83                     | \$1.90            | \$52,558               |
| <b>TOTAL</b>      | <b>4,845</b>    | <b>81,076</b>  | <b>36,853</b>  |                 | <b>38%</b>       |                            |                   | <b>\$246,355</b>       |

**Table 4.16.5b Alternative 5 – Sale Detail, continued**

| <b>Sale Name</b>         | <b>Avg. dbh</b> | <b>% Defect</b> | <b>Total Timber Value \$1000</b> | <b>Total Sale PNV \$1000</b> | <b>Sale Funds Available for added BMPs, etc.</b> | <b>BMPs, Culverts, Surfacing Costs \$1000</b> | <b>Net Funding Needed-BMPs, etc. \$1000</b> |
|--------------------------|-----------------|-----------------|----------------------------------|------------------------------|--------------------------------------------------|-----------------------------------------------|---------------------------------------------|
| <b>1. Upper Ninemile</b> | <b>11</b>       | <b>23%</b>      | <b>\$235</b>                     | <b>-\$244.1</b>              | <b>\$47.7</b>                                    | <b>\$558.9</b>                                | <b>\$511.2</b>                              |
| <b>2. Alpine</b>         | <b>13</b>       | <b>23%</b>      | <b>\$1,030</b>                   | <b>\$471.7</b>               | <b>\$802.8</b>                                   | <b>\$272.2</b>                                | <b>\$0.0</b>                                |
| <b>3. St. Louis</b>      | <b>11</b>       | <b>22%</b>      | <b>\$19</b>                      | <b>-\$9.6</b>                | <b>\$11.2</b>                                    | <b>\$131.5</b>                                | <b>\$120.3</b>                              |
| <b>4. Siegel</b>         | <b>11</b>       | <b>22%</b>      | <b>\$178</b>                     | <b>\$71.9</b>                | <b>\$150.1</b>                                   | <b>\$114.6</b>                                | <b>\$0.0</b>                                |
| <b>5. Pine</b>           | <b>10</b>       | <b>26%</b>      | <b>\$9</b>                       | <b>\$0.0</b>                 | <b>\$5.1</b>                                     | <b>\$12.9</b>                                 | <b>\$7.8</b>                                |
| <b>6. Sunrise</b>        | <b>11</b>       | <b>23%</b>      | <b>\$10</b>                      | <b>-\$0.3</b>                | <b>\$7.1</b>                                     | <b>\$0.0</b>                                  | <b>\$0.0</b>                                |
| <b>7. Landowner</b>      | <b>15</b>       | <b>24%</b>      | <b>-\$22</b>                     | <b>-\$262.1</b>              | <b>\$0.0</b>                                     | <b>\$349.2</b>                                | <b>\$349.2</b>                              |
| <b>8. Flat Creek</b>     | <b>12</b>       | <b>25%</b>      | <b>\$866</b>                     | <b>\$120.5</b>               | <b>\$555.1</b>                                   | <b>\$253.3</b>                                | <b>\$0.0</b>                                |
| <b>TOTAL</b>             |                 |                 | <b>\$2,324</b>                   | <b>\$148.0</b>               | <b>\$1,579.1</b>                                 | <b>\$1,692.6</b>                              | <b>\$988.5</b>                              |