SENSITIVE WILDLIFE

Introduction

Sensitive wildlife species are those species identified by the Regional Forester for which population viability is a concern. On the Flathead National Forest, all sensitive wildlife species have been designated as Management Indicator Species. Of the 12 Sensitive wildlife species (including the recently delisted peregrine falcon), for six there was determined to be no impact from the alternatives proposed in the Westside Reservoir Post-Fire Project as a result of a lack of presence, suitable habitat, or lack of effects on suitable habitat. These six species include the common loon, harlequin duck, flammulated owl, northern bog lemming, northern leopard frog, and peregrine falcon. The rationale for their exclusion is presented in Exhibits Rs-7 through Rs-12, and they are not discussed further in this document.

The six sensitive species for which effects were analyzed in this document include the black-backed woodpecker, boreal toad, fisher, northern goshawk, Townsend's big-eared bat, and wolverine. The Biological Evaluation for Sensitive Wildlife Species has been incorporated into the text of this document, with a separate signature page and summary document in the project file (Exhibit Rs-1). Each species will receive a distinct discussion within this document.

Analysis Area

All lands within the boundaries of the Beta, Doe, Blackfoot, and Ball Fires (Exhibit Rg-2) were considered for the evaluation of direct and indirect effects on sensitive species. This approximately 49 square mile area (approximately 32,000 acres) is large enough to include the home ranges of multiple individuals or pairs of a species, and is representative of the effects of fires, natural tree mortality, timber harvest, road management and construction, and firewood cutting across the landscape. All of the actions proposed in the alternatives that could directly or indirectly affect these species are contained within this area. The remaining area on the west side of Hungry Horse Reservoir was added to the above for the consideration of cumulative effects, totaling approximately 270 square miles (approximately 172,900 acres; Exhibit Rg-2). A larger-scale assessment was also conducted to address population viability concerns (Exhibit Rg-5).

Information Sources

Data used in this analysis included GIS analysis, a review of pertinent literature, pre-fire and post-fire aerial photography, post-fire habitat surveys, fire severities, road locations, stand exams, and field surveys of snags and downed logs.

Black-backed Woodpecker

Affected Environment

Within Montana, the black-backed woodpecker (*Picoides arcticus*) is not a federally listed or candidate species with the US Fish and Wildlife Service (USFWS), or currently petitioned for listing. The black-backed woodpecker has an S3 status with Montana Department of Fish, Wildlife and Parks (MDFWP). An S3 status is defined as "Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas." The black-backed woodpecker is identified by the Flathead National Forest as a sensitive and management indicator species, and an old growth associate.

The black-backed woodpecker (Exhibit Rs-2) lives in boreal and montane conifer forests in Alaska, Canada, and the northern conterminous United States. The species is a rare to uncommon permanent resident of the region. Black-backed woodpeckers have been reported on the Flathead National Forest and within the habitat created by the fires. The fire areas could potentially support high densities of this species.

This species is closely associated with recently burned forest habitats and depends heavily on the larvae of wood-boring beetles. A dynamic mosaic of recent burns across a landscape may be required to sustain populations (Dixon and Saab 2000). In western Montana, black-backed woodpeckers appear to be strongly dependent upon one to six year-old burns (Hejl and McFadzen 2000; Hitchcox 1996; Caton 1996; Hutto 1995a). In Alberta, Hoyt and Hannon (2002) found that there was a similar probability of occupancy in 3, 4, and 8-year old burns. Black-backed woodpeckers appear to primarily utilize areas that burned at moderate to high severities, and that support high densities of bark beetles and borers (Hejl and McFadzen 2000). Low-severity burns seldom contain the high density of bark beetles and borers needed by black-backed woodpeckers (Powell 2000).

Thick-barked trees are generally western larch and Douglas fir in the analysis area, and their thick bark contributes to their being more fire resistant than thin-barked species, typically Engelmann spruce, grand fir, subalpine fir, and western white pine in the analysis area. A proportion of the western larch and Douglas fir should gradually succumb over several years post-fire, whereas the vast majority of the thin-barked species will die immediately post-fire. Once the thick barked species do die, their thick bark promotes greater relative moisture retention, prolonging their suitability to wood boring insect larvae. As the thick-barked species contribute to longer lasing populations of wood-boring insect habitat, they also contribute to longer lasting black-backed woodpecker foraging habitat. Hoyt and Hannon (2002) found that black-backed woodpeckers foraged in thick-barked fire resistant trees in 3-year old burns more than would have been expected by chance. Black-backed woodpecker presence increases with increasing tree and snag diameter. Bark thickness increases with diameter for many tree species, particularly fire resistant species. Therefore, larger trees may be less prone to desiccation following fires than smaller trees, and as a result, would be suitable to wood-boring insect larvae for a longer period of time. The retention of thick-barked species (i.e. western larch and Douglas fir) in the post-fire environment, particularly the larger trees and snags of these species, would contribute to the

suitability of the area as black-backed woodpecker habitat for a longer time period than otherwise.

Based on findings by Hejl and McFadzen (2000), fires that kill 50% or more of a stand are preferred by black-backed woodpeckers. In the northern Rockies, black-backed woodpecker abundance correlates not to burn size but to the number of remaining snags (Hutto 1995b). Black-backed woodpeckers occurred in severely and moderately burned areas that had at least 40 percent canopy closure prior to the fire, were at least 75 acres, and averaged 100 acres (Saab 2002).

It is possible that populations could reach source levels (providing enough successful reproduction for dispersion) in recent burns, but may drop to sink levels (successful reproduction too low for long-term self-sustaining populations) during periods between large burns (Hutto 1995b). Annual variability of fire occurrence and size is high, and large fires are generally less frequent since the advent of effective fire suppression. Six years of drought in the analysis area contributed to larger fires in recent years.

Black-backed woodpeckers generally nest in post-fire stands that have not been salvaged (Caton 1996, Hejl and McFadzen 1998, Hitchcox 1996, Saab and Dudley 1998), and that have relatively high tree and snag densities (Saab and Dudley 1998). Hejl and McFadzen (2000) found that salvage logging virtually eliminated black-backed woodpeckers from a stand, even with the retention of some fire-killed trees. Saab and others (2002) suggest that cavity nesters as a group selected clumps of snags rather than uniformly spaced snags. Wisdom and others (2000) provide the following recommendations for back-backed woodpecker habitat:

- Avoid post-fire salvage logging in portions of large burned forests to maintain contiguous burned stands of at least 387 hectares (956 acres).
- Where post-fire salvage logging is planned in burned, lower montane forests, retain snags in clumps rather than evenly spaced distributions.
- Allow wildfires to burn in some forests with high fire risk to produce stand-replacing conditions.
- Avoid post-fire salvage logging in portions of large burned forests for about 5 years postfire.

Portions of the fire areas are likely moderate to high quality habitat for black-backed woodpeckers, particularly where they burned at high to moderate fire severities, and were in the mid to late seral stage prior to the fires (Table 3-105). The Westside Reservoir Fires created 16,336 acres of potential black-backed woodpecker habitat, which is approximately 52% of the total area burned.

Table 3-105. Potential Black-Backed Woodpecker Habitat in Each Burn Area.

	Beta	Doe	Blackfoot	Ball	Total
Acres Potential Black-backed Woodpecker Habitat	2919 acres	1693 acres	7764 acres	3960 acres	16,336 acres

Environmental Consequences

Effects on the black-backed woodpecker are directly related to one issue discussed in Chapter 1.

- Issue #1, Not enough snags are being left on the landscape
  Issue Indicators: Average density of large larch and Douglas-fir after salvage across salvage units that support these trees; and percent of area with high densities of large larch and Douglas-fir after salvage.

There were five additional "Key Issues" also related to black-backed woodpeckers.

- Issue #2, Not Enough Snags are Proposed for Harvest
- Issue #3, Not Enough of the Burned Areas are Being Salvage Logged
  Issue Indicator: Acres of salvage logging proposed.
- Issue #4, Bark Beetle Management is not Adequately Addressed in the Proposed Action
  Issue Indicators: Number of trap trees and pheromone traps used.
- Issue #7, Public Motorized Access is Reduced Too Much
  Issue Indicator: Miles of road closed to public wheeled motorized vehicles over the existing condition.
- Issue #9, Possible Old Growth and "Recruitment" Old Growth Should Not be Salvage Logged
  Issue Indicators: Acres of salvage harvest in pre-fire old growth with unknown post-fire status; Acres of salvage harvest in "recruitment old growth."

There were four "Other Key Issues" identified but not used in alternative development relevant to black-backed woodpeckers.

- Issue #10, Burned-up Old Growth should not be Salvage Logged
- Issue #11, Forest Plan Management Areas Unsuitable for Timber Management should not be Salvage Logged
- Issue #12, Rehabilitation of the Fire Areas Does Not Require Salvage Logging

Direct and Indirect Effects

The following were used to focus the black-backed woodpecker analysis and disclose relevant environmental effects:

- Acres of potential habitat created within the Westside Reservoir Fire areas.
- Acres of large bocks unsalvaged
- Acres salvaged by alternative
- Acres and percent of potential habitat left un-salvaged by fire area
- Size and distribution of snag leave patches.

Alternative A

The fires created 16,336 acres of potential habitat for black-backed woodpeckers. There are seven blocks greater than 956 acres in size (1017-3371 acres) across the four fire areas. Relatively small amounts of black-backed woodpecker habitat created by the fires was lost

through fire fighting and safety tree removal efforts. Under this alternative, no additional snags would be felled except for safety concerns. No additional salvage, harvest, or other rehabilitation actions are proposed with this alternative. Spruce beetle, Douglas fir beetle and other wood-boring beetle populations would be expected to increase, creating an adequate prey base for large numbers of black-backed woodpeckers across the burned and adjacent landscape. Black-backed woodpecker populations would begin to naturally decline following the decline in beetle larvae approximately six years post-fire. Other effects relevant to this species are disclosed in the Snag and Downed Wood Habitat section of this chapter.

Alternative B

Harvest of fire-killed snags would have a negative effect on habitat for the black-backed woodpecker (Table 3-106). Reduced road access would have a relatively small positive effect by reducing firewood harvest of fire-killed snags along open roads. If salvage areas are being used as breeding habitat during salvage operations, nesting activities could be disrupted and nest trees/snags could be felled while in use. Winter salvage operations would remove the risk to nesting birds but would disturb foraging and roosting at a time when energy reserves may be low and birds are susceptible to thermal stress.

Even though some fire-killed trees would be retained within many of the salvage units, salvage harvest in potential black-backed woodpecker habitat has been shown to virtually eliminate black-backed woodpecker use (Hejl and McFadzen 2000). Alternative B still retains substantial habitat outside of salvage harvest units for the black-backed woodpecker in three of the four fire areas (Table 3-106). The greatest impact would be within the Beta-Doris area, where a 2828-acre block would be reduced to three small blocks of less than 500 acres. This area also has the lowest percentage of potential habitat remaining after salvage logging (37%). The Doe area has one habitat block of 1198 acres and very little of this area would be harvested. The Blackfoot area has 3 habitat blocks ranging in size from 1340-3371 acres and salvage units in the northern portion of the burn would fragment blocks to some degree, but large areas of habitat would remain. The Ball area has one block that is 1017 acres in size, which would be reduced to about 767 acres following salvage harvest.

Table 3-106. Effects of Salvage on Patches of Potential Habitat for Black-backed Woodpecker on National Forest System Lands.

Fire Name	Potential Habitat Created by Fires	Potential Habitat Not Salvaged	Number of Blocks of Potential Habitat > 956 Acres After Salvage	Potential Habitat Remaining in Largest Contiguous Piece
Ball	3960 ac	2,472 ac (62%)	0	767 ac
Beta-Doris	2919 ac	1,079 ac (37%)	0	429 ac
Blackfoot	7764 ac	6,381 ac (82%)	3	3371 ac
Doe	1693 ac	1,370 ac (81%)	1	1191 ac
TOTAL	16,336 ac	11,302 ac (69%)	4	

Criteria for leaving unsalvaged patches, unsalvaged riparian corridors, having maximum DBHs for salvage of western larch and Douglas fir, and leaving obvious wildlife trees and snags if safe

to do so will increase the potential for salvaged areas to be used by black-backed woodpeckers. Snag concentrations seem to be critical for successful reproduction and winter foraging. Based on research in the Northern Rockies (Hutto 1995b), many of the reserve patches within units and non-harvested areas outside of units may be too small or unsuitable for use by black-backed woodpeckers. However, based on research done by Saab (2002) large units in high emphasis snag retention areas that leave reserve patches at least 75 acres in size should be large enough to provide habitat. In fire areas the reserve patch size cannot be determined until the unit reserve patches are laid out. The numbers of areas larger than 956 acres were tallied. Recommendations in Wisdom et al. (2000) appear to be met, resulting from the retention of large contiguous burned areas and the retention of snag patches in salvage units (Table 3-106).

The temporary roads proposed for salvage activities are to be dispersed throughout the fire areas, and would require the removal of a relatively small fraction of available trees and snags. Salvage operations including helicopter logging and associated human activity may temporarily displace individuals, but would have no long-term impact. Similar impacts would result from road decommissioning activities. See Exhibits Rs-3 and Rd-4 for more information, including additional effects of helicopter logging, cable logging, road construction, and firewood cutting.

Alternatives C, D, and E

The effects of Alternative C would be similar to those in Alternative B with the following exceptions and additions. In general, a decrease in the area and volume salvaged (Table 3-107) may decrease the potential for negative effects on the black-backed woodpecker. Closing additional roads would reduce firewood harvest along these areas. Reduced motorized trails would have little to no effect on this species. Decommissioning roads may cause temporary and short-term disturbance.

Table 3-107. Acres of black-backed woodpecker habitat harvested under each action alternative.

	Alternative B	Alternative C	Alternatives D and E
Acres of black-backed woodpecker habitat harvested	4998	4171	5004

The effects of Alternatives D and E would be similar to those in Alternative B with the following exceptions and additions. In general, increases in the area and volume salvaged would increase the potential negative effects on the black-backed woodpecker. Reducing snag retention and snag patch size, and increasing the minimum snag diameters of western larch and Douglas-fir to be harvested may substantially reduce the ability of these areas to support populations of black-backed woodpeckers. Closing more roads may provide a relatively small reduction in the number of snags being cut for firewood. Alternative D includes measures to control bark beetle populations via spruce and Douglas fir beetle trap trees, funnel traps, and pheromones. If successful, these efforts would reduce prey for black-backed woodpeckers across the affected areas. Wood-boring insects would still be abundant for the first 1-2 years after the fire.

Cumulative Effects

Effects Common to All Alternatives

Past and present cumulative effects in addition to those described above have shaped this species' affected environment. For an assessment of this species' viability at the Forest level, see the Final Environmental Impact Statement for Amendment 21 of the Forest Plan (USDA 1999) and Exhibit Rg-5. Exhibit Rs-13 is an assessment of the black-backed woodpecker and its habitat across USFS Region One.

Across the Interior Columbia River Basin, moderate or strong declines in unburned habitats used by black-backed woodpeckers were projected in nearly 70 percent of watersheds. The most widespread declines were in the northern and far eastern parts of the Columbia River Basin. Moderate or strong declines were projected in over 90 percent of watersheds within the Northern Glaciated Mountains (Wisdom et al. 2000). The natural pattern of beetle outbreaks has been altered through silvicultural and fire management practices. Silvicultural practices directed at maximizing wood production by harvesting trees before they are susceptible to bark beetle attacks, and salvage logging of beetle-infested, fire-killed, and wind-killed trees reduced the occurrence of beetles in some areas. Elsewhere, fire management policies have lengthened natural fire regimes and allowed more frequent occurrences of beetles. Considering both the departure from historically available habitat and the increased interval between large fires, the black-backed woodpecker may be at risk in USFS Region One (Hillis, Jacobs, and Wright 2003, Hoyt and Hannon 2002).

Fire suppression has been the greatest factor limiting the current distribution of potential habitat in this area. Between 1926 and 2001, there were few wildfires of considerable size. Across the Flathead National Forest, large acreages of black-backed woodpecker habitat were created by wildfires such as the Little Wolf, Moose, Robert, and Wedge, and extensive acreages of trees killed by insects or disease. A considerable acreage of dead tree habitat now occurs in areas that are outside of the timber base, and could provide well-distributed habitat for approximately six years (Exhibit Rg-5).

Past timber harvest and road building in the area reduced the potential for large acreages of dense snag habitat to be created by the Westside Reservoir Fires (Exhibit Rd-3). The postfire Roadside Hazard Tree Removal Project removed a limited amount of potential habitat adjacent to open roads. The Larch Heart Rot Study plans to take up to 400 snags in various size classes throughout the fire areas during the field seasons of 2004 and 2005. These snags will not be taken in any salvage harvest units and will be taken in close proximity to roads. Individual snags will be taken in separate areas dispersed throughout the fire areas, but not within riparian areas, so a negligible impact on future down wood or snag habitat is expected.

See Exhibit Rd-4 and the Snag and Downed Wood Habitat section for more information about cumulative effects on snags, the majority of which are relevant to black-backed woodpeckers. The effects of most of these past actions and events are imbedded in the environmental baseline described above (Exhibit Rd-3).

No vegetation management activities are planned on national forest lands in the analysis area in addition to those proposed in the action alternatives. Future wildfire, insect outbreaks, and timber harvest activities in the area may have cumulative effects on habitat black-backed woodpecker habitat.

Potential habitat in a large area running east of the proposed actions was lost to submergence during the creation of the Hungry Horse Reservoir.

Implementation of the proposed actions in combination with cumulative effects, may impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population or species.

Boreal Toad

Affected Environment

Within Montana, the boreal toad (*Bufo boreas*) is not a federally listed or candidate species with the USFWS, or currently petitioned for listing. The boreal toad has an S3 status with MDFWP. An S3 status is defined as "Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas." The Flathead National Forest identifies the boreal toad as both a sensitive and management indicator species.

Toad tadpoles feed on plant material and bottom detritus, and juveniles and adults prey primarily on a wide variety of insects. A partial list of predators of toad tadpoles includes ducks, sandpipers, herons, garter snakes, and diving beetles. Adult and juvenile boreal toads are also prey for a variety of predators. A partial list includes raccoon, coyote, short-tailed weasel, mink, marten, black bear, common raven, American crow, Steller's jay, gray jay, and the American robin.

Boreal toads breed in lakes, ponds, streams, and road ditches, with a preference for shallow areas with mud bottoms. Females may not reach sexual maturity until five or six years of age and may not breed consecutive years. Adults are largely terrestrial and will travel considerable distances from water. Historical data indicate that boreal toads were widely distributed and very common in Montana and other western states, but the species has apparently undergone severe population declines in the past 25 years (Currim 1996, Exhibit Rs-18 and 19). Surveys in the late 1990s indicate that they are absent from many historic locations and that they now occupy less than 10 percent of suitable habitat (Maxell 2000; Exhibit Rs-18). Factors associated with population declines range from natural population fluctuations to the effects of human-induced factors such as pollution, pesticides, habitat destruction and alteration, increases in UV radiation, and the introduction of predators or competitors. Some of these may function to facilitate the spread of infectious bacteria and fungus (Carey 1993, Muths 2003). A suggested explanation for the decline of boreal toads in Colorado includes multiple factors simultaneously causing sublethal

stress to individuals, this stress results in a suppressed immune system, which make the individual more susceptible to infection by agents such as bacteria and fungus (Carey 1993).

Fire, timber harvest and salvage, bacteria and fungus epidemics, and road construction and maintenance can affect this species. Individual toads or tadpoles can be killed by wildfire, salvage activities, and road construction or maintenance activities. Soil compaction, changes in the amount and types of vegetative cover, and in the quantity and quality of water can all indirectly affect this species. Toads travel away from water and are often found dispersing into burned habitat. Researchers have not been able to determine the reason why they disperse or what the draw to these areas is. They may be more visible to observers and predators in post-fire areas as a result of the lack of concealment and camouflage vegetation. Roads can be obstacles for toads as they are slow moving and vulnerable to being run over by vehicles, and they may also be more susceptible to predation when crossing roads.

Potential breeding habitat for the boreal toad has been identified as Riparian Landtypes NL1A and NL1E (USDA Forest Service 1995; Table 3-108), which are relatively level areas in flat valley bottoms with relatively fine substrates. The District has conducted no boreal toad surveys, and it is difficult to know how well this matches up with actual use of the habitat by toads. However, toads have been found in over 86 locations on Flathead National Forest lands and over 80% of these have been in NL1E or NL1A. Nearly all of the other reports were of tadpoles found in roadside ditches or adults found away from breeding habitat. There appears to be six acres of suitable wetland breeding habitat scattered throughout the affected areas. Some of this escaped burning in 2003, but much of it was burned over. All land in the analysis area is close enough to potential breeding ponds to be potential upland habitat for boreal toads.

Table 3-108. Riparian Landtypes NL1A and NL1E in the Westside Reservoir Fire Area.

Riparian Landtype	Gradient	Substrate Material	Habitat Type or Vegetation Community	Acres in Analysis Area	Acres by Fire Area		
					Beta/ Doris	Blackfoot	Ball
NL1A	Nearly level, valley bottom 2-4% slopes	Clays, silts, fine and medium sand	Subalpine fir	0	0	0	0
NL1E	Nearly level, valley bottom 2-4% slopes	Clays, silts, fine and medium sand	Willow and sedges	6	2	3	1

Some mortality may have occurred in and near the fires through burning, smoke inhalation, and heat stress. Adults and tadpoles have been observed within the proposed areas and in the general vicinity since the fires (Exhibit Rg-4), and decreased vegetative cover may result in increased predation. The ponds, wetlands, and streams occurring in or adjacent to the proposed areas provide water sources for this amphibian. Boreal toads have a broad prey base and the availability of individual prey likely increased for some prey species and decreased for others.

Environmental Consequences

Effects on the boreal toad are directly related to two issues discussed in Chapter 1.

- Issue #7, Public Motorized Access is Reduced Too Much
  Issue Indicators: Miles of road closed to public wheeled motorized vehicles over the existing condition.
- Issue #8, Water Quality Must Be Maintained or Improved
  Issue Indicators: Acres of salvage harvest in riparian areas or areas of high burn severity and steep slopes near streams.

Direct and Indirect Effects

The following Effects Indicators were used to focus the boreal toad analysis and disclose relevant environmental effects:

- Extent of activities that could cause direct mortality of boreal toads in terrestrial habitats.
- Extent of activities that could affect breeding habitats.
- Changes in motorized access management.

Alternative A

This alternative would have no direct effect on boreal toads. Ongoing actions like road maintenance and current motorized access that may impact boreal toads would continue at the current levels under this alternative. No additional salvage, harvest, or other rehabilitation actions are proposed with this alternative. Breeding and terrestrial habitat would progress through their natural successional stages, and vegetative cover would recover accordingly. There would be an increased availability and abundance of some prey species and a decreased availability of others. The retention of all snags would contribute to large downed wood over time, this habitat is important for hiding and thermal protection, as well as providing moist areas preventing desiccation. Snag retention also provides higher fuel loading relative to salvage alternatives.

Alternative B

Adult and juvenile toads may incur mortalities from salvage activities, increased vehicle use, road maintenance, temporary road construction, and road decommissioning activities (Table 3-109). Individual mortality would be infrequent and would not be expected to affect this species at the population level. Toads are inactive during winter and typically hibernate in subterranean burrows. Salvage activities during this period would likely have less negative impact on boreal toads than salvage activities occurring during the summer, when terrestrial adults are active and breeding activities and tadpole production are occurring. Reducing the amount of open roads and motorized trails would have a positive effect on boreal toad habitat in the affected area by providing a long-term reduction in associated mortality.

Table 3-109. Extent of activities that could cause direct mortality of boreal toads in terrestrial habitats.

Alternative	Acres Treated	Miles of Temporary Road Construction	Miles of Road Decommissioning
B	4921	4	49
C	3949	4	69
D	5298	4	69
E	5338	4	49

Protection of some potential nursery habitat will occur through a combination of protective measures in the Montana Streamside Management Zone Law, Montana Water Quality Act, and INFISH standards (See Fisheries Section). Requirements of the Montana Streamside Management Zone (SMZ) Law would be followed for all treatments within or adjacent to wetland or riparian zones. Buffers have been designed to minimize the effects on riparian habitat. Montana SMZ law requires a minimum 50-foot buffer on all streams. Fish bearing streams will have a 300-foot buffer, and non-fish bearing streams will have a 150-foot buffer. Ponds, lakes, or wetlands greater than 1 acre will have a 150-foot buffer, and those less than 1 acre will have a 100-foot buffer (see fisheries). Harvest in R units would be the exception to these protections. Roadside ditches that hold water long enough into the summer to provide breeding sites would not be protected unless they were associated with streams or other protected sites. These breeding sites would be vulnerable to seasonal dry-up and road maintenance, or temporary construction, possibly resulting in tadpole mortality. Road decommissioning could help to prevent mortality of toads breeding in roadside ditches and puddles.

Alternatives C, D and E

The effects of Alternative C would be similar to those in Alternative B with the following exceptions and additions. In general, a decrease in the area and volume salvaged may decrease the potential for negative effects on the boreal toad. The further reduction in open roads and motorized trails would have the beneficial effect of further reducing associated mortalities. Increased road decommissioning would have short-term and temporary negative effects, and possibly long-term beneficial effects.

The effects of Alternatives D or E would be similar to those in Alternative B with the following exceptions and additions. In general, increases in the area and volume salvaged would increase the potential negative effects on the boreal toad. Increased motorized access would result in an increase in associated mortalities.

Cumulative Effects

Effects Common to All Alternatives

Past and present cumulative effects in addition to those described above have shaped this species' affected environment. For an assessment of this species' viability at the Forest level, see the Final Environmental Impact Statement for the Flathead's LRMP Amendment 21 (USDA 1999) and Exhibit Rg-5.

Human activities including past timber harvest, road construction and maintenance, fires, and fire fighting have affected boreal toad habitat in this area as well as across the Flathead National Forest. Although beaver populations are recovering, reductions resulting from early trapping eras have likely reduced the number of beaver dams and associated habitat for the boreal toad.

Periodic road maintenance, specifically cleaning out roadside ditches, has impacted boreal toads when tadpoles or eggs were present. A reasonably foreseeable BMP Project would improve road drainage and culverts throughout the Westside Reservoir Fire Areas beginning in 2004. This would further affect tadpoles and eggs, depending on the season and location of work.

Fires rarely burn in this species' breeding habitat, although water quality and quantity varies after large fires upstream. Although the fires affected some riparian habitat, salvage activities include buffers for riparian areas. Some boreal toad mortality likely occurred as a direct or indirect result of the fires.

No vegetation management activities are planned on national forest lands in the analysis area in addition to those proposed in the action alternatives. Toad reproductive habitat is well distributed across the Flathead National Forest, and most is protected by adherence to the Inland Native Fish Strategy.

Habitat in a large area running east of the proposed actions was lost to submergence during the creation of the Hungry Horse Reservoir.

Habitat changes resulting from the burns resulted in changing habitat conditions that may favor fungi and bacteria that could result in increased infection and mortalities. Habitat changes resulting from the burns resulted in changing habitat conditions that may increase risk of predation.

Implementation of the proposed actions in combination with cumulative effects may impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population or species.

Fisher

Affected Environment

Within Montana, the fisher (*Martes pennanti*) is not a federally listed or candidate species with the USFWS, or currently petitioned for listing. The fisher has an S3 status with the MDFWP, and is currently managed as a furbearer with an annual harvest quota of 7 individuals. An S3 status is defined as "Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas." The Flathead National Forest identifies the fisher as both a sensitive and management indicator species, and as an old growth associate.

The fisher is a solitary, medium sized, forest carnivore endemic to North America. Although they are primarily terrestrial, fishers are well adapted for climbing. The fisher has relatively low reproductive rates and population densities compared to most other mammals. Home range areas average 15 square miles for males and 6 square miles for females (Powell and Zielinski 1994). During the late 19th and early 20th centuries trapping, logging, and the conversion of forested areas to agricultural lands contributed to the fisher being extirpated from much of its range in the United States and eastern Canada. Within Montana and Idaho, over a million acres of mature coniferous forest burned in the early part of the 20th century and the coincident loss of habitat played a role in the decline of fisher populations (Williams 1963). Restrictions on harvesting and reintroduction programs have contributed to recovering populations in portions of its historic range.

In the Rocky Mountains, fishers often use Englemann spruce and lodgepole pine dominated stands (Ruggerio et al. 1994). In north-central Idaho, fishers were found to use predominantly mature forests of grand and subalpine fir (Jones and Garton 1994). Forest structure, which affects prey abundance and vulnerability and provides denning and resting sites for fishers, is probably more important than tree species composition (Buskirk and Powell 1994). Forest structure can be characterized by a diversity of tree shapes and sizes, understory vegetation, snags and fallen limbs and trees, and tree limbs close to the ground (Buskirk and Powell 1994).

Fishers can be found in diverse habitats and successional stages, but late successional coniferous forests (often riparian) are considered optimal or preferred habitat, and overhead tree cover is a key habitat component (Ruggerio et al. 1994). Fishers prefer habitats with high canopy closure, and avoid areas with low canopy cover. Fishers appear to be restricted from areas with deep snow accumulation. A closed canopy can provide some protection from heavy snow accumulation. Fisher do not exclusively use late successional stage forested habitat. In Idaho, both sexes selected late successional conifer forests during summer but preferred young forests during the winter (Jones and Garton 1994). They forage where prey is available, and in two studies in the Rocky Mountains, they used young to medium age stands of conifers during parts of the year (Jones 1991, Roy 1991). Within these forests the presence of high densities of primary prey species, such as snowshoe hares and porcupines, may indicate high potential fisher habitat. Resting and denning tend to occur in structures associated with late successional forests. Riparian strips of late successional forest are thought to be particularly important as habitat and travel corridors.

Fishers use a variety of resting sites such as cavities, branch platforms, and witch's brooms. These sites provide security from predation, warmth and insulation in winter, and prevent overheating in summer. Zielinski and others (2004) found that utilized resting structures were found in the largest diameter trees and snags available. A study in Idaho found that the average diameter of trees used as resting sites was 22 inches (Jones 1991). This study also found that fishers preferred to rest in stands that exceeded 61% canopy closure during summer and winter, and avoided stands with less than 40% closure (Jones 1991). Managing for fisher resting habitat should include the retention and recruitment of large trees, and maintaining a dense canopy in the vicinity (Zielinski et al. 2004).

Fishers are thought to be highly selective regarding natal and maternal den site habitat. Den sites are thought to occur in hollow logs, under logs, tree cavities, rocks, trees, brush piles, and ground burrows. Most of the documented fisher den sites have been found in eastern North America, and were generally in cavities located high in large trees or snags. Large snags (greater than 20 inches diameter at breast height) are important as maternal den sites (Thomas et al. 1993). It is unlikely that early to mid successional forests provide the rest and den sites preferred by fisher.

Fisher prey on small to medium-sized mammals and birds, consume carrion, and occasionally eat fruit such as berries. Mammals constitute the majority of their diet and include small rodents, shrews, squirrels, muskrat, raccoon, and deer carrion. Snowshoe hares are an important dietary item for fisher in Montana, as is deer carrion (Foresman 2001). Fisher are also well known for their skill at killing porcupines and have been implicated as the only predator capable of regulating porcupine populations (Powell 1993). They are opportunistic predators and prey availability may be more important than prey abundance. Their relatively diverse diet means that potential prey species occur in a variety of forest types and seral stages. Fisher may forage in different habitats from those used for resting and denning. A complete description of habitat requirements should consider denning, resting, and foraging needs.

Fisher avoid insular patches of forested habitat and may require forested corridors between foraging and denning sites (Heinemeyer and Jones 1994). These forested corridors are often riparian (Witmer et al. 1998), and are vulnerable to habitat fragmentation from fire, timber harvest, and timber salvage (Powell and Zielinski 1994). Fisher are rarely located in forest stands adjacent to clearcuts, although they use ecotone areas adjacent to small, natural openings or waterways with structurally complex vegetation (Ruggiero et al. 1994), and are often found near streams or other wet sites. Fishers have also been found to use open areas under dense ground vegetation and young conifers, and may use forested saddles for dispersal (Powell and Zielinski 1994). Although fishers are apparently tolerant of human activity, increased human access into an area is correlated with increased fisher mortality through direct or incidental trapping (Claar et al. 1999).

In the Northern Rockies, fisher evolved under a disturbance regime that created numerous openings in a matrix of mature forested habitats. A large pulse of large logs on the ground due to fire or insect epidemics can provide denning structures and cover for fisher and prey species, but these areas are likely to be avoided until the living tree canopy cover again exceeds 40%. The conversion of some percentage of older age classes to younger age classes can promote a diversity of prey species and thus have long-term benefits for fisher populations (Jones 1991). Fisher occur primarily in dense coniferous or mixed forests, including early successional forests with dense overhead cover (Thomas et al. 1993). Jones (1991) suggested that fishers would likely avoid open areas for a period of 50 years and probably not preferentially select stands until they reach an age of 80-100 years for lodgepole pine, and 120-160 years for mixed conifer (Jones 1991).

Since 1968 fisher records have been verified in the Flathead, Mission, Swan, and Whitefish ranges (Vinkey 2003), and fisher habitat is found in some of the area surrounding the proposed actions. Areas within fire perimeters with light understory burning and high mature tree and snag survival likely retain denning and resting habitat. Fisher forage in a greater variety of habitats

than they use for resting and denning, but these habitats generally contain overhead cover. Overhead cover is temporarily reduced in burned areas, but will return over time as vegetative recovery and natural succession occur. Burned areas would provide increased availability and abundance of some prey species and a decreased availability and abundance for others.

Burn areas adjacent to live mature forest have associated ecotones and may provide foraging habitat. Large continuous areas of high severity burn may have compromised travel corridors until overhead cover returns (approximately 10 years), and may have a short-term (approximately 3-5 year) reduction in available prey base. Pockets of low severity burned habitat are of substantial value since they will serve as the future core habitat as the burned forest is restored. Portions of the burned areas could provide habitat for fisher (canopy closure increases to approximately 40%) within about 10-20 years particularly if adequate habitat components (down logs, large snags, and brush) are retained to provide cavities and prey habitat.

If fisher occurred in the area during the fires, individuals would likely have been mobile enough to escape mortality resulting directly from wildfire. It is possible that individuals may have been caught in dens or at rest sites during major runs of the wildfire, and perished as a result of radiant heat, smoke inhalation, or direct flames.

Environmental Consequences

Effects on the fisher are directly related to two issues discussed in Chapter 1.

- Issue #9, Possible Old Growth and "Recruitment" Old Growth Should Not be Salvage Logged

  Issue Indicators: Acres of salvage harvest in pre-fire old growth with unknown post-fire status; Acres of salvage harvest in "recruitment old growth."

There was one "Other Key Issue" identified but not used in alternative development relevant to the fisher.

- Issue #10, Burned-up Old Growth should not be Salvage Logged.

Direct and Indirect Effects

Action alternatives could set back the time of recovery to suitable breeding and denning habitat in some areas by reducing snag and downed wood components of large enough diameters to provide suitable cavities. The reduction of downed woody material may reduce the availability of some prey species.

In defining potential fisher habitat for this analysis, distribution of mid-seral forests (pole-sized and immature) and late-seral forests (mature and old growth) were analyzed (Exhibit Rs-6; Table 3-110). The mid-seral forests conservatively approximate winter habitat, while the late seral forests are potential summer breeding and resting habitat. Many studies stress the importance of riparian habitat as travel corridors. With the abundance of riparian habitat within the analysis

area this was not believed to be a limiting factor, and riparian areas were not singled out for analysis. Across all alternatives adequate canopy cover is expected to return in burned areas in approximately 10 to 25 years.

Table 3-110. Acres of Fisher Habitat Before and After the 2003 Fires.

	Beta-Doris	Doe	Blackfoot	Ball	Cumulative Effects Area
Pre-fire Early Seral	1433	506	3807	2554	44,945 acres (28%)
Pre-fire Mid Seral	30	2368	225	760	14,312 acres (9%)
Pre-fire Late Seral	3834	2368	9915	4785	100,598 acres (63%)
Post-fire Early Seral	2655	2185	11,567	17	58,954 acres (37%)
Post-fire Mid Seral	10	37	58	415	13,732 acres (9%)
Post-fire Late Seral	2634	737	2517	1781	87,365 acres (54%)
Change from Late to Early Seral by 2003 Fires	1210	1631	7397	3004	13,242 acres

In combination with recent past timber harvest in the vicinity, possible barriers to species movement and dispersal have been created, possibly impacting the ability for genetic interchange between individuals or sub-populations. These factors may contribute to decreased breeding success within the greater area with a subsequent decrease in fisher numbers over time. Breeding and resting habitat connectivity would be limited until mature forest develops, and forested riparian travel corridors and saddles recover. The greatest impact to fisher and fisher habitat in the project area was the fires. The fires burned and fragmented large blocks of contiguous habitat and may have displaced individuals. Connectivity of mid- and late-seral habitats was greatly reduced within a 7406-acre area of the Blackfoot fire and within a 3004-acre area of the Ball fire. Habitat connectivity is still relatively high within the Doe and Beta-Doris fire areas (Exhibit Rs-6).

If fisher occur in the area, they may forage in ecotones along burn edges, and in areas where a mosaic of burn intensities maintained canopy cover exceeding 40%. Initial seral stage forests are now abundant and distributed across the analysis area as a result of the fires, increasing from 28% of the 160,000-acre analysis area to 37% of the analysis area. After overhead cover reestablishes in 10 to 25 years these areas should function as foraging habitat. The amount of mid-seral habitat changed little as a result of the fires, while late seral habitat decreased from 63% to 54% of the analysis area.

It appears the current distribution of habitat for fishers would allow dispersal to continue between remaining denning habitat within the analysis area. Suitable denning and foraging habitat occurs in adjacent areas except to the east where the Hungry Horse Reservoir forms a barrier. Sections on "Snags and Downed Woody Material Wildlife Habitat," "Old Growth Habitat and Old Growth Associated Wildlife Species," and "Riparian and Wetland Wildlife Habitat" provide relevant habitat analysis. For more information about this species and its habitat at various scales, including that of the Flathead National Forest, see Exhibits Rg-3, Rg-5, and Rs-14.

Alternative A

No additional salvage or rehabilitation actions are proposed with this alternative. This alternative provides for the retention of the greatest levels of cover and potential den sites. The fire killed snags left under this alternative would provide standing and large downed wood contributing to this area's potential as fisher habitat until large diameter trees are again produced onsite in approximately 150 years. The abundance and availability of individual prey species may vary across alternatives, but with the fisher's wide variety of prey items, there would likely be an increased availability and abundance of some prey species and a decreased availability for others. Within areas where the canopies experienced heavy to total mortality from fire, it would take approximately 150 years or more for a closed canopy mature forest with complex structure to develop. Additional disturbances to the area, such as insects or fire, would set back succession and delay development of a mid to late seral forest. The retention of all snags would contribute to fuel loading which may provide relatively higher fuels than other alternatives for potential future fires and increase the probability of fire spreading to fisher habitat of higher quality. The decrease in canopy cover and mature live forest has reduced fisher habitat, especially in the Ball and Blackfoot fire areas, but the mosaic of unburned forest and fire intensities as well as the adjacent unburned forest likely retain value as fisher habitat. Human access and associated disturbance would remain as is under this alternative.

Alternative B

The majority of salvage operations are proposed for areas of moderate and high severity burn that are unlikely to function as denning or resting habitat until vegetation recovers. These areas may still provide adequate prey for foraging but are unlikely to provide the preferred overhead cover until vegetative recovery progresses for approximately 10-25 years. Current early seral habitat includes areas of high post-fire canopy tree mortality. In these areas (Table 3-111) the large diameter downed wood and standing snags left after salvage are the only available large diameter material until large diameter trees and new large downed wood are produced onsite again in approximately 150 years.

Table 3-111. Acres of Post-fire Habitat Salvaged Under Alternative B.

	Early Seral Habitat	Mid Seral Habitat	Late Seral Habitat
Doe	334 ac	0 ac	41 ac
Beta-Doris	1032 ac	8 ac	1223 ac
Blackfoot	1602 ac	0 ac	197 ac
Ball	977 ac	31 ac	730 ac
TOTAL	3945 ac	39 ac	2191 ac

In areas of high canopy tree survival, salvage harvest would result in a reduction of potential den sites and cover, but not a total loss given the retained live trees. Leave patches within salvage units would provide areas with full potential as denning habitat. Other leave criteria would provide for some retention of potential densities in large diameter material. These criteria would include leaving; obvious wildlife snags if safe to do so, riparian corridors, western larch and

Douglas fir snags above a set diameter (Exhibit Rd-8). Fishers have been shown to forage in a variety of habitats that generally contain overhead cover. Tree planting would accelerate regeneration of green canopy cover. With the fisher's wide variety of prey items, habitat changes resulting from salvage will likely increase the abundance and availability of some individual prey species and decrease that of others.

Riparian habitat would only be salvaged in the "R" units, generally 200' on the uphill side in areas with substantial slope, and 200' on both sides of the road for R units in areas of low to moderate slope. Salvage in these R units is proposed to prevent damage in riparian areas that would occur with firewood harvest along open roads. Negative effects to the fisher from salvaging in these riparian corridors would likely be similar to that which would occur with firewood harvest in these areas.

Reducing open roads would have slight beneficial effects including reduced loss of snags to firewood cutting, and reduced ease of access for trapping. The reduction in trapping access may be minimal as the areas are open to snowmobiling. Reducing motorized trails will likely have a positive benefit on security, and road decommissioning will result in short-term and temporary disturbance. This would further protect dead wood habitat and somewhat reduce the vulnerability of this species to trapping. Salvage operations, road maintenance, road decommissioning, and other activities may result in temporary and short-term disturbance.

Alternatives C, D, and E

The effects of Alternative C would be similar to those in Alternative B with the following exceptions and additions. In general, a decrease in the area and number of units salvaged would decrease the potential negative effects on fisher. Dropping the R units proposed in Alternative B may prevent severing of riparian corridors. This effect would be enhanced where the R units were along roads that would be closed as a result of access management and thus less susceptible to firewood cutting. If the units do not have desirable firewood tree species snags in them, or if these are not accessible, firewood cutters may not harvest in these areas even if they occur along open roads. Reduced motorized trails may provide for increased security, and road decommissioning would result in short-term and temporary disturbance.

The effects of Alternatives D and E would be similar to those in Alternative B with the following exceptions and additions. In general, increases in the area salvaged would increase the potential negative effects on fisher. Reduced snag retention and increased maximum snag diameters for harvest of western larch and Douglas would decrease the areas potential to function as denning habitat until the area again produces trees of sufficient size in approximately 150 years. The effects of salvaging the R units and further severing riparian corridors would remain. If increased motorized access occurs during the trapping season additional human caused mortality in this area may result.

Cumulative Effects

Effects Common to All Alternatives

Past and present cumulative effects in addition to those discussed above for each alternative have shaped this species' affected environment. For an assessment of this species' viability at the Forest level, see the Final Environmental Impact Statement for the Flathead's LRMP Amendment 21 (USDA 1999), Exhibit Rg-5, and Exhibit Rg-14, an assessment of the fisher and its habitat across USFS Region One.

As a result of habitat alteration and overexploitation by trapping, the fisher's status in the Western United States is thought to be "precarious and declining" (Witmer et al. 1998).

The absence of large fires over a period of 75 or more years resulted in denser, more closed canopies with more patches of shade tolerant tree species in the understory than typically occurred in the past. Fires and past timber harvest in the analysis area resulted in a complex matrix of edge, ecotones, microhabitat sites, and openings in various stages of regeneration. Recently, fire and timber harvest have reduced the availability of habitat with a relatively closed canopy of large trees and mature forest structure in the area across national forest, corporate, and private lands. This would have reduced the availability of denning habitat and forested connectivity. Across the analysis area, construction and use of roads has fragmented habitat, created openings, provided access for trappers and firewood cutters, and possibly made fisher more vulnerable to predation. Snowmobile use during the winter season is becoming increasingly popular, and advances in horsepower, traction, and suspension allow for greater access. The analysis area is part of MDFWP's trapping district 1, which has an annual harvest quota for fisher.

High quality fisher habitat in a large area running east of the proposed actions was lost to submergence during the creation of the Hungry Horse Reservoir.

Firewood harvest and roadside hazard tree removal has reduced snag and large downed wood habitat components. The Larch Heart Rot Study plans to take up to 400 snags in various size classes throughout the fire areas during the field seasons of 2004 and 2005. These snags will not be taken in any salvage harvest units and will be taken in close proximity to roads. Individual snags will be taken would be dispersed throughout the fire areas, and represent a negligible fraction of the snags proposed to be taken with any of the action alternatives.

Future wildfire or timber harvest activities in the area would likely have negative cumulative effects on fisher habitat. No vegetation management activities are planned on national forest lands in the analysis area in addition to those proposed in the action alternatives.

A relatively high concentration of human activity was experienced during suppression of the fires. The fire itself likely would have been the primary factor of disturbance, with suppression efforts being secondary. The construction of fire line, particularly using dozers, may have removed some habitat for fisher, but this would have been incidental to the fire itself. The suppression of the fires likely protected habitat outside of the fire areas.

Open expanses resulting from continuous high and moderate burning may have resulted in changing habitat conditions that favor other predator species, resulting in greater predation and interspecific competition. If multiple individuals were present in or near the fire area, intraspecific competition may increase in remaining quality fisher habitat.

Implementation of the proposed actions in combination with cumulative effects may impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population or species.

Northern Goshawk

Affected Environment

Within Montana, the northern goshawk (*Accipiter gentilis*) is not a federally listed or candidate species with the USFWS, or currently petitioned for listing. The northern goshawk has an S3 and S4 status with the MDFWP. An S3 status is defined as "Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas." An S4 status is defined as "Uncommon but not rare (although it may be rare in parts of its range), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern." The Flathead National Forest identifies the northern goshawk as a sensitive and management indicator species, as well as an old growth associate.

In addition to being a sensitive species for the Flathead National Forest, the northern goshawk is recognized as an old growth associate. The 1998 U.S. Fish and Wildlife Service (USFWS) review of goshawk in the western United States found that although forest management has changed the vegetation characteristics throughout most of the west, the goshawk continues to be well distributed throughout its historical range and there was no evidence of substantial population declines (Clark 1998). An assessment of potential goshawk habitat across USFS Region One (Exhibit Rs-16) done in 2003 found at least 68 percent of the Region's sixth-code Hydrologic Units have sufficient habitat for goshawks. Surveys specific to goshawk have not been completed in the analysis area in recent years. Management recommendations for the northern goshawk in the southwestern United States were developed by the USFS in 1992. These recommendations recognized three components of a goshawk's nesting home range including nest area, post-fledging area (PFA), and foraging area. Across the range of the species, home range areas are generally approximately 6,000 acres (Reynolds et al. 1992).

This species breeds in coniferous, deciduous, and mixed forests throughout much of North America. Exclusive of nesting areas, home ranges of adjacent pairs are not defended and may overlap (Squires and Reynolds 1997). Home ranges during nesting vary from 235 to over 8,500 acres depending on sex and habitat characteristics (Squires and Reynolds 1997). The nest area (approximately 30 acres) generally contains one or more stands of large old trees with dense canopy cover. Most goshawks have two to four alternate nest areas within their home range.

Warren (1990) suggested minimum patch size for nest stands is 25 acres with 125 acres being optimum. Northern goshawks have both relatively high nest site and mate fidelity (Detrich and Woodbridge 1994, Reynolds et al. 1994).

Northern goshawks have been documented in a variety of tree species found in the west including; aspen, Douglas fir, Engelmann spruce, grand fir, lodgepole pine, ponderosa pine, subalpine fir, western larch, and white fir (Hayward 1983, Lemke 1994, Moore and Henny 1983, and Patla 1990). Nesting habitat is typified by stands with dense canopy and late forest structure (Daw and DeStefano 2001, Beirer and Drennan 1997, Squires 2000, Reynolds et al. 1992, Graham et al. 1999). Hayward and Escano (1989) found nest sites in northwest Montana were often located in even-aged, single-storied, mature forest stands with a high canopy closure of widely spaced large trees. Squires and Ruggiero (1996) agreed with this description, adding that nest stands generally had clear forest floors. (Hayward and Escano (1989) found that in western Montana and northern Idaho, nesting habitat was generally found at lower to mid-elevation in moist habitat dominated by Douglas fir and mixed conifer forests. (Kirkley (1996) found goshawks in Montana nested predominately in mature large-tract conifer forests with a high canopy cover (69%), on slopes with little to sparse undergrowth. Goshawk nests are generally found on gentle to moderate slopes (less than 25 percent). Goshawks are more likely to occupy areas with relatively low amounts of stand initiation, shrub, or sapling habitat (Finn et al. 2002), with a low density of small trees in nest stands (Squires and Ruggiero 1996).

There are no confirmed nest sites within this watershed, but a possible nest was located in the Ball fire area in June of 2004 (Exhibit Rg-4). The severely burned and much of the moderately burned areas do not provide nesting or post-fledging habitat. Without stands of dense, mature, and generally live trees, goshawks are unlikely to nest in an area, but the vast majority of the habitat they use is for foraging. Preliminary monitoring of goshawks on the Bitterroot National Forest (Lockman, personal communication. 2002) following the fires of 2000 indicates that islands of green forest can still provide suitable nest habitat, while the edges of moderate and high severity burns can provide foraging habitat. Potential nesting habitat may exist in mature forest stands within the fire perimeters that burned with low severity, or in the adjacent unburned forest. It is possible that nest stands or trees were burned in the fires. It is doubtful that adult northern goshawks were killed in the fires and the fires occurred late enough in the year that young had likely fledged and were mobile.

The PFA (approximately 420 acres) surrounds the nest area. The post fledging area (PFA) is an area around the nest providing hiding cover and foraging practice for the young goshawks. It is used by the young from the time of fledging until they are no longer dependent on the adults for food. A study in eastern Oregon indicated that the PFA was a mix of different structural conditions, with a majority in the higher canopy closure categories. There was a positive association for openings in the forest cover within the PFAs (Daw and DeStefano 2001). PFA habitat is provided within the analysis area by the mosaic of unburned habitat and burn severities as well as adjacent unburned habitat.

The foraging area is approximately 5,400 acres in size and surrounds the PFA. Within this area, goshawks use available habitats opportunistically to hunt small to medium sized birds and mammals (Reynolds et al. 1992). The primary prey of goshawks in the Northern Region include

red squirrels, ground squirrels, snowshoe hares, woodpeckers, flickers, jays, grouse, robins and other passerine species (Warren, 1990). A study in south-central Wyoming determined that nesting goshawks foraged primarily on red squirrels, northern flickers, American robins, golden-mantled ground squirrels, and chipmunks (Squires 2000).

The goshawks morphology and behavior are adapted for hunting in moderately dense, mature forests. Goshawks are fast and maneuverable, and often attack from perches, using their short, broad wings and long tail to quickly maneuver through forested habitat. Foraging habitat is typically forests with relatively open understories (Beier and Drennan 1997, Squires and Ruggiero 1996). The goshawk is generally associated with mature open forests, but when foraging it can use a variety of forest types, forest ages, structural conditions, and successional stages. Ideal foraging habitat should consist of mature to late-seral stands with at least 40 percent canopy closure in dominant trees and an open understory. A study of forest structure and prey abundance in foraging areas of northern goshawks in northern Arizona indicated that prey availability, not prey abundance, determined habitat selection for foraging. Goshawks selected foraging sites that had higher canopy closure and density of trees than on contrast plots (Beier and Drennan 1997). Underburning can have a positive effect on goshawk habitat (Squires and Ruggiero 1996; Graham, et al. 1997, Finn et al. 2002). See Exhibit Rs-16 for more information.

A variety of forage opportunities are available in the mosaic of burn severities and unburned areas within the fires perimeters, and in the adjacent unburned forest. Goshawks may use the edges of burned areas for hunting. Foraging opportunities may increase between burned and unburned areas outside the fire due to the edge effect created by the fire. The edge will likely increase passerine bird diversity and reduce hiding cover, which will benefit goshawk (Smith 2000).

Environmental Consequences

Effects on the northern goshawk are directly related to two issues discussed in Chapter 1.

- Issue #9, Possible Old Growth and "Recruitment" Old Growth Should Not be Salvage Logged

  Issue Indicators: Acres of salvage harvest in pre-fire old growth with unknown post-fire status; Acres of salvage harvest in "recruitment old growth."

There was one "Other Key Issue" identified but not used in alternative development that was relevant to the northern goshawk.

- Issue #10, Burned-up Old Growth should not be Salvage Logged

Direct and Indirect Effects

Other specific issues that may be affected by the proposed alternatives include; the effects on forest structure particularly regarding nesting and post-fledging habitat, as well as prey species availability, the extent and connectivity of existing old growth habitat and late-seral forests,

adequate nest sites, pre-fire old growth and late-seral forest with an intact live overstory, post-fledging habitat, adequate forest structure for foraging habitat, prey availability, snags and downed wood available for prey species habitat, and late seral stage patch size and distribution.

Potential goshawk nesting habitat was identified as late seral and old growth habitat retaining a live overstory canopy of trees >17" DBH, with habitat types having a more open understory (for example ABLA/MEFE and ABLA/OPHO were excluded). ArcView GIS was used to determine where potential nesting habitat occurred in relation to the project areas. The size of nest habitat blocks and connectivity with adjacent areas of late seral habitat were also evaluated. Sections on "Snags and Downed Woody Material Wildlife Habitat" and "Old Growth Habitat and Old Growth Associated Wildlife Species," also provide relevant habitat analysis. For more information about this species and its habitat at various scales, including that of the Flathead National Forest, see Exhibit Rs-16.

The greatest impact to goshawk habitat in the project areas was the fires. The fires burned and fragmented large blocks of contiguous habitat and may have displaced individuals. According to GIS analysis, the cumulative effects analysis area provides a total of 9,539 acres of potential goshawk nesting habitat. There are 77 potential nest stands ranging in size from 26-979 acres, with an average stand size of 124 acres. In most of the area, potential nest stands are still adjacent to late seral habitat providing post-fledging areas of at least 420 acres. However, within the Blackfoot and Ball fire areas, most potential nest stands are surrounded by early seral habitat. In the Blackfoot area there are 12 potential nest stands less than 125 acres and 5 potential nest stands ranging in size from 125-582 acres. Within the Ball fire area, there are 8 potential nest stands less than 125 acres and 4 potential nest stands ranging in size from 125 to 324 acres.

Verified old growth habitat will be removed from salvage units pending results of post-fire old growth surveys. Potential nesting and post-fledging habitat would be largely absent within the proposed salvage unit boundaries, but would be found in some adjacent areas. The burned environment within salvage units may provide marginal foraging habitat. Salvage would target fire-killed trees and green trees likely to die from fire stress or insect attack in the near future. As goshawks generally utilize green and often older mature forests, the effects of salvage on goshawks would be negligible and primarily associated with prey availability. Meeting forest standards for down woody debris and snag retention would minimize impacts on some prey species. Implementation of any of the alternatives would result in increased availability of some prey species and decreased availability of others.

Alternative A

No additional salvage or rehabilitation actions are proposed with this alternative. The reduction of late-seral and old growth habitat as a result of the fires has reduced nesting habitat in the burned areas. The fire-killed snags left under this alternative would provide standing and large downed wood contributing to foraging habitat value until large diameter trees are produced onsite again in approximately 150 years. The abundance and availability of individual prey species may vary across alternatives, but with the northern goshawk's wide variety of prey items there would likely be an increased availability and abundance of some prey species and a decreased availability for others. Within areas with live canopies experiencing heavy to total mortality from

fire, it would take approximately 150 years or more for a closed canopy mature forest with complex structure to develop. Additional disturbances to the area such as insect or fire would set back succession and delay development of a mid- to late-seral forest. The retention of all fire-killed trees would contribute to fuel loading which may provide relatively higher fuels than other alternatives for potential future fires. Areas that experienced an understory burn and retained a canopy of live large trees may be better northern goshawk habitat than before the fire.

Alternative B

This alternative proposes salvaging 6% of the total potential nesting habitat in the area (Table 3-112). Much of this is surrounded by early seral habitat created by the fires.

Table 3-112. Acres of potential northern goshawk nesting habitat proposed for salvage under Alternative B.

Fire Area	Beta-Doris	Doe	Blackfoot	Ball	Total
Acres proposed for Salvage	144	6	125	322	597

Northern goshawks generally nest in live trees, and often in the largest size class trees in a stand. It is unlikely that salvage would remove nest trees as a result of the criteria for leaving live trees and the largest fire-killed western larch and Douglas fir. Foraging potential would benefit from the criteria for leaving obvious wildlife trees/snags if safe to do so, strips along the important riparian corridors, maximum DBHs for salvage of western larch and Douglas fir, and potentially additional leave patches. Not removing these large trees and snags will provide snag and large downed wood habitat for prey species until large trees and large downed wood are again produced onsite in approximately 150 years. With the northern goshawk's wide variety of prey items, salvage will likely increase the abundance and availability of some individual prey species and decrease that of others. The amount of reduced open roads and motorized trails may provide minimal positive affects by improving nest security, and security for some prey species. Decommissioning roads would cause short-term and temporary disturbances.

Leaving all live trees wherever safe to do so would optimize the potential of the area for future nesting habitat. The amount of large downed wood would be less than in the No Action alternative but will be provided by un-merchantable pre-fire downed wood, un-merchantable material left standing, later windfall of leave trees and leave snags, and felled hazard or un-merchantable trees. Tree planting would accelerate regeneration of green canopy cover, and may reduce the probability of fire spreading to remaining adjacent nesting habitat. The small amount of proposed temporary roads would not have a measurable impact on goshawk habitat. If nesting were occurring near salvage operations, they would be a temporary disturbance associated with project activities. Winter salvage activities would take place outside of the nesting period.

Alternative C, D, and E

The effects of Alternative C would be similar to those in Alternative B with the following exceptions and additions. In general, a decrease in the area and number of units salvaged may decrease the potential for negative effects on the northern goshawk. There would be a reduced

chance of activities removing future nest trees, or of disturbing adjacent nesting activities. Reduced open roads and motorized trails may provide some increased security for the northern goshawk and prey species. Road decommissioning may cause short-term and temporary disturbance.

The effects of Alternatives D and E would be similar to those in Alternative B with the following exceptions and additions. In general, increases in the area salvaged would increase the potential negative effects on the northern goshawk. Reducing snag retention and snag patch sizes, and increasing maximum snag harvest diameters, would likely decrease the available prey base until the area again produces trees of sufficient size (approximately 150 years) to provide cavity supporting trees and snags, and large downed wood. The effects of increased motorized access would be to increase the chance of disturbing nesting activity near roads.

Cumulative Effects

Past and present cumulative effects in addition to those described above have shaped this species' affected environment. For an assessment of this species' viability at the Forest level, see the Final Environmental Impact Statement for Amendment 21 of the Forest Plan (USDA 1999) and Exhibit Rg-5. Exhibit Rs-16 is an assessment of the northern goshawk and its habitat across USFS Region One.

Fire suppression and timber harvest have altered the availability of habitat with large trees and open understories (primarily southerly slopes) in the greater area. The absence of large fires, possibly associated with effective fire suppression during the past 75 or more years has resulted in increased understory growth and dense mid-canopy shade tolerant trees, reducing the potential of foraging habitat.

Past timber harvest of old growth stands has reduced available nesting habitat by reducing canopy closure and removing larger size class trees. However, observations of goshawk nest sites on the various National Forests found numerous nests in second growth forests with medium size (20" dbh) trees.

No vegetation management activities are planned on national forest lands in the analysis area in addition to those proposed in the action alternatives. Future wildfire or timber harvest activities in the area would likely have negative cumulative effects on goshawk habitat (with the exceptions of understory burning or thinning from below).

Northern goshawk habitat in a large area running east of the proposed actions was lost to submergence during the creation of the Hungry Horse Reservoir.

A relatively high concentration of human activity was experienced during suppression of the fires. The fire itself likely would have been the primary factor of disturbance, with suppression efforts being secondary. The construction of fire line, particularly using dozers, may have removed some habitat for goshawk but this would have been incidental to the fire itself. The suppression of the fires likely protected habitat outside of the fire areas. The use of fire retardant likely had little, if any direct effect on this species.

Open expanses resulting from continuous high and moderate burning may have resulted in changing habitat conditions that favor other raptor species, resulting in greater interspecific competition for the goshawk. If multiple individuals or pairs of goshawks were present in or near the fire area, intraspecific competition may increase for remaining quality goshawk habitat.

Implementation of the proposed actions in combination with cumulative effects may impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population or species.

Townsend's Big-Eared Bat

Affected Environment

Within Montana, the Townsend's big-eared bat (*Plecotus townsendii*) is not a federally listed or candidate species with the USFWS, or currently petitioned for listing. The Townsend's big-eared bat has an S2 and S3 status with the MDFWP. An S2 status is defined as "At risk because of very limited and potentially declining numbers, extent and/or habitat, making it vulnerable to global extinction or extirpation in the state." An S3 status is defined as "Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas." The Flathead National Forest identifies the Townsend's big-eared bat as both a sensitive and management indicator species.

This species occurs in a wide variety of habitats and has a widespread distribution but is uncommon to rare. The current range extends throughout western North America with isolated populations further east. The Townsend's big-eared bat is a specialist, feeding almost exclusively on small moths (Dobkin et al. 1995) high in living forest canopy, and occasionally gleans beetles, flies, and other insects from leaves. Their primary foraging sites are near wet meadows in a wide variety of forest types, but they have also been observed feeding along forest edges, roads, or open areas within a forest (Christy and West 1993). A notable decline has been reported in the western United States (Dobkin et al. 1995). This species is very sensitive to human disturbance (Genter and Jurist 1995). The most serious factor leading to population declines in bats, including this species, is loss and disturbance of suitable roosting habitat. Loss and degradation of foraging habitat may also contribute to the declines of populations. The Townsend big-eared bat's roost fidelity, longevity, and low reproductive capability all combine to intensify any negative effects of anthropogenic threats to the species (Christy and West 1993, Pierson et al. 1999).

This species' distribution is limited by the availability of roosting habitat such as caves and human-made structures such as buildings or mines that provide sites for communal nurseries or winter hibernation (Christy and West 1993, Reel and Ruediger 1989, Tuttle and Taylor 1994).

Tree cavities and rock outcrops may also be used. Maternity roosts are used for whelping and raising the young and hibernacula are used for over-wintering. This species uses a variety of roosts for different purposes. In addition to maternity roosts and hibernacula, there are smaller roosts used during the day by individuals for sleeping and resting that provide security from predators and prevent exposure to sunlight. Similar, smaller roosts are used at night when resting from hunting and for feeding on captured prey. The relatively large maternity roosts and hibernacula of the Townsend's big-eared bat are of primary importance.

There is no documentation of caves, mines, roosts, or individuals of this species within the analysis area. However, the area has not been surveyed for roosting habitat or bat occupancy, and there is the potential for communal roosts or individuals to occur. It is possible that undocumented caves or mines occur within the proposed areas. There appears to be sufficient foraging habitat and the snags and live large trees that may contain adequate cavities for roosting in the proposed project areas.

The 2003 fires reduced the number of large trees and snags with potential roosting cavities. If Townsend's big-eared bats did occur in the area during the fires, burning in the immediate vicinity of bat roost sites may have caused the death of individuals from smoke inhalation and heat stress. If roosts did occur within the project area and individuals were displaced during the day, they would have been susceptible to an increased risk of predation. If Townsend's big-eared bats do roost within the project area, they may be using remaining large live trees and snags with cavities. Individuals may be roosting under bark separated from live or dead trees. Roosts of primary importance associated with live trees and snags in this area would be in relatively large cavities providing potential communal roosting habitat. As a result of the fires, foraging opportunities may have increased with increased edge, and the availability of prey likely increased for some species and decreased for others.

Environmental Consequences

One "Key Issue" discussed in Chapter 1 is directly related to the effects on the Townsend's big-eared bat.

- Issue #9, Possible Old Growth and "Recruitment" Old Growth Should Not be Salvage Logged

  Issue Indicators: Acres of salvage harvest in pre-fire old growth with unknown post-fire status; Acres of salvage harvest in "recruitment old growth."

One "Other Key Issue" discussed in Chapter 1 is related to the effects on the Townsend's big-eared bat.

Issue #10, Burned-up Old Growth should not be Salvage Logged

Direct and Indirect Effects

The effects of alternatives on potential communal roost sites are the primary issue for Townsend's big-eared bats.

Alternative A

No additional salvage or rehabilitation actions are proposed with this alternative. Potential roosting cavities would remain in the larger, wind resistant fire-killed snags and trees and contribute to this area's potential as habitat until large diameter trees and associated cavities are again produced onsite again in approximately 150 years. There would be an increased availability of some prey species and a decreased availability of others. The retention of all snags would contribute to fuel loading which may provide relatively higher fuels for future fires than salvage alternatives.

Alternative B

The loss of communal roosting habitat potentially found in the cavities of large snags or trees in salvage areas is the primary effect consideration for this species. If Townsend's big-eared bats roost within the project area, reducing large fire-killed snags that may have large cavities would negatively affect roosting habitat for this species. Potential roosting habitat will benefit from the criteria for leaving obvious wildlife trees/snags if safe to do so, strips along the important riparian corridors, maximum DBHs of western larch and Douglas fir for salvage, and potentially additional leave patches. Retaining these large trees and snags will retain large cavities until large trees and snags are again produced onsite in approximately 150 years. The reduction in open roads may prevent some potential roosting snags from being harvested for firewood. Reducing motorized trails would likely not affect this species, and decommissioning roads could cause short-term and temporary disturbance.

If Townsend's big-eared bats occur in the area, salvage activities in the immediate vicinity of bat roost sites may disturb individuals or colonies for the duration of salvage activities. Individuals displaced during the day would be susceptible to an increased risk of predation. The disturbance of communal roosts such as maternity and hibernacula in or adjacent to salvage activities would have the greatest detrimental effects on this species. Disturbance when maternity roosts are active would occur when individuals, both females and young, are very vulnerable. Winter salvage activities could cause direct mortality to individuals if hibernacula were destroyed or disturbed, causing thermal stress and associated mortality. Prey availability would likely increase for some species, and decrease for others.

Alternative C, D, and E

The effects of Alternative C would be similar to those in Alternative B with the following exceptions and additions. In general, a decrease in the area and volume salvaged may decrease the potential for negative effects on the Townsend's big-eared bat. There would be a reduced risk of cutting snags with roosting cavities or of cutting or disturbing live trees with cavities. A further reduction in open roads may provide for a decreased number of roosting trees or snags

being cut for firewood in this area. Reducing motorized trails would likely have little to no effect on this species. Road decommissioning would cause short-term and temporary disturbance.

The effects of Alternatives D or E would be similar to those in Alternative B with the following exceptions and additions. In general, increases in the area and volume salvaged would increase the potential negative effects on the Townsend's big-eared bat. Reducing snag retention and increasing minimum snag diameters would remove large trees and snags with associated cavities decreasing potential roost sites until the area again produces trees of sufficient size (approximately 150 years) to support large cavities. Increased motorized access would give greater access to potential roost snags for firewood cutting.

Cumulative Effects

Past and present cumulative effects in addition to those described above have shaped this species' affected environment. For an assessment of this species' viability at the Forest level, see the Final Environmental Impact Statement for Amendment 21 of the Forest Plan (USDA 1999) and Exhibit Rg-5.

There is a small chance that some Townsend's big-eared bats were killed in the fires, and that large trees or snags containing roosting cavities were burned. It is doubtful that adequate sites for maternity roosts and hibernacula occurred in the fire perimeter prior to the burns. There is a possibility that past activities such as timber harvest, dozer fire line construction, or road construction impacted roost sites (primarily caves or crevices) in the past. If Townsend's big-eared bats occur or occurred in the area, some trees and snags containing adequate roosting cavities were likely removed during timber harvest and other activities.

Riparian habitat is recognized by some sources as particularly valuable habitat for Townsend's big-eared bats, all salvage activities include buffers around riparian areas. Some riparian habitat was affected by the wildfires.

No vegetation management activities are planned on national forest lands in the analysis area in addition to those proposed in the action alternatives. Future wildfire or timber harvest activities in the area may have negative cumulative effects on habitat (with the possible exceptions of understory burning or thinning from below).

Habitat in a large area running east of the proposed actions was lost to submergence during the creation of the Hungry Horse Reservoir.

Human activity from timber management and recreation may disturb roosting bats, as they are sensitive to disturbance during this period. A relatively high concentration of human activity was experienced during suppression of the fires. The fire itself likely would have been the primary factor of disturbance, with suppression efforts being secondary. The construction of fire line, particularly using dozers, may have removed some habitat but this would have been incidental to the fire itself. The suppression of the fires likely protected habitat outside of the fire areas. The use of fire retardant likely had little, if any direct effect on this species.

The burns resulted in changing habitat conditions that may favor the Townsend's big-eared bat or other chiropteran species, possibly resulting in greater interspecific competition or advantage. The burns resulted in changing habitat conditions that may favor predators of the Townsend's big-eared bat, resulting in increased predation.

Implementation of the proposed actions in combination with cumulative effects may impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population or species.

Wolverine

Affected Environment

Within Montana, the wolverine (*Gulo gulo*) is not a federally listed or candidate species with the USFWS, or currently petitioned for listing. The wolverine has an S3 status with the MDFWP. An S3 status is defined as "Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas." The MDFWP currently manages the wolverine as a furbearer in trapping districts 1 through 5 with a limit of one wolverine per trapper annually. Montana is the only state in the conterminous U.S. that currently allows the legal harvest of wolverines. The Flathead National Forest identifies the wolverine as a sensitive and management indicator species.

The range of this medium-sized carnivore includes portions of the tundra, boreal, and mountain regions of North America and Eurasia. Wolverines have large home ranges, low reproductive potential, and are more ecologically similar to large carnivores than other species of similar size (Weaver et al. 1996). Wolverine habitat normally encompasses large areas of rugged, remote terrain, and populations naturally exist at relatively sparse densities. Wolverines are generally associated with remote wilderness areas, and are considered to be sensitive to human development, especially with respect to selection of denning sites (Banci 1994). Even in areas that have not been subjected to human encroachment, wolverines naturally exist at very low densities. Isolation from human impacts and activities, a diverse prey base, ungulate carrion, and natal den site security seem to be the primary factors associated with effective wolverine habitat. Hornocker and Hash (1981) identified habitat loss and predation by humans as the most important factors affecting wolverine numbers. Wolverine appear to not tolerate land-use activities that permanently alter habitats, such as agriculture, and urban and industrial development (Banci 1994). Refugia, large areas that are not trapped and free from land-use impacts, can serve as sources of dispersing individuals (Banci 1994).

Wolverine home ranges vary from less than 37 square miles to greater than 347 square miles (Banci 1994), which is very large relative to other species of similar body size, and is more on

order with that required by larger carnivores such as the grizzly bear. In central Idaho, Copeland (1996) found home ranges ranging from 148 to 611 square miles. Wolverines do not appear to be as territorial as once thought, and ranges of individuals can overlap. In summer, wolverine in Montana travel to higher elevation forests dominated by subalpine fir. In Idaho higher elevation talus/rock cover types were preferred during summer, and montane coniferous forest cover types during winter.

The diet of the wolverine is very broad and varies with region and season. The wolverine is an excellent scavenger of carrion, with a robust skull, musculature, and dentition (Pasitschniak-Arts and Lariviere 1995) capable of crushing large ungulate bones and rendering frozen carcasses. Movement to lower elevations in winter may result from increased presence of carrion attributable to the fall big game hunting seasons (Copeland 1996), and winter-kill (Butts 1992). Additionally, the wolverine is a proficient predator capable of killing large ungulates, primarily in deep snow. More commonly they prey on smaller species such as snowshoe hares, cottontails, ground squirrels, porcupines, marmots, skunks, and weasels (Banci 1994; Copeland 1996). They also opportunistically consume berries, insects, fish, birds, and eggs. In central Idaho, a study conducted from 1992 to 1995 indicated that ungulates (predominantly carrion) were the most common food item, with small mammals (rodents and lagomorphs) being second (Copeland 1996).

Wolverine natal den habitat in the northern Rockies is strongly tied to secluded, high elevation, glaciated landscapes (Copeland 1996, Hillis and Kennedy 2002, Hornocker and Hash 1981, Magoun and Copeland 1998). Females den in very remote, high elevation cirque basins in late winter (Foresman pers comm.) Wolverine dens have been located in high elevation cirque basins and may also occur in cirque headwalls or avalanche chutes. Low availability of natal dens may limit reproduction in some areas, especially those that have been extensively modified by logging or other land use practices such as ski resorts (Banci 1994). Female wolverines may be extraordinarily sensitive to human disturbance near the natal den site (Copeland 1996). Moving kits in response to this disturbance potentially increases kit mortality. Given the wolverine's low fecundity any reproductive losses could be significant.

Hillis and Kennedy (2002) mapped wolverine natal den habitat in Region One using three criteria; minimum elevation, degree of concavity, and degree of slope. The minimum elevation west of the continental divide used was 6,200 feet. Slope concavity is a feature fairly unique to glaciated landscapes and thus a good predictor of cirque basins. Maximum slope was limited to 30%. Cirque basins identified by this method were then buffered for two miles above 6,200 feet. The result revealed a mix of potentially suitable natal den habitat (cirques and avalanche chutes) across the landscape. Nearly 75% of the identified natal den habitat on the Flathead National Forest was protected by designated wilderness. The Flathead National Forest plan was reviewed to identify those management Areas (not designated wilderness) that precluded snowmobiles. When those restrictions were considered the percentage of natal den habitat protected increased from 73.1% to approximately 90% (Hillis and Kennedy 2002).

High elevation cirque basins have traditionally received little human activity in late winter with the exception of downhill ski areas. Kennedy, however, demonstrated that the recent popularity of backcountry snowmobiling and the advent of more powerful snowmobiles have resulted in

substantially increased late winter disturbance into areas suitable for denning female wolverines (Kennedy In: USDA 1998). With increased horsepower, improved traction, and improved suspension, snowmobilers are able to access more remote and rugged areas. Copeland (1996) believed that over-snow vehicles and increased interest in winter recreation has likely displaced wolverines from potential denning habitat in Central Idaho. Copeland (1996) found that when denning females were exposed to even low levels of human disturbance, those females immediately relocated their dens, often miles away from the original location. Several researchers have speculated that such behavior to avoid humans could result in reduced young survival or total den failure (Ruggiero et al. 1994, Copeland 1996). Krebs corroborated this assumption in British Columbia by demonstrating that wolverine populations had the highest levels of juvenile recruitment within areas where there was no human disturbance in late winter. Since backcountry snowmobilers are capable of covering a vastly greater area than cross-country skiers, and areas accessible to snowmobiles are vastly greater in size than lands occupied by downhill ski areas, backcountry snowmobiling has been identified as a possible limiting factor to wolverines in Region One. All of the proposed project areas fall within larger areas that are open to snowmobiling.

Survival is substantially lower in trapped populations of wolverines, and human caused mortality is largely additive to natural mortality (Krebs et al. 2004). Trapping may be a threat to wolverines as they have a low realized biological potential and are easily trapped (Ruggiero et al. 1994). Highways likely form barriers and cause occasional mortalities for this wide ranging and high mobile species. Backcountry snowmobiling constitutes the limiting factor managed by National Forests that is the most likely limiting factor on wolverine.

Wolverine likely occur in low densities in the greater area encompassing and surrounding the proposed project areas. The project area provides habitat for many of the species included in the wolverine's broad diet. Timber harvest may benefit some of the wolverine's prey by providing early seral conditions often preferred by big game for seasonal foraging and snowshoe hare and ground squirrel habitat. Negative benefits to prey species have also likely resulted from timber harvest. Reduced canopy cover reduces thermal cover effectiveness and the ability of the canopy to capture some of the snow that would otherwise fall on foraging habitat. Timber harvest also reduces mature forest attributes such as a complex physical structure affecting many smaller forest species. The early seral stages provided by past timber harvest may be particularly important in a landscape where large fires have until recently been successfully suppressed. Ungulate carrion is provided from winterkill and big game hunting seasons.

The Westside Reservoir Fires burned large areas of suitable wolverine habitat and temporarily may have reduced the suitability of this habitat to marginal. This reduction in suitability is primarily a result of cover loss, and temporary reductions in prey species and ungulate carrion. The project areas are within mosaics of fire severity within a larger mosaic of habitats at the scale at which a wolverine would range. Considering their broad diet and the speed at which initial vegetative recovery establishes, the period that the area's suitability is reduced for the wolverine would be relatively short. Deer, elk, and moose tracks were observed frequently and regularly in the post fire area the summer following the fires (Exhibit Rg-4). If wintering ungulate populations or ungulate carrion were reduced in the area resulting from the fires, this could have a negative effect on wolverine in a limited area.

Environmental Consequences

Four "Key Issues" discussed in Chapter 1 are directly related to effects on the wolverine.

- Issue #1, Not Enough Snags are Being Left on the Landscape
  Issue Indicators: Average density of large larch and Douglas-fir after salvage across salvage units that support these trees, by fire area; Percent of area with high densities of large larch and Douglas-fir after salvage.
- Issue #5, Grizzly Bear Security is not Adequately Addressed in the Proposed Action
  Issue Indicators: Number of A19 component standards (security core, total road density, and open road density) met or exceeded across the six bear management subunits. There are a total of 18 of these components in the project area.
- Issue #6, Bald Eagle Security and Big Game Winter Range Quality Need to be Emphasized
  Issue Indicators: Acres of salvage in older Douglas-fir stands that burned at low or moderate intensity in known ungulate winter range.
- Issue #7, Public Motorized Access is Reduced Too Much
  Issue Indicators: Miles of road closed to public wheeled motorized vehicles over the existing condition.

Direct and Indirect Effects

The following Effects Indicators were used to focus the wolverine analysis and disclose relevant environmental effects:

- An assessment of effects on prey and ungulate carrion.
- Potential disturbance from implementation.
- Amount of natal denning habitat within proposed salvage units.
- The results on habitat security from human disturbance.

None of the proposed alternatives would cause permanent habitat loss. Regarding the effectiveness of wolverine habitat it is likely that remote and unroaded areas are better than roaded and "heavily-use" habitats, and activities that enhance the ungulate populations are better than those that reduce ungulate populations. Project implementation will not likely promote the use of the area as denning habitat, but only a minuscule fraction of the proposed project is potential denning habitat as it is. Given the tendency for wolverine population viability to increase with remoteness from humans and human activities, wolverine would likely benefit similarly to grizzlies from the implementation of Amendment 19.

Alternative A

No changes to access management, additional salvage, harvest, or other rehabilitation actions would occur with this alternative. Under this alternative, short-term effects on potential live prey and carrion sources would be variable. Short-term effects of limited availability of forage and loss of thermal cover may benefit wolverine because of potential over-winter mortality of big game animals. The potential winter ungulate mortality is depends both on the condition of the

animals going into winter, and the severity of the winter. These both depend on unpredictable climatic influences such as precipitation during the growing season, and snowfall and extreme temperatures during the winter. The occurrence and abundance of individual prey species included in the wolverines broad diet would fluctuate and change over time as the areas progress through successional pathways. Motorized access, particularly snowmobiling, would not change under this alternative, and the related levels of disturbance and resulting decreased habitat effectiveness would continue.

Alternative B

Winter salvage activities would be conducted on approximately 20 acres of identified potential natal den habitat. This represents a minuscule fraction of available natal den habitat in the area, and of the total area proposed for salvage (Exhibit Rs-17). If wolverine were in the area during salvage operations or other activities, there would be associated temporary and short-term disturbance and displacement. Project activities will likely have a negligible effect on ungulate carrion and prey species in the project area. Wolverine would benefit by reducing motorized access. Benefits would include decreased disturbance, decreased access for trapping (perhaps offset by the area being open to snowmobiling), and increased security for prey species. Decommissioning roads would result in short-term and temporary disturbance.

Effects on Prey and Ungulate Carrion

When considering the potential for an area to support wolverine, vegetative characteristics are likely secondary to the availability of large ungulate carrion and smaller prey items. Ungulates and other prey species would be temporarily disturbed and dislocated during project activities. Vegetative manipulation may affect the use of the area by ungulates and the availability and composition of smaller prey species. Project implementation will likely have a negative effect on some prey species and a positive effect on others. Wolverines largely depend on ungulate prey and carrion during winter and spring. There is no identified winter range in the Beta, Doe, or Blackfoot fire areas, but some elk winter range identified through interagency efforts does occur in the Ball Fire Area and proposed salvage units. Some ungulates may winter in the lower elevations of the fire areas and winter harvest activities in those areas could temporarily directly impact big game use for a limited time period. This may cause greater energy expenditures and reduced winter forage availability. Associated ungulate mortality may benefit wolverine by providing additional carrion, but mortality at levels affecting ungulate populations could negatively affect wolverine. If ungulate mortality does result from project activities it would not be at a scale detrimental to ungulate populations.

The retention of large diameter snags and reserve patches would provide additional security cover for big game during hunting seasons and during calving/fawning seasons. Retention of snags and coarse woody material would improve habitat for many smaller prey species and should increase both abundance and availability of these prey items. The project areas would constitute a small percentage of land across the landscape and large areas adjacent to salvage activities should provide adequate displacement and source areas for prey species. Extensive winter mortality of ungulates would not be expected in the fire areas as the project areas have little winter range in

them. Winter ungulate losses are expected to be low, if any, in the fire areas, and long-term reduction in winter range or ungulate carrion would not occur as a result of project activities.

Potential Disturbance from Implementation

Road closures and decommissioning proposed under this alternative would improve habitat suitability for wolverine by reducing overall road density in both fire areas. This alternative would have a beneficial impact on wolverine by reducing access into high elevation habitats. The proposed temporary roads should have minimal, if any impacts as they would be short spurs and open for a short period of time. The proposed reduction in motorized access would improve habitat suitability for wolverine. Implementation would occur during summer and winter seasons under all alternatives. Salvaging should not directly affect wolverine habitat, but disturbance-related effects could indirectly affect wolverine. Project activities could occasionally temporarily disturb individual wolverines. The general remoteness of the project areas, adjacent habitat, and roadless areas within or adjacent to the fire perimeters should provide adequate hiding and traveling areas for wolverines moving through the area. Disturbance and displacement related affects would be extremely rare events likely confined to rare possible instances of wolverine traveling through the area. Winter and early spring activities could affect denning activities if wolverine dens were in the vicinity.

Potential Natal Den Habitat within Proposed Salvage Units

There were 632,000 acres of natal den habitat identified on the Flathead National Forest (Hillis and Kennedy 2002). Ninety-three of these acres are within the proposed project areas representing 1.5% of the 6,128 original acres proposed for harvest. This modeled potential natal den habitat overlaps with three units in the Beta Fire area, some of which are proposed for winter harvest. Given the wolverine's low densities and large home ranges any given area of random natal den habitat has a small chance of being used by a wolverine. If these or similar areas are used by wolverine for denning during winter salvage activities, disturbance and a subsequent increased kit mortality risk would likely result. No long-term effects on the potential of the area to function as natal den habitat in the future would result from project activities.

Alternatives C, D, and E

The effects of Alternative C would be similar to those in Alternative B with the following exceptions and additions. In general, a decrease in the area and volume salvaged may decrease the potential for negative effects on the wolverine. Increased snag retention may provide more hiding cover for deer and elk thereby reducing hunter caused mortality in these areas. Additional snag and coarse woody material on the ground would also improve habitat characteristics for many small mammals and birds and would likely increase prey diversity and abundance. Reducing open roads and motorized trails would benefit this species primarily be increasing security in the area. Road decommissioning would cause short-term and temporary disturbance.

The effects of Alternatives D or E would be similar to those in Alternative B with the following exceptions and additions. In general, increases in the area and volume salvaged may slightly increase potential negative effects on the wolverine. Reducing snag retention and increasing

minimum snag diameters may negatively effect security cover for ungulates in this area, as well as reducing habitat potential for many smaller prey species. Increased motorized access would decrease the suitability of the area to function as wolverine habitat. Habitat security will decrease, and disturbance will increase.

Cumulative Effects

Effects Common to All Alternatives

Past and present cumulative effects in addition to those described above have shaped this species' affected environment. For an assessment of this species' viability at the Forest level, see the Final Environmental Impact Statement for Amendment 21 of the Forest Plan (USDA 1999) and Exhibit Rg-5. Exhibit Rs-17 is an assessment of the wolverine and its habitat across USFS Region One.

Nearly 75% of the identified natal den habitat on the Flathead National Forest was protected by designated wilderness. The Flathead National Forest plan was reviewed to identify those management Areas (not designated wilderness) that precluded snowmobiles. When those restrictions were considered the percentage of natal den habitat protected increased from 73.1% to approximately 90% (Hillis and Kennedy 2002). Snowmobile use during the winter season is becoming increasingly popular. Snowmobiles are supposed to remain on designated groomed trails, although as snowmobiles become more powerful riders are increasingly leaving the trails, which further impacts wolverine use of an area and natal denning success.

Activities such as the human activities associated with Roadside Hazard Tree Removal, the Larch Heart Rot Study, and mushroom harvest will likely have a negative cumulative impact on wolverine.

Wolverine habitat in a large area running east of the proposed actions was lost to submergence during the creation of the Hungry Horse Reservoir.

Before management actions such as road building and timber harvest, wolverine had unlimited access to the variety of habitats and most likely traveled from high elevation summer habitats to low elevation winter big game ranges. These actions and others have fragmented wolverine habitat and often reduced the prey carrying capacity of large areas. Fire suppression has affected habitat types and vegetative structure in the greater area. Roads and snowmobiles have provided increased access for trapping and associated mortality. Future road building, snowmobile use, timber harvest, and other human activities in the area will have cumulative effects on the effectiveness of wolverine habitat.

Human developments such as campgrounds, hiking trails, and road development probably had more far reaching effects by increasing human presence in once remote areas. However, since the mid-1970s the Forest has closed a number of roads.

No vegetation management activities are planned on national forest lands in the analysis area in addition to those proposed in the action alternatives. Best Management Practices road maintenance is scheduled to occur beginning in 2004. It is likely that work related to this project would take from three to five years to complete. Human activities associated with this work may have a slight negative cumulative effect on wolverine use in affected areas.

Wolverine have experienced a great range reduction in the conterminous United States in modern times, and have twice been petitioned for listing in this portion of their range. Many view these populations as precarious and possibly declining.

Survival is substantially lower in trapped populations, and human caused mortality is largely additive to natural mortality (Krebs et al. 2004). Trapping may be a threat to wolverines as they have a low realized biological potential and are easily trapped (Ruggiero et al. 1994). The analysis area is part of MDFWP's trapping district 1, which allows an annual harvest of one wolverine per trapper.

Post burn and salvage conditions result in changing habitat conditions that may favor other predator species, resulting in greater interspecific competition and possible predation. If multiple wolverine were present in or near the fire area, intraspecific competition may increase in remaining undisturbed wolverine habitat.

Past and current activities have and are affecting ungulate winter ranges and populations in the greater area. Decreased ungulate numbers would likely have a negative effect on wolverine.

Implementation of the proposed actions in combination with cumulative effects may impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population or species.

REGULATORY FRAMEWORK

Federal laws and direction applicable to sensitive species include the National Forest Management Act (NFMA, 1976) and Forest Service Manual 2670. Amendment 21 to the Forest Plan has standards to conduct analyses to review programs and activities, to determine their potential effect on sensitive species, and to prepare a biological evaluation. It also states "adverse impacts to sensitive species or their habitats should be avoided. If impacts cannot be avoided, the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole would be analyzed. Project decisions would not result in loss of species viability or create significant trends towards federal listing." A goal in Forest Plan Amendment 21 is to "ensure that Forest Service actions do not contribute to the loss of viability of native species." Future conservation strategies for each species would present direction on maintaining habitat diversity and managing for population viability, as required by the NFMA and Forest Plan Amendment 21. The USDA Forest Service is bound by federal statutes (Endangered Species Act, National Forest Management Act), regulation (USDA 9500-4), and agency policy (FSM 2670) to conserve biological diversity on national forest system lands.

REGULATORY CONSISTENCY

In accordance with FSM 2673.42 determinations have been made on the degree of impact the proposed activities may have on sensitive species (Table 3-113 and Exhibit Rs-1). Along with Chapter 1, Chapter 2, and the sub-section above on each species, these determination statements meet the requirements of the Biological Evaluation for Sensitive Wildlife Species. These statements are based on available information on the distribution, presence in the project area, habitat requirements, and management strategies for these species, as well as the project design and location. These determination statements are for the segment of the population using the Affected Area, not the entire population. They are also based on an additional analysis that assessed viability at the forest scale (Exhibit Rg-5). All alternatives would comply with NFMA direction that wildlife habitat be managed to maintain viable populations of existing native and desired non-native species well distributed across the planning area. In addition, the analysis for Flathead National Forest's Forest Plan Amendment 21 assessed the forest-level viability of sensitive wildlife species (USDA Forest Service 1999a, and Exhibit Rg-3)."

Table 3-113. Biological Evaluation Determinations for Sensitive Wildlife Species (Exhibit Rs-1)**.**

Sensitive Wildlife Species	ALTERNATIVE				
	A	**B**	**C**	**D**	**E**
Black-backed woodpecker	BI	MIIH	MIIH	MIIH	MIIH
Boreal toad	NI	MIIH	MIIH	MIIH	MIIH
Common loon	NI	NI	NI	NI	NI
Fisher	NI	MIIH	MIIH	MIIH	MIIH
Flammulated owl	NI	NI	NI	NI	NI
Harlequin duck	NI	NI	NI	NI	NI
Northern bog lemming	NI	NI	NI	NI	NI
Northern goshawk	NI	MIIH	MIIH	MIIH	MIIH
Northern leopard frog	NI	NI	NI	NI	NI
Peregrine falcon	NI	NI	NI	NI	NI
Townsend's big-eared bat	NI	MIIH	MIIH	MIIH	MIIH
Wolverine	NI	MIIH	MIIH	MIIH	MIIH

NI = "No Impact."
MIIH = "May Impact Individuals or Habitat but would not likely result in a trend toward federal listing or reduced viability for the population or species".
BI = "Beneficial Impact."