

It is difficult to predict at this time to what extent and where beetle treatments farther into the future may occur (i.e. 5 or more years from now). Continuing monitoring of beetle populations and brood survival will provide us with information needed to ascertain whether additional actions to manage beetle populations are needed. If so, the appropriate analysis and assessment of effects would occur before implementation.

3.3 WILDLIFE

3.3.1 Introduction

The Robert and Wedge Post Fire Project area provides habitat for a wide variety of species, including mule deer, white-tailed deer, elk, wolf, lynx, bobcat, mountain lion, striped skunk, long-tailed weasel, grizzly and black bear, coyote, deer mouse, western harvest mouse, pocket gopher, golden mantled ground squirrel, snowshoe hare, mountain cottontail, gray jays, nuthatches, woodpeckers, mountain bluebirds, spruce grouse, hummingbirds, bald eagles, doves, hawks, owls, ravens, various bats, snakes, lizards, and many other species. Distribution and abundance of wildlife populations is largely influenced by spatial arrangement, size, and specific conditions of habitat areas. This list is not all encompassing of all species that occur in the Robert and Wedge Post Fire Project area; rather it is intended to provide a representation of the wildlife in the area.

The wildlife analysis addresses wildlife habitat and wildlife species needs within the Robert and Wedge Post Fire Project area. Wildlife species and habitat will be evaluated in relation to the existing condition, the desired future condition and how the no-action and proposed action alternatives affect specific species and their habitat. The size and the location of the area that will be analyzed will vary by the habitat needs of the wildlife species that is being considered. Habitat characteristics for sensitive species with habitat in the area listed for Region 1 of the Forest Service will be addressed. Sensitive species known to have occurred or to have potential habitat within the vicinity of the Robert and Wedge Post Fire Project area include; wolverine, black-backed woodpecker, fisher, northern goshawk, common loon and boreal toad. Management indicator species (MIS), neotropical migratory birds, and wildlife species of interest in the area will also be addressed.

Unique/special habitats (e.g. riparian areas, ponds, rock outcrops) as well as specific habitat attributes (i.e. snags and down logs) are important to numerous wildlife species. These important habitat components are distributed across the analysis areas and were heavily impacted by the Robert and Wedge Fires. These habitat components will be discussed as they relate to the individual wildlife species addressed in this report.

Field Surveys/Resource Contacts

Post-fire field reviews were done in the fall of 2003 and early spring 2004. Prior to the preparation of this document a review of District and Forest wildlife records, the U.S Fish and Wildlife Service (USFWS) list of Federally Threatened and Endangered species on the Flathead National Forest, the Region 1 Sensitive Species List and the Montana Fish, Wildlife and Parks website was conducted. Field survey data were also utilized from various surveys done within the Robert and Wedge Post Fire Project area and surrounding vicinity.

During project analysis both written and oral information was obtained on a continual basis from Amy Jacobs - Flathead National Forest Tally Lake District Wildlife Biologist, Henry Rivera - Hungry Horse/Glacier View District Wildlife Biologist, Heidi Trechsel - Hungry

Horse/Glacier District Silviculturist, Betty Kuropat - Tally Lake District Silviculturist, Tim Their - Montana Department of Fish, Wildlife and Parks Wildlife Biologist and Brian Giddings - Montana Department of Fish, Wildlife and Parks State Furbearer Coordinator. Other resource contacts included various resource specialists on the Hungry Horse and Tally Lake Ranger Districts, Flathead National Forest staff and Regional Office staff from Regions 1 and 6 including Vicki Saab - Rocky Mountain Research Station and Kim Melon – Region 6 Regional Wildlife Ecologist. Other local experts were also contacted.

Forest Plan Direction/Other Direction

The Robert Fire project area lies in several Forest Plan Management Areas. Forest Plan Management Areas and percentage of acres are as follows: Management Area 15 (66%), Management Area 18 (12 %), Management Area 3 (9%), Management Area 12 (8%), Management Area 17 (3%) and Management Area 2a (2%) with less than 1% Management Area 9. These are the mapped acres from GIS. Explanations about each of the management areas are found in Chapter 1.

The Wedge Canyon Fire project area lies in several Forest Plan Management Areas. Forest Plan Management Areas and percentage of acres are as follows: Management Area 15 (37 %), Management Area 11 (32 %), Management 2a (9 %), Management Area 3 (3%), Management Area 12 (2%), Management Area 18 (1%), Management Area 7 (1%) and Management Area 2b (<1%). These are the mapped acres from GIS.

Information Sources

Data used in this analysis included pre-fire and post-fire aerial photography, stand exams, TSMRS data, field survey and observation records, fire severity maps and data, road locations, geographical information system (GIS) data, research literature, and personal communication with numerous individuals knowledgeable about the area.

3.3.2 Affected Environment

The entire Robert Fire burned approximately 13,123 acres and the Wedge Fire burned approximately 21, 526 acres on the Flathead National Forest during the summer of 2003. The total number of acres that burned in the Robert Fire was approximately 52,900, of which approximately 39,630 acres burned in Glacier National Park. The Wedge Fire burned an approximate total of 54,405 acres or which approximately 30,317 acres burned in Glacier National Park. This document will address the existing condition and potential effects of the proposed Robert and Wedge Post Fire Project activities on wildlife and wildlife habitat within the two separate fires areas. There are about 3,090 acres (23%) proposed for salvage harvest within the Forest Service lands portion of the Robert Fire and approximately 2,987 acres (12%) proposed for salvage harvest in the Wedge Fire. Elevations within the Robert Fire burn area range from 3,160 feet where the North Fork of the Flathead River leaves the Robert fire boundary to 6,331 feet at the head of the Deep Creek drainage. Elevations within the Wedge Fire burn area range from 3,700 feet where the North Fork of the Flathead River leaves the Wedge Canyon fire boundary to about 7,300 feet on Cleft Rock Mountain. The last major fire that burned in the vicinity of the project areas was the Moose fire (35,000 acres within the Flathead National Forest). The Moose Fire burned directly adjacent to northern portion of the Robert Fire in 2001.

The main tree species within both fire areas include; western larch, Douglas fir, subalpine fir, lodgepole pine, Engelmann spruce, whitebark pine, and western white pine. The fire areas also include hardwoods, montane meadow and riparian areas. Primary riparian vegetation

includes willow and alder. The eastern border of the Flathead National Forest portions of both fires are located on of the North Fork of the Flathead River. Many perennial creeks flow year round in both fire areas. Many of the meadow areas are associated with these creeks. There are numerous other drainages that are ephemeral, with springs.

Burn Severity

Within the project areas are vegetation resources that were impacted to varying degrees as soil burn severity varied across the landscape. See Table 46 and Table 47 below to see the acres of burn severity for each of the fires. Maps displaying the burn severities in each fire area are located on pages 75 (Figure 10) and 90 (Figure 14). The low severity fire resulted in removal small portions of the duff layer, with minimal effect to the grasses, forbs, shrubs and trees. Much of the low and a small amount of moderate burn severity areas still have 1,000-hour fuels remaining on the ground, and live tree canopies overhead. In other moderate burn severity areas, the fire killed between 30 and 80 percent of the vegetation. It should be noted that these burn severity ratings are designed to help assess watershed impacts (i.e. flooding and erosion) rather than tree mortality. This means, areas rated as having low and particularly moderate burn severity may still have experienced high levels of tree mortality. This was the case in portions of both fires where stands listed as having low burn intensity had many of the large overstory trees killed due to the buildup of fuel at the base of these trees or they were spruce (personal observation). This fuel smoldered around the base of the trees for a long period due to low fuel moisture, effectively girdling the tree by cambium kill.

Table 46. Burn severity acres within the Robert and Wedge fire perimeters.

Severity	Acres	% of Fire Perimeter	Acres	% of Fire Perimeter
	Robert		Wedge	
Unburned	14	<1	73	<1
Low	3,514	27	5,177	24
Moderate	2,932	22	5,481	25
High	6,457	49	10,795	50
(not classified)	206	2	0	100
Total Acres	13,123	100	21,526	100

Table 47. Burn severity acres within proposed treatment units for Robert and Wedge fires.

Severity	Acres	% of Fire Perimeter on NFS Lands	Acres	% of Fire Perimeter on NFS Lands
	Robert		Wedge	
Low	164	1	140	<1
Moderate	804	6	934	4
High	2,122	16	1,659	7
Total Acres	3,090	23	2,733	11

Snags, Down Wood and Old Growth

Many wildlife species dependent on or who prefer old forest habitat and dense canopy cover were impacted by the loss of habitat by both the Robert and Wedge Fires. Examples of these species in this area include American marten, fisher, and northern goshawk.

Both fires created an abundance of snags and down wood in all areas that had not been previously harvested. The sizes of the snags differ greatly between areas that experienced one or more fires in the last 100 years and other areas that have not burned for 250 years or more. The snags and down logs that result from fire serve a vital role in the structure and function of healthy forest ecosystems and play an important role in post-fire recovery and long-term site productivity. Snags and down logs provide food and shelter to wildlife, fish, insects, microbes and fungi. Large snags and down logs serve as a substrate for microorganisms, provide cover and feeding opportunities for invertebrates, act as perching, nesting, and roosting sites for birds, and provide dens and escape cover for mammals. Large down logs provide for long term soil productivity and serve as horizontal travel, resting and denning cover for wildlife.

Prior to the fires there was approximately 1,643 acres of inventoried old growth within the Robert Fire perimeter and 1,339 acres within the Wedge Fire perimeter. All of the old growth structure burned in both fire areas and the majority of it burned at high to moderate severity. In the Robert Fire approximately 898 acres of old growth burned at high severity, 547 acres burned at moderate severity and 198 acres burned at low severity. In the Wedge Fire approximately 807 acres of old growth burned at high severity, 1,339 acres burned at moderate severity and 103 acres burned at low severity. The burned old growth has limited function as old growth habitat for old growth dependent wildlife species because although there are pockets of trees that may not have burned or just the understory burned, the size of these pockets have limited function for old growth dependent wildlife. In the Robert Fire area there was a total of approximately 198 acres of inventoried old growth that burned at low severity and of those acres there is one approximately 30 acre contiguous patch, the rest were small little pockets that burned at low severity, The Wedge Fire burned about 103 acres of inventoried old growth at low severity; of that there were no patches that were 20 acres in size or larger. This is not to say that these pockets are not valuable because they add diversity to the landscape and as the forest regenerates these pockets will become more valuable to a variety of wildlife species.

Many species of wildlife respond positively to fires and are attracted to burns for the flush of nutrients and new vegetation. Cavity-nesting and denning species often benefit from snags and down logs created by fire. Many native species of wildlife and plants that inhabit these forest ecosystems have adaptations that respond to patterns and processes of fire disturbance and recovery, while others do not.

Riparian Habitat

Riparian habitats are found throughout both fire areas. Riparian habitat benefits most wildlife species. They serve as migration corridors, bedding grounds for a number of species fawning/calving areas for deer, elk and moose, hunting and travel corridors for mammals, and roosting, foraging, and nesting areas for bats, owls, raptors, neotropical migratory birds and many resident bird species. There were approximately 2,112 acres of all classes of riparian habitat (from ephemeral to year-round creeks) that burned at moderate or high severity within the Robert Fire project area. There were approximately 2,842 acres of all classes of riparian habitat (from ephemeral to year-round creeks) that burned at moderate or high severity within the Wedge Fire project area. Riparian areas are used more heavily by wildlife than any other

portion of the fire areas. Table 48 below shows the number of acres in Riparian Habitat Conservation Areas (RHCA) by burn severity within both fire areas.

Table 48. RHCA burn severity acres within the Robert and Wedge fire areas.

Perennial RHCAs Burn Severity	Robert Acres		Perennial RHCAs Burn Severity	Wedge Acres
1-Unburned	7		1-Unburned	67
2-Low	755		2-Low	1,338
3-Moderate	617		3-Moderate	808
4-High	1,495		4-High	2,034
Total Acres:	2,874		Total Acres:	4,247

RHCA = Riparian Habitat Conservation Area (Streams)

As a result of the Robert and Wedge Fires, most of the proposed project areas have reverted from mid or late-seral forest conditions to early-seral conditions. It will take at least 100-150 years to re-establish large trees (greater than 24 inch dbh) and at least 200-250 years to develop old trees with decadence features beneficial to old forest dependent wildlife. These time frames are the best-case scenario and are based upon no additional stand replacement wildfires.

Roads

There are currently approximately 23 miles of open or seasonally open roads within the Robert Fire perimeter and a road density of 1.09 miles per square mile. There are currently approximately 35 miles of open or seasonally open roads within the Wedge Fire perimeter and a road density of 0.93 miles per square mile. Roads reduce habitat by dissecting the land and can interrupt animal migration corridors. Forest fragmentation, which transforms large tracts of habitat into smaller pieces, reduces habitat quality for species such as marten, fisher, owls, and songbirds that depend upon the forest interior for food and shelter. Roads cause direct habitat loss by creating a long, narrow, unnatural disturbance and allowing humans increased access into otherwise remote and secure habitat. Use of roads leads to increased mortality either directly (road kills) or indirectly (hunting, trapping, poaching). Carnivorous mammals such as marten, fisher, and wolverine are vulnerable to illegal over-trapping, and over-trapping can be facilitated by road access. Roads also allow access into areas for fuelwood cutting, which in turn reduces the number of snags and down logs available for wildlife use.

Roads present a physical barrier for small animals, such as voles, pocket gophers, and others that use cover for camouflage and protection. The 20 to 30 feet of bare soil on a road’s surface can present a migration obstacle that these species will not cross. Those that do try to cross face a high risk of predation from raptors and other visual feeders who can spot animals trying to cross a roadbed. Over 70 percent of the 91 broad-scale species of focus used for the Interior Columbia Basin Ecosystem Management Project (ICBEMP) analysis were found to be negatively affected by one or more factors associated with roads (USDA FS 1997a [pages 114-121](#)).

Road densities affect habitat use patterns of mule deer, grizzly bear, black bear and other wildlife species that utilize the project area. Vulnerability of deer and black bear during hunting season is particularly influenced by road density and use. Wildlife react with physiological responses (e.g., increased heart rate) when vehicles are in the area.

General Wildlife Habitat

Both fire areas have provided a set of habitat values not observed in many drainages of their size. They have provided habitat for all of the ungulates (except mountain goat), carnivores, and most of the avian, small mammal, and amphibian species known to occur on the Flathead National. Examples include:

- Year-round habitat for grizzly bear, lynx, and wolverine.
- Older aged forest habitats for species such as fisher, and other forest interior habitat specialists, such as northern goshawk.
- Seasonal habitat for gray wolves.
- Seasonal range for white-tailed deer, mule deer, and elk.
- A wide variety of forest cover types and successional stages that include; western larch dominated conifer mixes; lodgepole pine; spruce/subalpine fir; and whitebark pine. Some of these forest types provide specific habitat values for some species. For example; pileated woodpeckers are associated with mature/older aged western larch, and >20 inch in diameter.

The Robert Fire caused major habitat changes in the Canyon Creek drainage. The Wedge Fire caused major habitat changes in the Tepee, Trail and Whale Creek drainages. The existing condition of the burned areas are that of a “beginning” forest where, assuming no re-burns occur within the next 100 years, most of the land that was a “green” forest before the fire, can be expected to produce another forest. However, not all acres are equal in their potential to receive, germinate, and grow tree, shrub, grass, and forb seeds, so variations in the continuity, coverage, and species composition of the next generation of forests should be expected. Similarly, many factors (e.g. disease, predation, weather-related mortality, human influences, etc.) affect which, when, and how wildlife species re-occupy and persist in a regenerating post-fire landscape. Salvage logging, road closures, and decommissioning can be expected to affect wildlife re-colonization, use, and persistence in various ways. How much and with what level of intensity the burned areas are managed could influence which and when wildlife species would be successful at repopulating and persisting in the area. Those wildlife species that used habitat within the fire areas are expected to return when conditions are favorable and their habitat needs can be met.

The proposed action contains two basic kinds of forest management activities that can affect wildlife habitat and wildlife use of habitat: 1) removal of dead and dying trees and 2) road restrictions and decommissioning. The methods and seasons of operation (i.e. ground-based versus helicopter; summer versus winter) can also affect wildlife. In this context, Table 49 (Robert) and Table 50 (Wedge) provide a synopsis of historical and current management indicator species (MIS) distributions at the sub-basin (rivers) and project area geographical scales. This data was used to help determine which species to carry forward into the analysis. Table 51 summarizes the historic presence, distribution, and existing habitat for species and habitat of particular interest in both the Robert Fire and Wedge Fire areas.

Table 49. Historic and existing presence and distribution of sensitive species and MIS within the Robert Fire affected area.

Species	Status	Historical ²			Existing		Habitat Comments/Issues Related to Project Area
		NFSB	SW	PA	NFSB	PA	
Peregrine Falcon	RD	P	Unl	Unl	Unk	Unl	No known nesting sites, current or historical, have been documented in or adjacent to the burned area.
Flammulated Owl	S	Y	Unk	Unk	P	Unl	The pre-fire project area contained limited potential suitable habitat; suitable habitat currently does not exist.
Harlequin Duck	S	Y	P	P	Y	P	No ducks have been observed in the Robert Fire affected area.
Common Loon	S	Y	N	N	Y	N	There is no known breeding habitat for this species within the proposed salvage area:
Townsend's Big-eared Bat	S	P	Unk	Unk	P	Unl	No known caves that can function as hibernacula or maternity roosts known in the project area.
Black-backed Woodpecker	S	Y	P	P	Y	P	Expected beetle outbreaks would provide a good forage base to support a woodpecker population increase.
Wolverine	S	Y	Y	P	Y	P	This wide-ranging species may travel through the fire areas and opportunistically hunt, especially during the winter for possible ungulate carrion.
Fisher	S	Y	P	P	Y	Unl	Mature and old growth forests adjacent to streams are preferred habitat conditions; no areas of appropriate size of this habitat type exists in the Robert burned area.
Northern Goshawk	S	Y	P	P	Y	Unl	Mature and old growth forests, especially in riparian areas are preferred habitat conditions; too little of this habitat exists in the Robert burned area.
Northern Leopard Frog	S	Unk	Unl	Unl	Unk	Unl	This species occurs in or near water in non-forest habitats. Closest reports are about 35 miles to the northwest; riparian areas are protected habitats.
Boreal Toad	S	Y	P	P	Y	P	Breeding habitat occurs in lakes, ponds, slow

Species	Status	Historical ²			Existing		Habitat Comments/Issues Related to Project Area
		NFSB	SW	PA	NFSB	PA	
							streams, and ditches.
Northern Bog Lemming	S	Unk	Unl	Unl	Unk	Unl	There is no known habitat for this species within the proposed salvage area; known required habitat is protected.
White-tailed Deer	MIS	Y	Y	Y	Y	Y	Summer use and very limited year-round use occurs.
Elk and Mule Deer	MIS	Y	S	S	Y	S	Summer use and very limited year-round habitat exist.

¹ST = Status; T=Federally Threatened; E= Federally Endangered; RD=Recently delisted, likely to be listed as Sensitive; S=Forest Service Region 1 listed as Sensitive; MIS= Flathead National Forest Management Indicator Species ²NFSB=North Fork Flathead River Sub-basin; SW= Subwatersheds, PA=Robert Project Area vegetation treatment sites; Y=Yes; N=No; P=Probable (based on known habitat requirements); Unl=Unlikely (based on known habitat requirements); Unk=Unknown; S= Seasonal.

Table 50. Historic and existing presence and distributon of sensitive species and MIS within the Wedge fire affected area.

Species	ST ¹	Historical ²			Existing		Habitat Comments/Issues Related to Project Area
		NFSB	SW	PA	NFSB	PA	
Peregrine Falcon	RD	P	Unl	Unl	Unk	Unl	No known nesting sites, current or historical, have been documented in or adjacent to the burned area.
Flammulated Owl	S	Y	Unk	Unk	P	Unl	The pre-fire project area contained limited potential suitable habitat; suitable habitat currently does not exist.
Harlequin Duck	S	Y	P	Y	Y	P	Harlequin Ducks have been observed in Trail Creek.
Common Loon	S	Y	Y	Y	Y	Y	Common Loon utilize Tepee Lake and are known to successfully nest on the lake.
Townsend’s Big-eared Bat	S	P	Unk	Unk	P	Unl	Caves that function as hibernacula or maternity roosts are not known in the project area. The caves in the Trail Creek area do not show signs of bat use.
Black-backed Woodpecker.	S	Y	Y	P	Y	P	Expected beetle outbreaks would provide a good forage base to support a woodpecker population increase.
Wolverine	S	Y	Y	P	Y	P	This wide-ranging species may travel through the fire areas and opportunistically hunt, especially during the winter for possible ungulate carrion.
Fisher	S	Y	P	P	Y	Unl	Mature and old growth forests adjacent to streams are preferred habitat conditions; no areas of appropriate size of this habitat exists the Wedge burned area.
Northern Goshawk	S	Y	P	P	Y	Unl	Mature and old growth forests, especially in riparian areas are preferred habitat conditions; none of this habitat exists in the Wedge burned area.
Northern Leopard Frog	S	Unk	Unl	Unl	Unk	Unl	This species occurs in/near water in non-forest habitats. Closest reports are about 30 miles to the northwest; riparian areas are protected habitats.
Boreal Toad	S	Y	P	P	Y	P	Breeding habitat: lakes, ponds, slow streams, and ditches.
Northern Bog Lemming	S	Unk	Unl	Unl	Unk	Unl	There is no known habitat for this species within the proposed salvage area; known required habitat is protected.
White-tailed Deer	MIS	Y	Y	Y	Y	S	Summer use occurs and limited year-round use occurs.

Elk and Mule Deer	MIS	Y	S	S	Y	S	Summer use occurs and limited year-round use occurs.
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¹ST = Status; T=Federally Threatened; E= Federally Endangered; RD=Recently delisted, likely to be listed as Sensitive; S=Forest Service Region 1 listed as Sensitive; MIS= Flathead National Forest Management Indicator Species ²NFSB=North Fork Flathead River Sub-basin; SW= Subwatersheds, PA=Wedge Project Area vegetation treatment sites; Y=Yes; N=No; P=Probable (based on known habitat requirements); Unl=Unlikely (based on known habitat requirements); Unk=Unknown; S= Seasonal.

Table 51. Historic and known presence and distribution of species and habitat within the Robert and Wedge fire areas.

Species	Historical Presence ²			Existing		Habitat Comments/Issues Related to Project Area
	NFSB	SW	PA	NFSB	PA	
Cavity Nesting Birds	Y	Y	Y	Y	Y	Habitat exists within both fires areas for a suite of cavity nesting birds
Neotropical Migratory Birds	Y	Y	Y	Y	Y	Habitat exists within both fires areas for a suite of neotropical migratory birds
Old Growth Species	Y	Y	Y	Y	Unl	Robert and Wedge fires eliminated habitat suitability for old growth dependent species.
Snags & Down Wood	Y	Y	Y	Y	Y	Large diameter snags are currently at adequate levels.

²NFSB=North Fork Flathead River Sub-basin; SW= Subwatersheds, PA=Robert and Wedge Post Fire Project Area: Y=Yes; N=No; P=Probable (based on known habitat requirements); Unl=Unlikely (based on known habitat requirements); Unk=Unknown; S= Seasonal.

The Forest Plan lists the following as wildlife management indicator species: all threatened, endangered and sensitive species; and species commonly hunted. While the wildlife section of this DEIS does not contain a separate section titled *Management Indicator Species*, each species that may occur within the project area, or for which habitat exists in the project area, is addressed.

Suitable habitat for old-growth-associated wildlife species no longer exists within either fire area because the fire reverted most all the late-old forest habitat to stand a initiation stage. Most, migratory songbird habitat is associated with intact mid-late seral forests, which only exists in small isolated patches within both the Robert Fire and Wedge Fire burned areas, and would not be affected by the proposed action. The cavity nesting birds as well as the snag and down wood portions of this analysis (found later in this section) provide discussion on the effects of the proposed salvaging on wildlife that depend on or use snags and down logs as habitat.

3.3.3 Environmental Consequences

Sensitive Wildlife Species

Regulatory Framework Common To All Sensitive Wildlife Species

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 Flathead's 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." 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. 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."

Regulatory Consistency Common To All Sensitive Wildlife Species

In accordance with FSM 2673.42, determinations have been made as to the degree of impact the proposed activities may have on sensitive species (Table 57). Along with Chapter 1, Chapter 2, and the sub-section below 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/absence from the project areas, 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 fire Affected Areas, not the entire population. They are also based on an additional analysis that assessed viability at the forest scale for species that may be affected by the Action Alternative. Both 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 FS 1999a).

Black-backed Woodpecker (Sensitive/Management Indicator Species)

Affected Environment

The black-backed woodpecker lives in mature and old growth boreal and montane conifer forests in Alaska, Canada, and the northern lower 48 states. It is closely associated with recently burned forest habitats and depends heavily on larvae of wood boring beetles and spruce budworm outbreaks that result in high concentrations of boring insects invading. It may require a dynamic mosaic of recent burns across a landscape to sustain populations (NatureServe 2004). Black-backed woodpeckers are intra-specifically territorial. Their home range appears to vary with the quality of the habitat. The species is a rare to uncommon permanent resident of the region. Black-backed woodpeckers were reported in the Moose Fire area in 2002 and are expected to be present in both the Robert and Wedge Fire areas in 2004. Black-backed woodpeckers were frequently observed, including nesting observations (Caton 1996) in the 1988 Red Bench fire area, which is an older burn located between the Robert and Wedge fire areas. Immediately north of the Robert Fire is the Moose Fire, which burned approximately 35,000 acres within the Flathead National Forest in 2001. The Moose Fire also burned another 36,000 acres of Glacier National Park, Coal Creek State Forest and private lands. These areas, especially in Glacier National Park, currently contain habitat to support high densities of black-backed woodpeckers.

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). Black-backed woodpeckers apparently only exploit fires that burned at moderate or 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). Based on findings by Hejl and McFadzen (2000) and observations by O'Connor and Hillis (2001), fires that only kill 50% of the stand are substantially less preferred by black-backed woodpeckers. In the Northern Rockies, black-backed woodpecker abundance correlates not to burn size but to the number snags remaining after the fire (Hutto 1995b). Burns within smaller-sized stands do not support bark beetles and borers at densities preferred by black-backed woodpeckers.

It is possible that black-back populations could reach *source* levels in recent burns, but may drop to sink levels in the time between large burns (Hutto 1995b). Annual variability of fires is high, both in occurrence and size, and large fires are generally less frequent since the advent of effective fire suppression.

USFS Region One draft guidelines (unpublished) suggested that in areas of 2000 to 6000 feet elevation, 30 percent of burned areas should be left unsalvaged in a fire area of over 10,000 acres. In addition, Wisdom *et al.* (2000) recommended maintaining contiguous burned areas of at least 956 acres, retaining snags in salvage units in clumps rather than evenly distributed, and avoiding post-fire salvage logging in portions of large burned forests for about 5 years. Saab (2002) found black-backed woodpeckers in severely and moderately burned areas that had at least 40 percent canopy closure prior to the fire and that were at least 75 acres in size. The average burn area size that she found back-backed woodpeckers in was about 100 acres in size.

Hejl and McFadzen (2000) found that salvage logging virtually eliminated black-backed woodpeckers from a stand, even when some of the fire-killed trees were retained. Snag

concentrations seem to be more critical for winter foraging. [Saab *et al.* \(2002\)](#) suggest that cavity nesters as a group selected clumps of snags rather than uniformly spaced snags.

[Wisdom *et al.* \(2000\)](#) 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 ha [956 acres].
- 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 yrs postfire.

It is not likely black-backed woodpeckers were not in either fire area or at low source levels prior to the fires, however they were in close proximity due to the Moose Fire in 2001. Both the Robert Fire and the Wedge Fire created expansive habitat for black-backed woodpeckers that did not exist prior to the fires. Both the Robert Fire and Wedge Fire affected areas are considered to have moderate or high-quality habitat potential for black-backed woodpeckers if they burned at high or moderate fire severities, had trees 9 inches dbh or greater and had canopy closure of 40% or more prior to the fires. The Robert Fire created approximately 7,260 acres of potential black-backed woodpecker habitat. This is 55 percent of the Robert Fire affected area on Forest Service land. The Wedge Fire on Flathead National Forest created approximately 13,270 acres of potential black-backed woodpecker habitat (See Table 52). This is 62 percent of the Wedge Fire affected area on Forest Service land.

Table 52. Approximate acres of quality snag habitat within proposed units.

Snag Quality	Fire Severity	Robert	Wedge
High	High	5,051	8,319
High	Moderate	1,962	3,333
Moderate	High	171	1,158
Moderate	Moderate	77	457
Total Acres of Quality Snag Habitat		7,261	13,267

Both the Robert Fire and Wedge Fire burned into Glacier National Park. The Robert Fire burned approximately 39,400 acres and the Wedge Fire burned approximately 30,320 acres in Glacier National Park. Approximately 14,400 acres burned at high severity, 15,115 acres burned at moderate severity and 9,880 acres burned at low severity during the Robert Fire in Glacier National Park. Approximately 3,220 acres burned at high severity, 23,470 acres burned at moderate severity and 3,626 acres burned at low severity during the Wedge Fire in Glacier National Park. Most of what burned in Glacier National Park should support black-backed woodpeckers. There is no salvage logging planned within the Park. The black-backed woodpecker habitat in these areas is expected to persist for approximately a 6-year period. For more information related to black-backed woodpecker habitat see the Cavity Nesting Birds and Snags and Down Wood sections of this chapter.

Direct and Indirect Effects: Robert and Wedge Fire Affected Areas

Alternative 1 (No Action)

In this alternative, no additional snags would be felled except where they pose a serious threat to human safety, such as along trails and near administrative sites. Spruce beetle and Douglas-fir beetle populations would be expected to increase, which would kill more trees in the area and create additional potential black-backed woodpecker habitat over a larger landscape. Within about six years, black-backed woodpecker populations would naturally decline in the burned areas, following the decline in beetle larvae. Other effects relevant to this species are disclosed in the Cavity Nesting Birds as well as the Snag and Down Wood Habitat sections of this chapter.

Alternative 2 (Action Alternative)

No issues related to the black-backed woodpecker were identified in Chapter 2, however during the public scoping process concern regarding black-backed woodpecker habitat was expressed. The following effects indicators were used to focus the black-backed woodpecker analysis and disclose relevant environmental effects:

- Acres and percent of habitat lost
- Number of large blocks unsalvaged
- Potential black-backed woodpecker habitat across the Robert Fire and Wedge Fire areas.

Even though many fire-killed trees would be retained within most of the salvage units, salvage harvest in potential black-backed woodpecker habitat has been shown to virtually eliminate black-backed woodpecker use in most salvage units (Hejl and McFadzen 2000). However, as

Table 53 below shows, the Action Alternative still retains substantial habitat outside of salvage harvest units for the black-backed woodpecker in both fire areas. 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 for black-backed woodpecker use. In both 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, due to the maintenance of large contiguous burned areas and the retention of snags in clumps in salvage units. Figure 20, Figure 21, Figure 22, and Figure 23 show existing and post-project woodpecker habitat in patches greater than 75 acres, while Figure 24, Figure 25, Figure 26, and Figure 27 show habitat in patches greater than 956 acres.

Table 53. Effects of harvest on Black-Backed Woodpecker habitat in the project area.

Fire Name	Alternative	Acres of Potential Habitat That Burned at High and Moderate Severity	Number of Acres in Patches > 74 Acres in Size	% Snag Patches Retained	Number of Patches > 74 Acres in Size	Number of Acres in Patches > 956 Acres in Size	Number of Patches > 956 Acres in Size	% Snag Patches Retained
Robert	1 (Current Condition)	7,261	7,054	100%	4	6,471	1	100%
Robert	2 (Action Alternative)	7,261	3,779	54%	4	3,367	2	52%
Wedge	1(Current Condition)	13,337	12,557	100%	4	11,812	2	100%
Wedge	2 (Action Alternative)	13,337	10,006	80%	7	8,204	2	69%

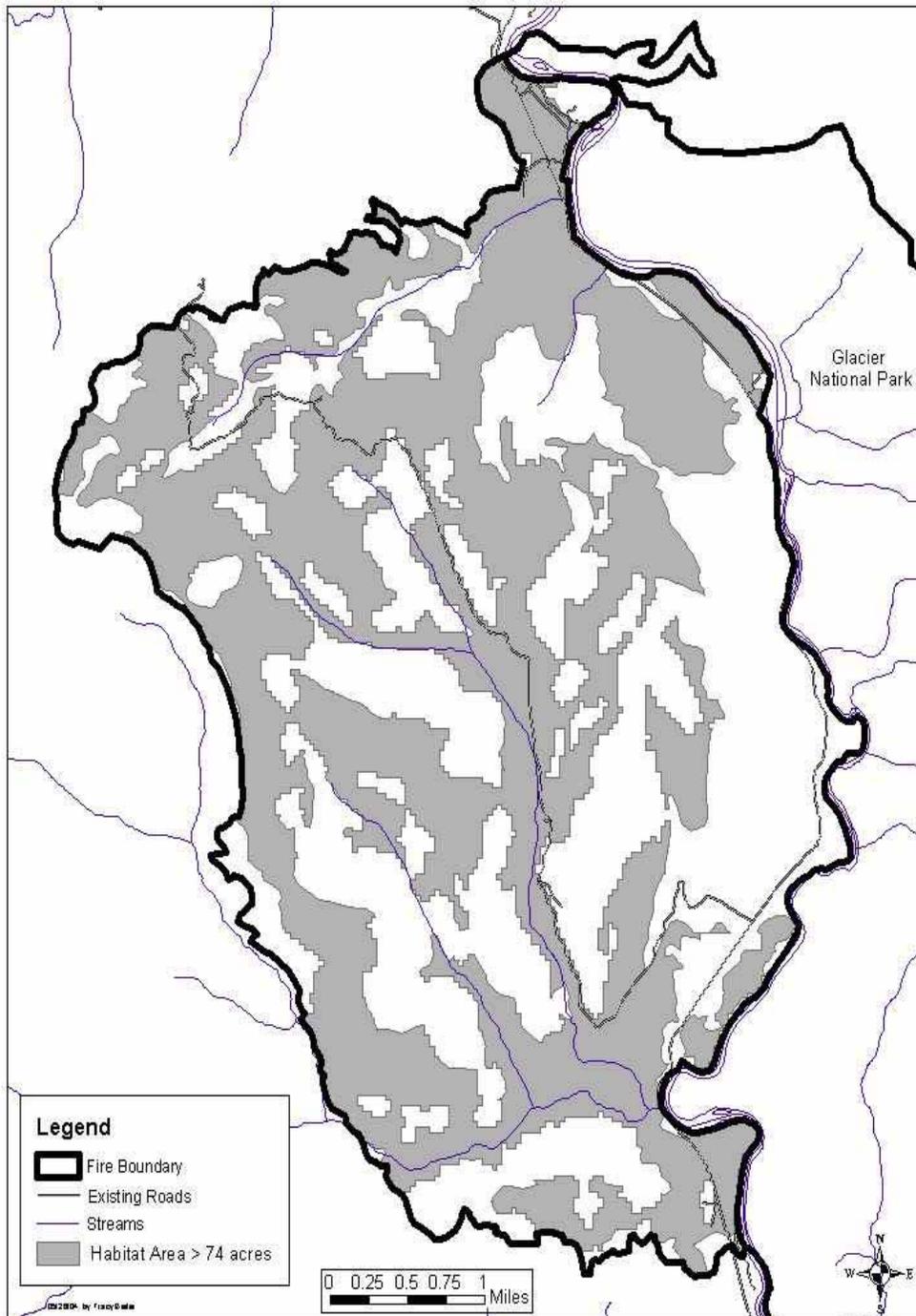


Figure 20. Robert Fire Area: Woodpecker Habitat in Patches >75 Acres (existing)

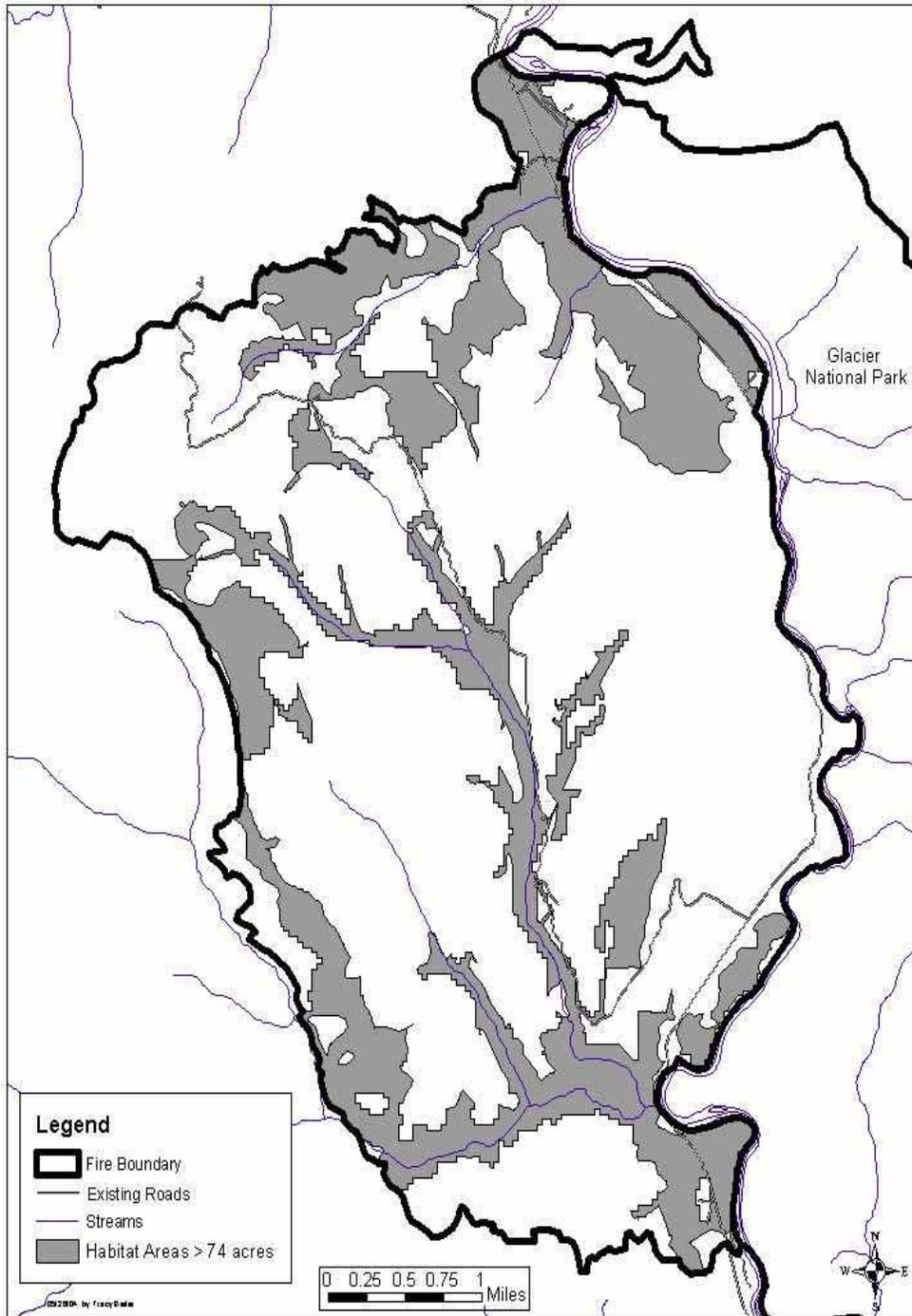


Figure 21. Robert Fire Area: Woodpecker Habitat in Patches >75 Acres (post-project)

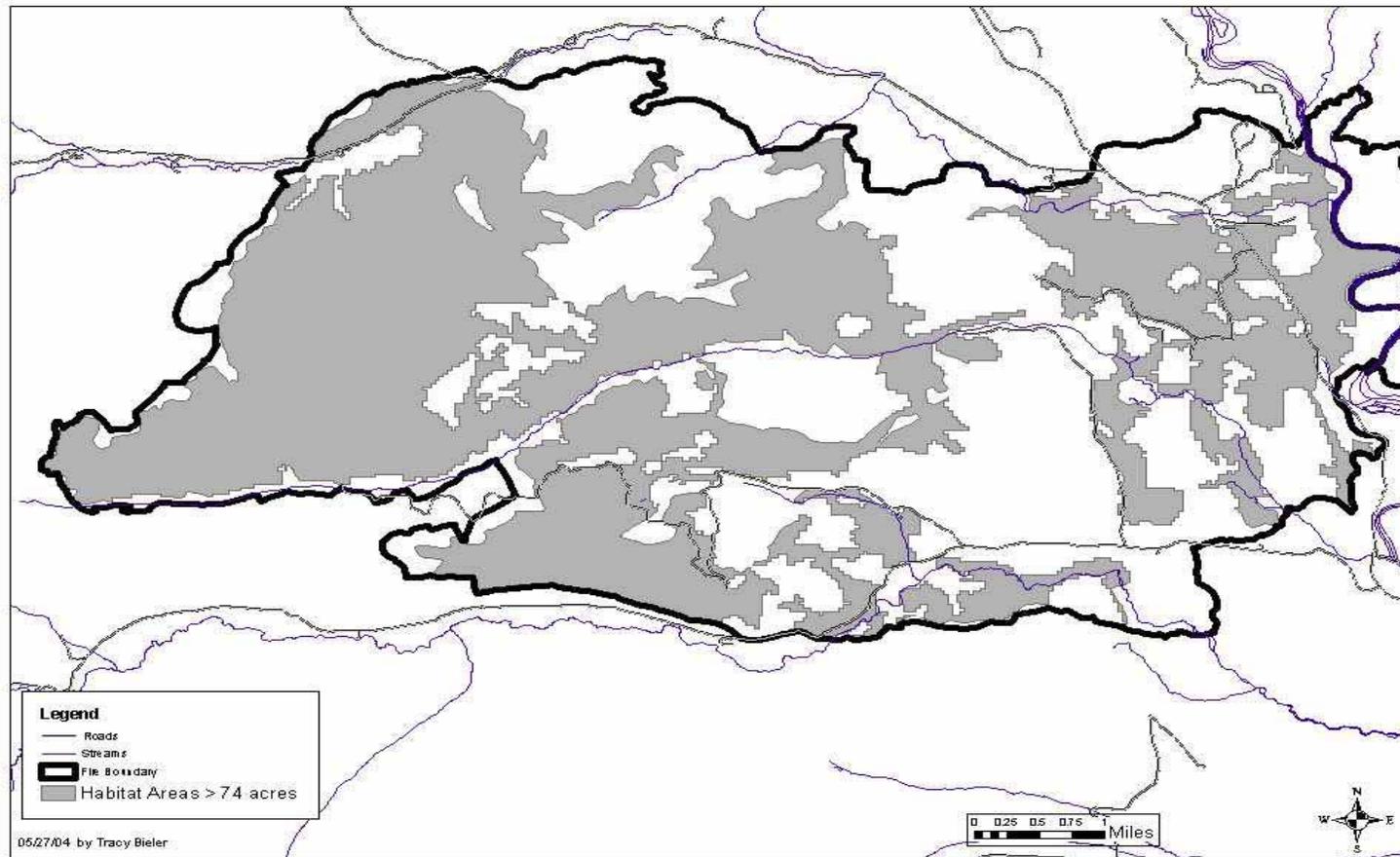


Figure 22. Wedge Canyon Fire Area: Woodpecker Habitat in Patches >75 Acres (existing)

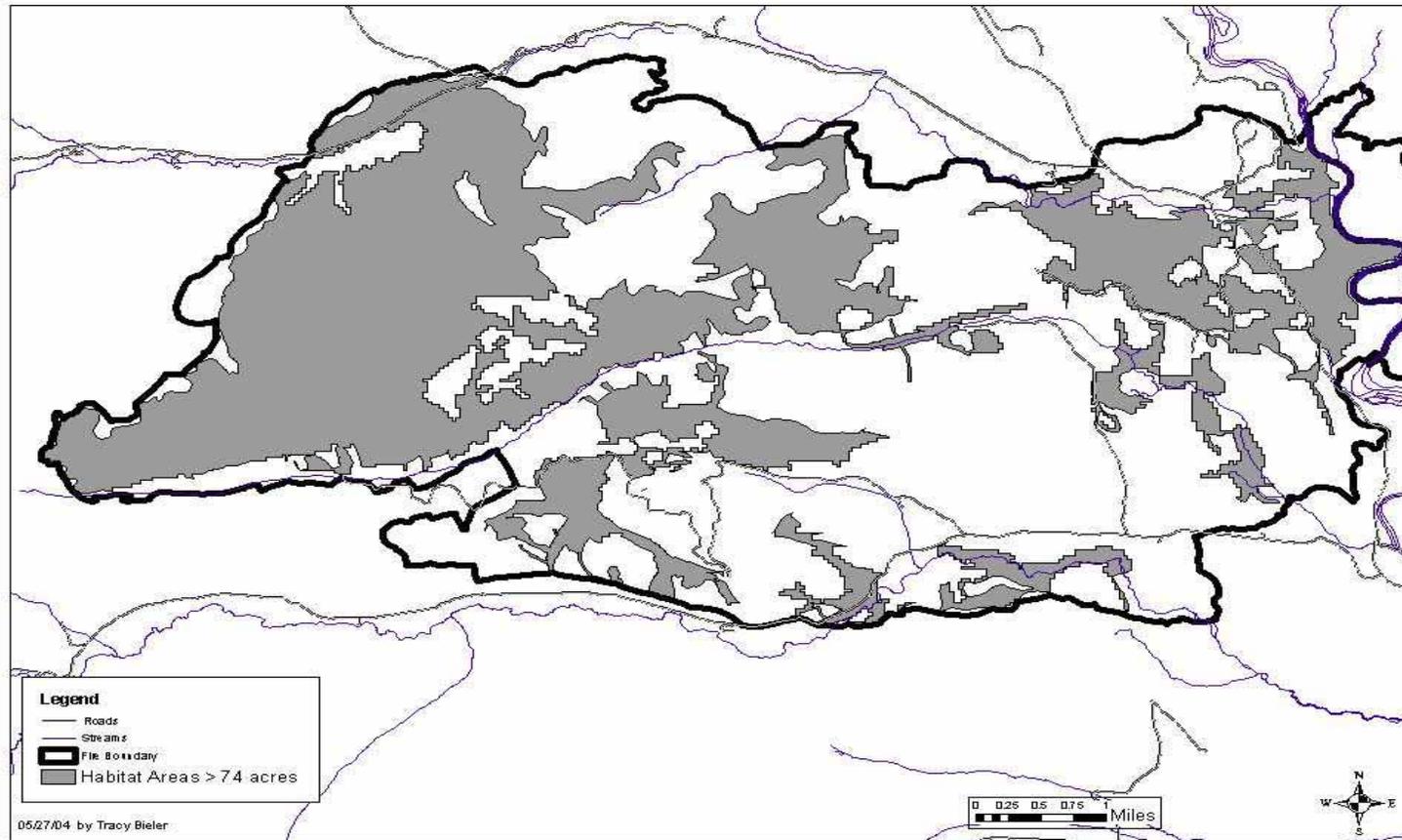


Figure 23. Wedge Canyon Fire Area: Woodpecker Habitat in Patches >75 Acres (post-project)

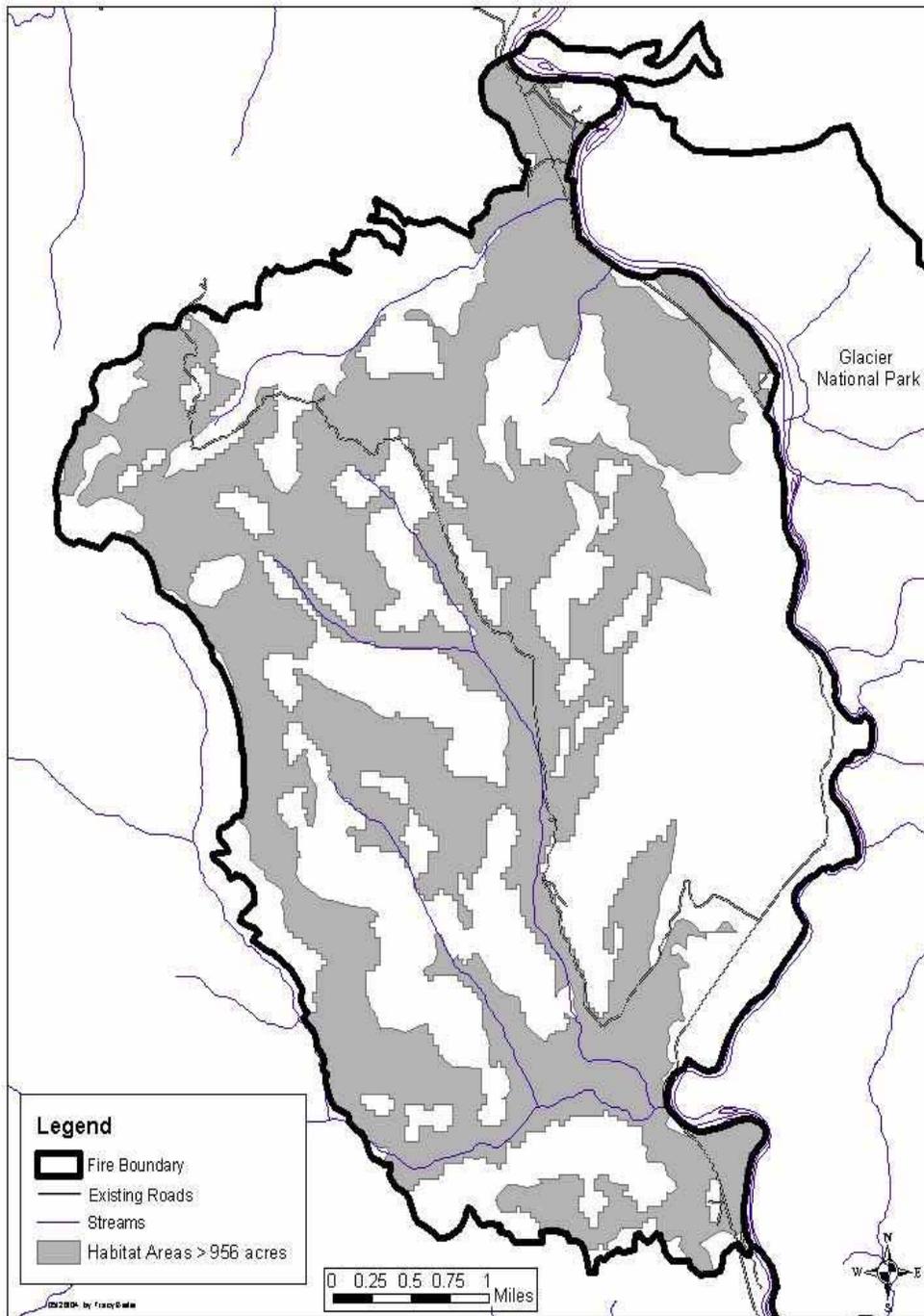


Figure 24. Robert Fire Area: Woodpecker Habitat in Patches >956 Acres (existing)

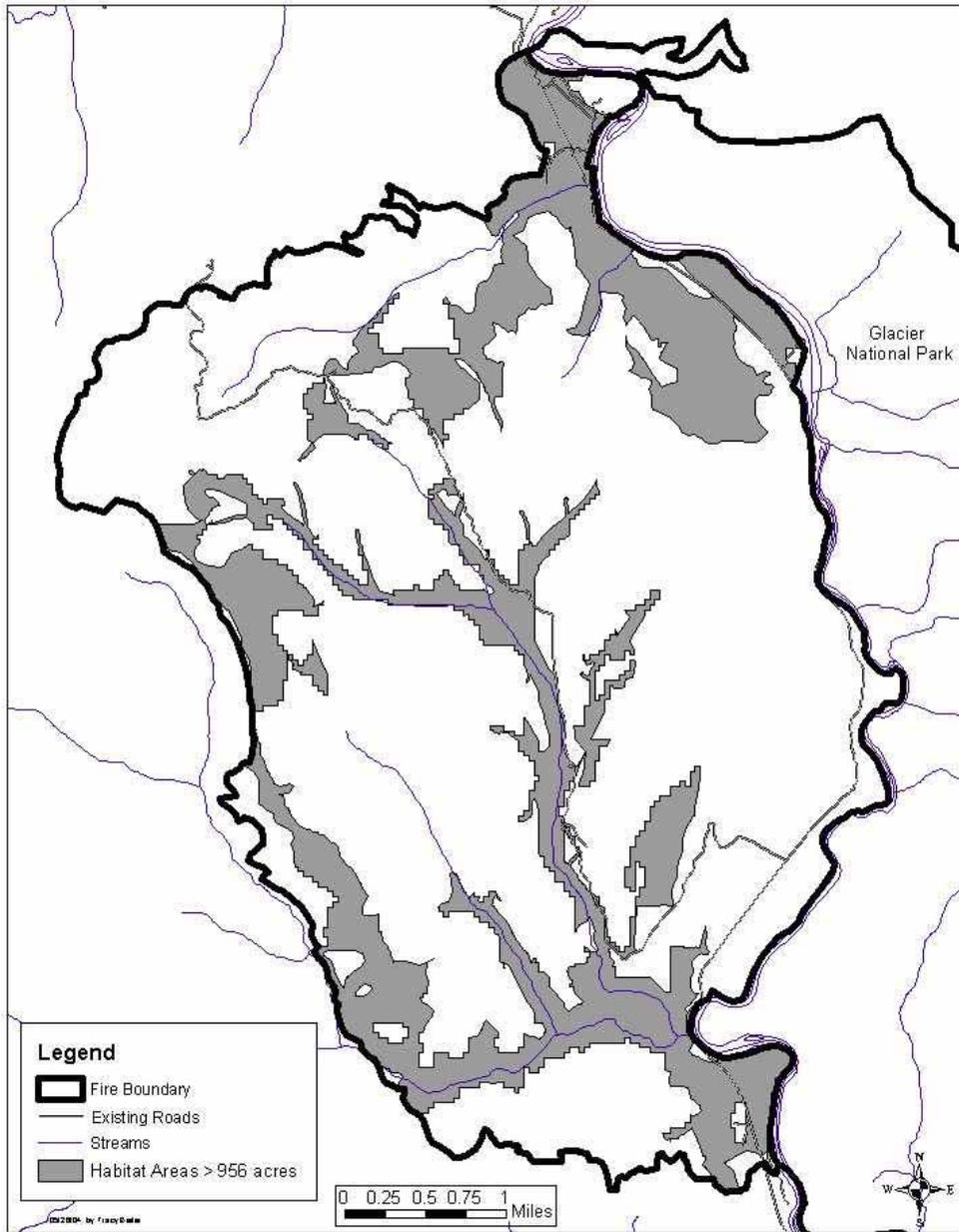


Figure 25. Robert Fire Area: Woodpecker Habitat in Patches >956 Acres (post-project)

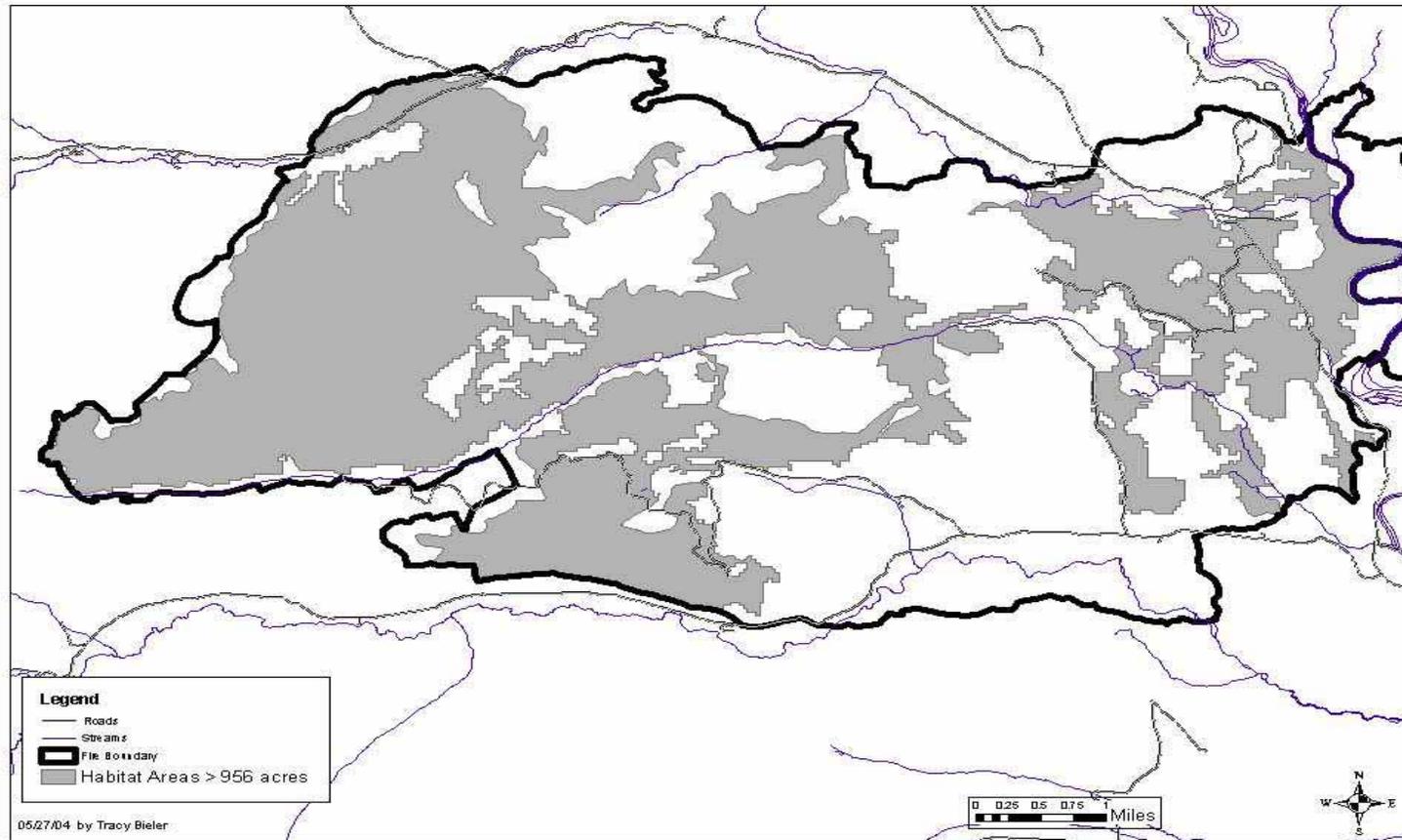


Figure 26. Wedge Canyon Fire Area: Woodpecker Habitat in Patches >956 Acres (existing)

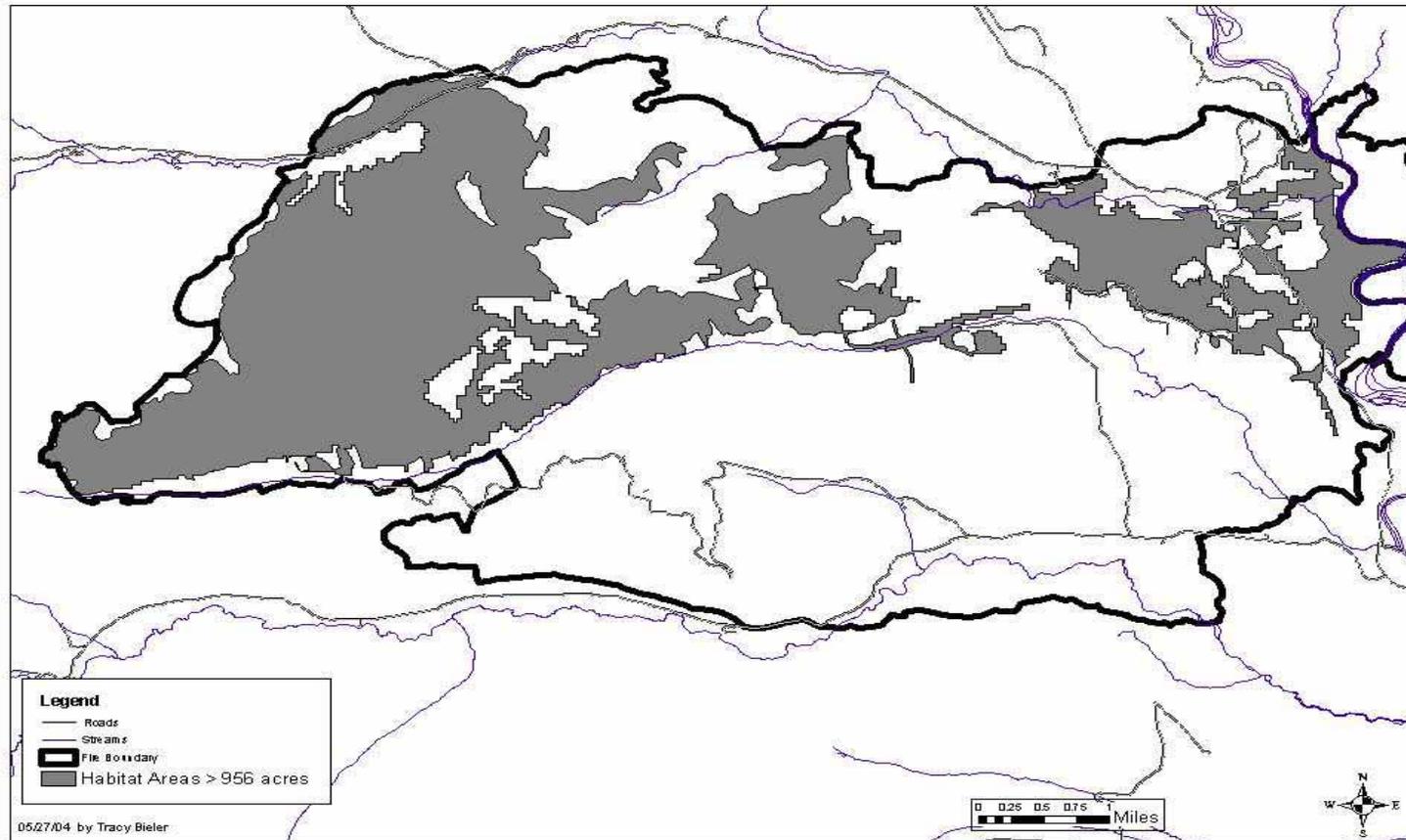


Figure 27. Wedge Canyon Fire Area: Woodpecker Habitat in Patches >956 Acres (post-project)

The Action Alternative includes measures to control bark beetle populations via spruce beetle trap trees, spruce beetle funnel traps, and pheromones. These efforts would likely slightly reduce the black-backed woodpecker numbers on and adjacent to USFS lands in the Robert and Wedge Post Fire affected area. Alternative 2 may affect individual black-backed woodpecker and/or their habitat but these actions are not expected to lead to listing of the species.

The proposed temporary roads should have little impact on the black-backed woodpecker population since they would be short spurs dispersed throughout both fire areas and would be taking a limited number of trees. The total miles of temporary roads proposed in the Robert Fire area is approximately 2.2 miles and in the Wedge Fire area 3.4 miles. The human activity and noise associated with the activities may temporarily displace individuals but would not have a long-term impact on the use of suitable habitat. The proposed road closures and decommissioning should not impact black-backed woodpeckers other than the short-term noise associated with the projects. Helicopter logging within units would be short-term and although it may cause individuals to leave the vicinity during operations they would return to suitable habitat after operations had ceased.

Cumulative Effects Common to Both Alternatives: Robert and Wedge fire Affected Areas

The Roadside Hazard Tree Removal Project removed a limited amount of potential habitat for black-backed woodpeckers adjacent to open roads soon after the fires burned in both the Robert and Wedge fire areas. The BMP projects, routine road maintenance, and activities such as mushroom picking are not expected to impact black-backed woodpeckers other than the noise associated with these activities. The Larch Heart Rot Study plans to take up to 100 snags in various size classes throughout both the Robert and Wedge 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 both fire areas so the study is not expected to impact black-backed woodpecker habitat.

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 ([ibid](#)). 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 in prep](#)). However, in addition to the Robert and Wedge fires large acreages of black-backed woodpecker habitat were created across the Flathead National Forest by recent wildfires such as the Moose Fire, Little Wolf Fire, Red Bench Fire, the Westside Reservoir Fire complex and Crazy Horse Fire complex. In addition insects or disease has killed extensive acreages of trees. A considerable acreage of dead trees has occurred in areas that are outside of the timber base, and thus could provide well-distributed habitat for this species for five or six years after the outbreak.

Fire suppression had been the greatest factor limiting the current distribution of potential habitat in this area. Until 2001, there were few wildfires after 1926, and none over 200 acres in size. In addition, past timber harvest and roading on Federal, State, and private land in the Robert Fire and Wedge Fire affected areas and drainages reduced the acreage of dense snag habitat. No State lands burned in the Robert Fire. Wedge Fire burned about 1,094 acres on the Montana Department of Natural Resources and Conservation (DNRC), which created additional black-backed woodpecker habitat. However, that land is currently being logged and it is unclear at this time how much black-backed woodpecker habitat would remain after the salvage efforts.

In addition, all of the approximately 39,400 acres and 30,317 acres, respectively, of potential habitat created by the Robert and Wedge Fires in Glacier National Park is expected to persist until naturally no longer usable by black-backed woodpeckers.

The Cavity Nesting Birds and Snag and Down Wood Habitat sections of this document contain additional information about cumulative effects on snags, most of which are relevant to black-backed woodpeckers.

Regional and Forest Scale Assessment

Fire suppression has had adverse effects on black-backed woodpeckers, by substantially reducing the amount of burned forests (Hillis *et al.* 2002b). Salvage logging, especially during extended low fire periods, can further reduce the amount of fire-killed forest habitat available to black-backed woodpeckers (Hillis *et al.* 2002b). The direct and indirect effects section disclosed that salvage logging would reduce black-backed woodpecker habitat and further disclosed that the project would “impact individuals but not lead to federal listing.”

At the Region One scale, Hillis *et al.* (2002b) concluded that historically, burned forests 1 to 6 years old averaged approximately 2% of the landmass of forests in Region One. They also found that between 1940 and 1987, black-backed woodpecker habitat declined to only 18.8% of that historic level as a result of very successful fire suppression. Large fires in 1988, 2000, and 2001, however, brought the average for the 1940 to 2001 period up to 75.4% of the historic level. When Hillis and others looked just at the period from 1988 to 2001, the level of available black-backed woodpecker habitat was 284.4% of average historic levels. Fires in 2003, especially on the Flathead National Forest have brought that percentage even higher.

Hillis and others (2002b) concluded that the *scale* at which fires burned was another important consideration in the management of black-backed woodpeckers. They found that historically, *burned stands that provided substantial amounts of black-backed woodpecker habitat, were essentially the result of a few, very large fires.* Frequent small fires, while perhaps important to local populations of black-backed woodpeckers, historically did not contribute many acres. Big fires, of 1889 or 1910 magnitude, tended to occur on a scale that typically encompassed a 5th code hydrologic unit (approximately 100,000 acre) to a 4th code hydrologic unit (approximately 1,000,000 acres). Losensky (2002) concluded such big fires occurred at the rate of 1 or 2 per decade in Region One.

This 284.4% level of habitat, measured for the 1988 to 2001 periods, might suggest black-backed woodpeckers are not at risk and don't justify their sensitive status. Hillis and others (2002b) concluded otherwise. They felt that the 47-year interval from 1940 to 1987, in which available habitat was only at 18.8% of normal not counting losses from salvage logging, may have substantially impacted black-backed woodpecker populations.

While Hillis and others' rationale may suggest black-backs are still at some risk, recent research findings and National Forest monitoring indicate black-backed woodpecker

populations are still reasonably high. Several researchers including Hitchcox (1996), Caton (1996), Hejl and McFadzen (2000) and Powell (2000) found numerous nesting pairs of black-backed woodpeckers on fires that burned in 1991, 1988, and 1998 respectively. National Forest monitoring crews (O'Connor and Hillis 2000, Monson and Boniecki 2002) found numerous nesting pairs in fires that burned in 1998 and 2000 respectively.

While the black-backed woodpecker may have been imperiled by past fire suppression activities, the current amount of habitat is surplus to what occurred historically. Salvage activities planned on the Flathead, Lolo, and Bitterroot National Forests will retain greater-than-historic levels of habitat when completed. Research and monitoring indicates black-backed woodpeckers are present and nesting in high densities in burned forests. Consequently, fire salvage actions taken on the Flathead National Forest (and the Lolo and Bitterroot as well) appear fully consistent with the direction to maintain viable populations of black-backed woodpeckers.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on black-back woodpeckers or their habitat.

Alternative 2– Implementation of Alternative 2 may impact individual black-backed woodpeckers or their habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for Determinations

- There are no measurable impacts with implementation of Alternative 1.
- Alternative 2 would create human related noise and other disturbances within the project area.
- Alternative 2 incorporated the needs of black-backed woodpeckers into the project design
- Although Alternative 2 reduces the amount of black-backed woodpecker habitat it retains adequate acres of habitat within both the Robert Fire and Wedge Fire area.
- There is more black-backed woodpecker habitat now in both fire areas than prior to the fires
- There is substantial habitat that will not be salvaged logged in Glacier National Park.

Boreal Toad (Sensitive/Management Indicator Species)

Affected Environment

Boreal toads breed in lakes, ponds, streams, and road ditches, with a preference for shallow areas with mud bottoms. Adults are largely terrestrial in a wide variety of habitats, including forests, up to at least four miles 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). 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).

Boreal toads can be affected by fire, timber harvest and salvage, insect epidemics, and road construction and maintenance. Individual toads or tadpoles can be killed by wildfire or salvage logging or road construction/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. Since toads travel away from water, post fire areas may make them more visible to predators due to the lack of concealment/camouflage vegetation. Boreal toads are often found dispersing into burned habitat. Researchers have not yet been able to determine the reason why they disperse or what they are drawn to these areas is. It could be travel is made easier soon after a fire due to the lack of vegetation and the reduction of obstacles (Christopher Pearl 2004, pers. comm.). It may also be the availability of water. Roads can be obstacles for toads since toads tend to be slow moving and vulnerable to being run over by vehicles and/or can more easily fall prey to predators while crossing roads.

Potential breeding habitat for the boreal toad was identified as Riparian Landtypes NL1A and NL1E. These are nearly level riparian habitats in flat valley bottoms and with relatively fine substrates. See Table 54 and USDA Forest Service (1995) for more information about these two types. It is difficult to know how well this matches up with actual use of the habitat by the toads. The District has conducted no boreal toad surveys. However, toads have been found in over 86 locations on Flathead National Forest lands and over 80% of these have been in NL1E and NL1A. Nearly all of the other reports were of tadpoles found in roadside ditches or adults found away from breeding habitat.

Table 54. Characteristics of riparian landtypes NL1A and NL1E.

Riparian Landtype	Gradient	Substrate Material	Habitat Type or Vegetation Community
NL1A	Nearly level, valley bottom 2-4% slopes	Clays, silts, fine and medium sand	Subalpine fir
NL1E	Nearly level, valley bottom 2-4% slopes	Clays, silts, fine and medium sand	Willow and sedges

There appears to be approximately 102 acres of suitable wetland breeding habitat scattered throughout the Robert Fire project area. There appears to be approximately 332 acres of suitable wetland breeding habitat scattered throughout the Wedge Fire affected area, much of which is within the Tepee Lake wetland complex area. These acres do not include Tepee Lake itself. The Robert Fire has a small amount of NL1A and the rest was NL1E, while the Wedge Fire area has only NL1E. All of Forest Service land in the analysis area is close enough to potential breeding ponds to be potential upland habitat for boreal toads.

Direct and Indirect Effects to Both Robert and Wedge Fire Affected Areas

Alternative 1 (No Action)

On going actions like road maintenance that could potentially impact boreal toads would continue under this alternative. However, since the No Action Alternative has no actions proposed, this alternative would have no direct effect on boreal toads.

Alternative 2 (Action Alternative)

No issues related to the boreal toad were identified for either fire area. The following effects indicator was used to focus the boreal toad analysis and disclose relevant environmental effects: activities that could cause direct or indirect mortality of boreal toads in terrestrial habitats. The juvenile and adult toads would be vulnerable to road maintenance, temporary road construction, and road decommissioning as well as activities associated with salvage harvest. If adult boreal toads were present, individual mortality could occur during harvest or

site preparation, or by vehicles, logging machinery, or road equipment. These main activities are shown in Table 55. Such individual mortality would be infrequent and would not be expected to affect population levels of boreal toads.

Table 55. Proposed activities that could cause direct mortality to boreal toads.

Fire Name	Acres Treated	Miles Temporary Road Construction	Miles Road Decommissioning
Robert	~3,090	~2.2 miles	~14 miles
Wedge	~2,733	~3.4 miles	0 miles

Under the Action Alternative, the total miles of open forest road would eventually be reduced within both fire areas. Road closures and decommissioning would benefit toads. In addition, Alternative 2 provides full protection to nursery habitat through a combination of protective measures in the Montana Streamside Management Zone Law, Montana Water Quality Act, and INFISH standards for threatened bull trout.

Salvage logging Wedge Fire units 121, 123, 124 and 128 (add additional A19 winter units) during the winter months would have less impact on boreal toads than salvage harvesting during the summer months. This is because the toads would most likely be active in the vicinity of these units during the spring, summer and fall due to these units proximity to potential breeding habitat. During the winter, the toads would be inactive (hibernate in protected areas) and less vulnerable to harm from the various activities associated with salvage logging. Alternative 2 may affect individual boreal toads and/or their habitat but these actions are not expected to lead to listing of the species.

Cumulative Effects Common to Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Past timber harvest, road construction and maintenance, fires, and fire fighting have likely affected boreal toad habitat in both fire areas as well as across the Flathead National Forest. Periodic road maintenance, specifically cleaning out roadside ditches, has probably impacted boreal toads if tadpoles were present and were still dependent on ditch water. A reasonably foreseeable Robert Fire and Wedge Fire BMP Project would improve road drainage and culverts throughout both fire areas. This could further affect tadpoles, depending on the season and location of work. The State land in the Wedge Fire area will be salvage logged in 2003 and 2004. Both the road building and salvage harvest may impact toads on State owned lands. A reasonably foreseeable action would be measures to control weed species, although weed control would not likely affect toads. Fires probably rarely burn in this species' breeding habitat, although water quality and quantity varies after large fires upstream. Beaver dams also provide a flux of habitat availability; past beaver trapping may have affected habitat availability where beavers may not have re-colonized. See the Hydrology/Fisheries sections of this chapter for more information about cumulative effects on these and similar habitats. In general, toad reproductive habitat is well distributed across the Flathead National Forest; most is protected by adherence to the Inland Native Fish Strategy, Montana Water Quality Act and the requirements of the Montana Streamside Management Zone (SMZ) Law.

Forest and Regional Level Assessment

Amphibians are declining worldwide (Maxell 2000). It has been suggested that boreal toads are also declining (Maxell 2000). Various explanations have been offered, including those

typically suggested for all amphibians such as global warming, ozone depletion, introduced exotic predators, introduced exotic diseases, pesticides, and chemical pollution.

Toads are terrestrial during their adult life and disperse throughout a mix of forested habitats. Like all amphibians, however, they reproduce in bodies of water that provide nursery habitat for the young from eggs through metamorphosis. In Region One, nursery habitat for toads includes ponds, lakes, and sloughs, and occasionally roadside ditches and puddles (Maxell 2000). Maxell (2000) describes the density of toads in Region One as “well-distributed but rare.”

The Direct and Indirect effects section identified possible direct effects on adult toads from being hit by vehicles on forest roads and salvage harvest activities. A portion of the Action Alternative would benefit toads since the total miles of forest road would eventually be reduced in both fire areas. In addition, Alternative 2 provides full protection to nursery habitat through a combination of protective measures in the Montana Streamside Management Zone Law, Montana Water Quality Act, and INFISH standards for threatened bull trout.

The protective measures contained in the Action Alternative that include Montana Streamside Management Zone Law, Montana Water Quality Act, and INFISH, apply equally at larger scales including the Flathead National Forest, Western Montana Planning Zone, and that portion of Region One within the State of Montana.

When considering all the factors that may place toads at risk, failure to protect nursery habitat would most likely be at the top of the list of factors that the Forest Service has control over. Since protection of riparian habitats is substantial, and somewhat redundant (multiple laws providing overlapping protection), the decline in toads cannot be attributed to failure to protect nursery habitat. This suggests that Forest Service management actions at all those scales probably are not placing toads at risk.

Another factor that should be brought up when considering toads is road mortality. This factor is potentially important but has received little attention. Traffic may be destructive to animal populations in two ways: directly, by killing individuals and indirectly, by fragmenting a population’s habitat. Fragmentation in turn may lead to isolation of populations, which again may result in a reduced population size and an increased stochastic risk of extinction. As traffic along Forest roads continues to increase this could impact toad numbers. However, since around the mid-1970s the Forest has closed a considerable number of system roads and continues to do so. Closing roads benefits toads and re-vegetating them further improves their habitat. For more information related to black-backed woodpecker habitat see the Cavity Nesting Birds and Snags and Down Wood sections in this chapter.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on boreal toads or their habitat.

Alternative 2– Implementation of Alternative 2 may impact individual boreal toads or their habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.

- The juvenile and adult toads would be vulnerable to road maintenance, temporary road construction, and road decommissioning as well as activities associated with salvage harvest.
- Such individual mortality would be infrequent and would not be expected to affect population levels of boreal toads.
- In addition, Alternative 2 provides full protection to nursery habitat through a combination of protective measures in the Montana Streamside Management Zone Law, Montana Water Quality Act, and INFISH standards for threatened bull trout.
- Under the Action Alternative, the total miles of open forest road would eventually be reduced within both fire areas. Road closures and decommissioning would benefit toads.
- Salvage logging Wedge Fire units 121, 123, 124 and 128 during the winter months would have less impact on boreal toads than salvage harvesting during the summer months.

Common Loon (Sensitive/Management Indicator Species)

Affected Environment

Loons are totally dependent on water. They typically nest on remote lakes that are larger than 20 acres in size, and appear to avoid lakes above 5,000 feet in elevation. Shallow bays with good vegetative cover are preferred. They will also sometimes nest around the edge of larger rivers in forested areas. The common loon is very sensitive to human disturbance and usually nests only at undisturbed lakes. Fish generally comprise the majority (up to 80%) of its diet. Other animal foods include frogs, salamanders, snails, leeches (which Tepee Lake has a lot of), and aquatic insects.

Although many threats were listed for the common loon, wildfire and logging activities were not listed in [NatureServe \(2004\)](#). Breeding Bird Survey data shows the population as stable to slightly upward in this area of Montana ([BBS data 2004](#)).

No lakes exist within the Robert Fire for common loon. No common loons have been observed within the Robert Fire area.

The Wedge Fire contains Tepee Lake which is approximately 25 acres in size. The Wedge Fire burned at high severity around most of Tepee Lake except for a small portion of the southeast side that burned at low severity. There are several cabins/homes in close proximity to Tepee Lake on the southeast and southern sides. Common loons are known to utilize Tepee Lake although use fluctuates. Nesting has been observed on the lake in 1993, 1999, 2000, 2001 and 2003 ([Amy Jacobs and Rachel Potter 2004](#)). In years when nesting has not been successful the loons still utilize the lake. Last year, two nestling were hatched by Memorial Day, which was earlier than normal.

The loons were on Tepee Lake during the 2003 fires and remained there until they left in the fall. The adults would leave to forage elsewhere but would return to their young. The young were not able to fly at the time of the Wedge Fire. As mentioned earlier, the common loon is very sensitive to human disturbance and usually nest only at undisturbed lakes. Although there are cabins/homes in close proximity to the lake, the residents try not to bother the loons. They often caution visitors to keep their distance. The loons appear to have habituated to the normal human activities around the lake and nest a distance from the cabins. There are several pond areas in close proximity to Tepee Lake, though no common loons have been observed in these areas.

The lake is still suitable for common loon use although green vegetation and shade on the edges of the lake is limited. No other lakes exist within the immediate vicinity on Forest Service lands. The Wedge Fire did not affect the forage resource for the loons. Although the fire heavily impacted the vegetative cover around the lake edge, the forb and grass component is expected to recover quickly. A pair of common loons returned to Tepee Lake in mid-April 2004. At the time of this writing they had not yet begun to nest ([Rachel Potter 2004](#)).

Direct and Indirect Effects on the Robert Fire Affected Area

Alternative 1 (No Action) and Alternative 2 (Action Alternative)

The Robert Post Fire project area contains no suitable common loon habitat. The No Action and the Action Alternative would have no impact common loon habitat or common loon individuals either directly or indirectly because there is no habitat in the Robert Post Fire project area.

Direct and Indirect Effects on the Wedge Fire Affected Area

Alternative 1 (No Action)

The Wedge Fire area No Action Alternative would have no impact on common loon habitat or common loon individuals either directly or indirectly because no activities are planned in the fire-affected area. The loons have already returned to Tepee Lake. The Wedge Fire did not measurably impact their food source.

Alternative 2 (Action Alternative)

The Wedge Post Fire project area contains Tepee Lake, which regularly receives use from common loons and has had successful nesting in the past. The common loons returned to the lake in the spring of 2004, so although the vegetative habitat surrounding the lake was dramatically altered by the fire apparently the lake continues to be suitable habitat. The forage availability has not been measurably altered.

The Action Alternative has no salvage harvest units or management activities proposed adjacent to Tepee Lake. The salvage units in closest proximity to the lake are tractor units that are northeast and west of the lake. These units (121, 123, 124 and 128) would be winter logged and hauled, while the loons have left for the winter. If all the units are logged that would haul on FS road 9899 (which is one the closest roads in proximity to the Tepee Lake along with FS road 1069), during the winter there should be no impact to the loons. Helicopter flight paths could disturb nesting or feeding loons or impact their normal flight patterns. However, there are no helicopter units in the vicinity that would fly over the lake during the summer months. Activities associated with the proposed action would not increase human activities on or adjacent to the lake itself. Therefore, based on the project design, no further analysis of common loon or its habitat is warranted. The Action Alternative would have no impact to common loon individuals or their habitat.

Cumulative Effects of Both Alternatives for the Wedge Fire Area

It is not known how long the common loon has been using Tepee Lake. Over the years, roads and cabins have been built in the vicinity of the lake. The human activity right next to Tepee Lake has possibly displaced loons from available nesting habitat or lowered nesting success. Future development on private lands may affect nesting populations and resting activity on the lake.

Traffic along the roads in the vicinity of Tepee Lake is expected to continue without undue impacts to loons utilizing the lake. Forest Service project activities such as road maintenance, monitoring and tree planting is not anticipated to affect loon use on the lake since the loons appear to have habituated to road use and the roads are not adjacent to the lake.

No Forest Service activities have removed nesting habitat. Past harvesting on the west side of the lake may have caused short-term displacement of loons, however a buffer strip along the lakeshore assured retention of nesting habitat along the shoreline. When considered with past management activities, implementation of the Action Alternative would not contribute to any cumulative effects to habitat availability for loons.

Forest and Regional Level Assessment

The southern edge of the breeding habitat for the common loon extends into the United States across many of the eastern states, and into the Rocky Mountains. Northwest Montana supports nearly all the common loon reproduction in the western United States. The original extent of the population is unknown; populations have probably declined with the settlement of the west. Currently, there are around 30 to 40 successfully breeding pairs and approximately 200 birds in the total Montana population ([Moose EIS 2002](#)). Local loons winter off the Pacific coast, with some known to go as far south as California.

Determination for the Robert Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on common loons or their habitat.

Alternative 2 – Implementation of Alternative 2 would have no impact on common loons or their habitat.

Determination Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on common loons or their habitat.

Alternative 2 – Implementation of Alternative 2 would have no impact on common loons or their habitat.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- The Action Alternative has no salvage harvest units or management activities proposed adjacent to Tepee Lake.
- The salvage units in closest proximity to the lake are tractor units that are northeast and west of the lake. These units (121, 123, 124 and 128) would be winter logged and hauled, while the loons gone for the season.
- There are no helicopter units in the vicinity that would fly over the lake during the summer months.
- Activities associated with the proposed action would not increase human activities on or adjacent to the lake itself.

Flammulated Owl (Sensitive/Management Indicator Species)

Affected Environment

Flammulated owls are associated with old growth ponderosa pine/Douglas fir forests. They depend on woodpeckers to create nesting cavities, usually in large dead trees. Reynolds and Linkhart (1992) state that in reports where forests surrounding the nest were described or photographed, all nests were in or adjacent to mature or old growth stands (Bloom 1983, Bull and Anderson 1978, Cannings et al. 1978, Goggans 1986, Reynolds and Linkhart 1984). However, Bloom (1983) reported nests in forests that had been partially cut but contained large, residual trees, and Winter (1994) found the owl in second growth forests, although they did not report nesting in this age-class (Reynolds and Linkhart 1987).

Flammulated owls are insectivorous and nocturnal. They feed on small to medium sized beetles, moths, caterpillars, and crickets. They glean prey from among tree branches and shrub foliage or by pouncing on ground insects from a perch. Open stands with well-developed grass or shrub understories support insects in a forest layer used extensively by fledged owlets and molting adults in late summer (Reynolds and Linkhart 1987).

Flammulated owls spend winters in Mexico and Central America, returning to breed in western Montana around May 1, when nights are warm enough to support the nocturnal flying insects that they depend on for food. They are not typically associated with burned areas, probably due to the lack of physical and biological components needed to support both the owls and the insects they prey on. However, unburned or low severity burned patches of mature forest may provide potential habitat for flammulated owls, especially if there is enough habitat to support a cluster of territories, as suggested by Wright (1996) and the Montana Bird Conservation Plan (Montana Partners in Flight 2000). A cluster of territories would be equivalent to 60-180 acres (20 to 60 acres per pair) of suitable habitat.

Neither the Robert Fire nor Wedge Fire contained old growth ponderosa pine/Douglas fir forests prior to the fires nor are there any single storied old forests in either fire area. Both fire areas are in moist and cooler vegetation types than the more dry and open ponderosa pine/Douglas fir habitats described above, which are normally considered flammulated owl habitat.

Prior to the fires, habitat for flammulated owls would have been marginal at best due to the lack of ponderosa pine/Douglas fir forest. Since the fires, these owls are even less likely to occupy these areas since they are not expected to be present in burned areas or in the remaining low severity burned patches because the patches do not contain the necessary mature forest structure in patches large enough to support a cluster of territories (> 60 acres). Flammulated owls had not been observed in either fire area or the vicinity prior to the fires or since the fires. It is unlikely either fire area contained flammulated owls prior to the fires. It is even more unlikely either fire area contains them after the fires.

Direct and Indirect Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Neither the Robert nor Wedge Post Fire project areas contained what is considered flammulated owl habitat prior to the fires. No flammulated owls were known to inhabit either area prior to the fires. Regeneration of these areas would not create what is considered flammulated owl habitat. Therefore, no further analysis of flammulated owls or its habitat is warranted. Neither the No Action nor the Action Alternative would impact flammulated owl individuals or their habitat in either the Robert Fire or Wedge Fire areas.

Cumulative Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Because neither alternative is expected to have any impact on flammulated owls or their habitat, no cumulative impacts could occur as a result of implementing either of the alternatives.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on flammulated owls or their habitat.

Alternative 2– Implementation of Alternative 2 would have no impact on flammulated owls or their habitat.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- Neither the Robert nor Wedge Post Fire project areas contained what is considered flammulated owl habitat prior to the fires.
- No flammulated owls were known to inhabit either area prior to the fires.
- Regeneration of these areas would not create what is considered flammulated owl habitat.

Harlequin Duck (Sensitive/Management Indicator Species)

Affected Environment

Female harlequin ducks and their young typically live in oxbows and ponds adjacent to mountain streams until the ducklings are old enough to feed and travel in fast currents. On the Flathead National Forest, surveys have found that streams with nesting harlequins have flows of 77-125 cubic feet per second, temperatures of 9-17 degrees Celsius, braided or canyon-type channels, generally cobble to boulder streambed, and banks lined with dense shrubs or trees (Carlson 1990). Nests are located in woody debris in streams, overhangs in stream banks, or in adjacent tree cavities. In Northern Idaho, old growth and mature forest were adjacent to 90% of the observation sites and woody debris was present at 77% of the sites (Cassirer and Groves 1989). Clear, clean water and an abundant aquatic food source appear essential for successful reproduction (Cassirer *et al.* 1993).

There are no records of harlequin ducks being observed in the Robert Fire area. However, harlequin ducks have been observed and recorded along Trail Creek within the Wedge Fire project area. In May 1992, 4 pairs were reported in Trail Creek and in August of the same year 2 females and 2 broods of 4 each were reported. 1992 was the last year the Forest has records for harlequin ducks in the Trail Creek area, however they may still utilize Trail Creek and other creeks in both fire areas. Harlequin ducks have also been observed in Big Creek, which is between the Robert Fire and Wedge Fire areas. Approximately 2,867 acres of the Riparian Habitat Conservation Area (RHCA) buffer areas burned during the Robert Fire and approximately 4,180 acres of the RHCA buffer areas burned during the Wedge Fire. Roughly 7 acres of RHCA did not burn during the Robert Fire and around 67 acres of RHCA did not burn during the Wedge Fire. The vast majority of the RCHAs burned in both fire areas, which impacted the habitat adjacent to the creeks harlequin ducks could potentially utilize. A little over ½ of what was old growth habitat adjacent to Trail Creek, prior to the fire, burned at high severity and most of the rest burned at low severity. Most of what burned

at low severity was spruce so many of the trees are dead or dying within the low severity burn areas. Little if any live old growth trees remain adjacent to the creeks in either fire area. Over the short term a flush of ash and other sediment through the creeks is expected, which will impact the micro-invertebrates. However, this is expected to be short term (1-3 years) and then forage and water clarity should return to similar conditions to what it was like prior to the fires. See the Hydrology and Soils section for further information about the effects the fires had on the creeks and foraging habitat. If harlequin ducks were in either fire area, it is assumed that they left prior to being overcome by fire or remained safe in the water.

Direct and Indirect Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Area

Alternative 1 (No Action)

The greatest impact to harlequin ducks and their habitat were the fires themselves. The Robert Fire project analysis area contains limited potential habitat for harlequin ducks in creeks. They have not been recorded during harlequin duck surveys and no observations have been recorded in District files.

The Wedge Fire had known use by harlequin ducks in Trail Creek in years prior to the fire and also has potential habitat along other creeks such as Whale Creek. The fires burned the old growth habitat adjacent to the creeks in both fire areas. It can be hypothesized that harlequin ducks tend to prefer nesting adjacent to old growth stands for the cooler air temperatures and cover it provides. Essentially all the old growth stands in the Robert Fire and Wedge Fire area burned at least at low severity and no longer provides the same degree of shade or cooler air temperature they did when they were old growth stands. However, these stands would eventually regenerate and provide potential habitat again in the future. It is unclear whether harlequin ducks would utilize either fire area in the next few years, due to the fire impacts to the adjacent vegetation, foraging habitat and creek properties. The No Action Alternative proposes no actions and should not impact harlequin duck habitat in either the Robert Fire or Wedge Fire areas. Therefore, the No Action Alternative would have no impact on individual harlequin ducks or their habitat.

Alternative 2 (Proposed Action)

It is not clear whether harlequin ducks would still find either fire area suitable habitat since the fires. Stream conditions appear to not have drastically changed since the fire, however the adjoining vegetative habitat has substantially changed. The action alternative has no salvage activities proposed in RHCAs that are suitable potential habitat, and no proposed temporary road crossings are proposed in suitable potential habitat. Any potential downstream effects from upland salvage harvest or roadwork should have no impact or an immeasurable impact on harlequin ducks or their habitat. There would be no salvage harvest in the upper portion of Trail Creek in the Wedge Fire and no haul along that section of road. Haul on any road would be short term and therefore should have little to no impact harlequin ducks over the long-term. In addition, Alternative 2 provides protection to potential habitat through a combination of protective measures in the Montana Streamside Management Zone Law, Montana Water Quality Act, and INFISH standards for threatened bull trout.

Cumulative Effects of Both Alternatives for the Robert Fire Affected Area

Roads in close proximity to potential harlequin duck habitat may influence whether these creeks are used or not. Past management activities in the Tepee Creek drainage in the Wedge

Fire area removed tree cover along the upper reaches of Tepee Creek. A section of this creek runs underground the majority of the year, except for spring runoff. This activity removed approximately 70 acres of conifer alongside Tepee Creek, which may have been used as cover by any waterfowl in the area. However, no harlequin ducks have been sighted or are known to use the upper reaches of Tepee or Whale Creek. Implementing the Action Alternative would not further impact any habitat that may be used by harlequin ducks. Because neither alternative is expected to have any measurable impact on harlequin ducks or their habitat, no cumulative impacts could occur as a result of implementing either of the alternatives.

Forest and Regional Level Assessment

The harlequin duck is holartic in distribution but occurs in distinct eastern and western populations. They are an uncommon and localized breeder throughout the Rocky Mountains of the Forest Service Northern Region. These isolated breeding populations winter along the North Pacific Coast (Reel *et al.* 1989). As of 1996, at least 159 pairs nested in Montana (Reichel, Genter, and Hendricks 1997). Breeding has been confirmed on at least 32 streams in northwestern Montana (Reichel and Genter 1995).

Across North America, the range of the harlequin duck has decreased dramatically from the historical record (Genter 1993). Local populations appear to be stable, although there is virtually no information before 1988. Low population size, restricted distribution, narrow habitat requirements, and small numbers of breeding ducks have led to the listing of this species as sensitive. Montana Natural Heritage Program personnel have surveyed for harlequin ducks on the Flathead National Forest since 1989 although surveys have not been conducted every year.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on harlequin ducks or their habitat.

Alternative 2– Implementation of Alternative 2 would have no impact on harlequin ducks or their habitat.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- Harlequin ducks have not been recorded in either fire area since 1992.
- The action alt has no salvage activities proposed in RHCAs that are suitable potential habitat, and no proposed temp rd crossings are proposed in suitable Potential habitat.
- Any potential downstream effects from upland salvage harvest or roadwork should have no impact or an immeasurable impact on harlequin ducks or their habitat.
- There would be no salvage harvest in the upper portion of Trail Creek and no haul along that section of road.
- Haul on any road would be short term and therefore should have little to no impact harlequin ducks over the long-term.

Northern bog lemming (Sensitive/Management Indicator Species)

Affected Environment

The bog lemming is a rare short-tailed rodent, which is found in wet meadows containing standing water and extensive coverage of sedges and species such as sphagnum moss. Special habitat features include fallen logs and other woody debris used for burrowing.

The northern bog lemming has few populations in the lower 48 states. It is known from 8 locations in Washington, 4 locations in Idaho, and 13 sites in Montana (Reichel and Beckstrom 1993). Since about 10,000 years ago, this species has become a glacial relic with localized primary habitat. A bog lemming was trapped in 1992 at the head of Bowen Creek, over 35 miles west of the Robert Fire. This is the only known occurrence of this species on the Flathead National Forest, although other bog lemming sites occur just to the north of the above mentioned site, on the Kootenai National Forest. This species was also found in 2 or 3 locations on the west side of Glacier National Park (Reichel and Beckstrom 1993). It is unlikely bog lemmings are or were present in either fire area.

Potential habitat for the northern bog lemming was identified as Riparian Landtypes NL1A and NL1E. These are nearly level riparian habitats in flat valley bottoms and with relatively fine substrates. See Table 56 and USDA Forest Service 1995 for more information about these two types. It is difficult to know how well this matches up with actual use of the habitat by the northern bog lemming. The District has not conducted surveys for this species in recent years. The only known finding of a bog lemming on the Flathead National Forest was in an NL1E site.

Table 56. Characteristics of Riparian Landtypes NL1A and NL1E

Riparian Landtype	Gradient	Substrate Material	Habitat Type or Vegetation Community
NL1A	Nearly level, valley bottom 2-4% slopes	Clays, silts, fine and medium sand	Subalpine fir
NL1E	Nearly level, valley bottom 2-4% slopes	Clays, silts, fine and medium sand	Willow and sedges

There appears to be approximately 102 acres of suitable wetland breeding habitat scattered throughout the Robert Fire project area. There appears to be approximately 332 acres of suitable wetland breeding habitat scattered throughout the Wedge Fire affected area, much of which is within the Tepee Lake wetland complex area. These acres do not include Tepee Lake itself. The Robert Fire had a small amount of NL1A and the rest was NL1E, while the Wedge Fire area had only NL1E.

Direct and Indirect Effects to Both Robert and Wedge Fire Affected Areas

Alternative 1 (No Action)

No issues related to the northern bog lemming were identified for either fire area. The following effects indicator was used to focus the boreal toad analysis and disclose relevant environmental effects: activities that could cause direct or indirect mortality of northern bog

lemming. Since the No Action Alternative has no actions proposed, this alternative would have no direct or indirect effects on northern bog lemmings.

Alternative 2 (Action Alternative)

Both the Robert Fire and Wedge Fire project analysis areas contain limited potential habitat for the northern bog lemming. They have not been recorded during surveys or observed in either fire area. No wet areas within either the Robert Fire and Wedge Fire areas would be entered under any of the proposed activities in the Action Alternative. No project activities that affect any lotic or lentic wetlands within either fire area would be implemented. In addition, Alternative 2 provides full protection to northern bog lemming habitat through a combination of protective measures in the Montana Streamside Management Zone Law, Montana Water Quality Act, and INFISH standards for threatened bull trout. Therefore, no further analysis of northern bog lemming or its habitat is warranted. Northern bog lemming habitat would not be impacted with the implementation of the Action Alternative. The Action Alternative would have no impact northern bog lemming individuals or their habitat.

Cumulative Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Because neither alternative is expected to have any measurable impact on northern bog lemmings or their habitat, no cumulative impacts could occur as a result of implementing either of the alternatives.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on northern bog lemmings or their habitat.

Alternative 2– Implementation of Alternative 2 would have no impact on northern bog lemming or their habitat.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- Both the Robert Fire and Wedge Fire project analysis areas contain limited potential habitat for the northern bog lemming.
- They have not been recorded during surveys or observed in either fire area.
- No wet areas within either the Robert Fire and Wedge Fire areas would be entered under any of the proposed activities in the Action Alternative.
- No project activities that affect any lotic or lentic wetlands within either fire area would be implemented.

Fisher (Sensitive/Management Indicator Species)

Affected Environment

Fishers are larger, weasel-like predators with a strong affinity for forested riparian habitats. Fishers avoid insular patches of forested habitat and may require forested riparian travelways between feeding and denning sites (Heinemeyer and Jones 1994). They rarely stray far from 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). Areas of otherwise suitable habitat can be isolated when cover in travelways between home ranges is removed. In the Northern Rockies, fishers 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 several prey species, but these areas are likely to be avoided until the living canopy cover exceeds 40%. The conversion of some percentage of older age classes to younger age classes can promote diversity of prey species and thus have long-term benefits for fisher populations (Jones 1991). Fishers would likely avoid open areas for a period of at least 50 years and probably not preferentially select them up to 80 to 100 years for lodgepole pine or 120 to 160 years for mixed conifers (Jones 1991).

Fishers are long-lived, have low reproductive rates, large home ranges (for carnivores of the size) and exist in low densities throughout their range. This implies that fishers are highly prone to localized extirpation, colonizing ability is somewhat limited, and that populations are slow to recover from deleterious impacts. Isolated populations are therefore unlikely to persist. Habitat connectivity is a key to maintaining fisher within a landscape. It is expected that the majority of the fisher that occupied the burned area escaped prior to the wildfire. However, because it is primarily a nocturnal forager, it is expected that some may have been within or sought out resting structures during major runs of the wildfire and may have perished as a result of radiant heat, smoke inhalation, or direct flames.

The greatest impact to fisher and fisher habitat in both project areas were the fires themselves. The fires destroyed large blocks of habitat, which may have left individuals that utilized these areas more vulnerable to starvation and predation. Fisher may use the edges of the burns directly adjacent to remaining live old forest conifer stands. Only small patches of suitable fisher habitat remain in old growth habitat that burned at low severity consequently both fire areas no longer contain viable fisher habitat. Fisher use riparian areas a substantial amount of time. In the Robert Fire approximately 755 acres burned at low severity. The rest of the riparian area burned at moderate (618 acres) or high severity (1,495 acres), only approximately 7 acres of riparian habitat did not burn. In the Wedge Fire approximately 1,338 acres burned at low severity. The rest of the riparian area burned at moderate (808 acres) or high severity (2,034 acres), only approximately 67 acres of riparian habitat did not burn.

Prior to the fires there was approximately 1,643 acres of inventoried old growth within the Robert Fire perimeter and 1,339 acres within the Wedge Fire perimeter. All of the old growth structure burned in both fire areas and the majority of it burned at high to moderate severity. In the Robert Fire approximately 898 acres of old growth burned at high severity, 547 acres burned at moderate severity and 198 acres burned at low severity. In the Wedge Fire approximately 807 acres of old growth burned at high severity, 1,339 acres burned at moderate severity and 103 acres burned at low severity. Once the old growth burned it no longer functioned as old growth habitat for fisher because although there are pockets of trees that may not have burned or just the understory burned, the size of these pockets are not large enough to function as fisher habitat. This is not to say that these pockets are not valuable because they add diversity to the landscape and as the forest regenerates these pockets will become valuable to fisher as the canopy cover increases to at least 40% and the new trees mature. These small pockets of old growth may also help in the development of travel corridors.

Prior to the Robert Fire and Wedge Fire there was approximately 10,008 acres (62%) and approximately 13,337 acres (62%) respectively of the affected areas that had 40 to 100% canopy closure. Approximately 7,261 acres (73%) of that burned at moderate to high severity in the Robert Fire. Approximately 13,337 acres (77%) of that burned at moderate to high severity in the Wedge Fire. The rest burned at low severity. This resulted in a substantial loss of habitat and prey species across the area. This loss is compounded by the

other wildfires and management activities that occurred within these drainages within the last one hundred years. During the fires most trees and large woody material were killed within the high and moderate severity burn areas. Habitat for fisher and their prey remains in the mosaic of low severity burn within the perimeter of the fires however, due to its fragmentation and size it is not currently usable. There was only approximately 14 unburned acres in the Robert Fire and 77 unburned acres in the Wedge fire. This is a long-term effect that will last for decades. The high and moderate severity burn areas will not provide what is considered suitable fisher foraging and denning habitat for 100 to 150 or more years.

Pockets of low severity burned habitat areas exist in a mosaic fashion across the landscape. These pockets are of substantial value to retain since they provide a degree of cover for fisher, which are restricted to ground and tree based movement. These pockets will also serve as the future core habitat as the burned forest is restored.

It is predicted that portions of the burned areas could still provide marginal travel/resting habitat for fisher, within about 10-20 years; if adequate habitat components (down logs, snags and brush) are retained to provide protection and prey habitat. Once the new trees reach a canopy closure that is close to 40%, they should provide adequate travel/resting habitat. Prey availability for fisher within the fire perimeters and analysis areas has been reduced over the short term, but should recover in approximately ten years.

Riparian habitats are important for foraging, cover, and especially as travelways for dispersal to other areas of suitable habitat. Forest carnivores are known to utilize riparian areas for travel, hunting, denning, and resting activities. The riparian areas of a fisher home range are key areas. It is critical to maintain, protect and enhance the habitat values of these areas.

Suitable fisher travel corridors within both fire areas are lacking. Both the Robert Fire and the Wedge Fire made connectivity between other watersheds to other populations of fisher much more limited and difficult. This is further compounded by the other recent fires in this area, which include but are not limited to the Moose and Red Bench fires. These fires also temporarily eliminated several thousand acres of habitat for fisher (and marten as well as goshawk). Suitable travel corridors need to be developed that would provide connectivity between the remaining fisher habitat areas. It is also important to preserve the remaining old forest structure in adjacent areas to the burns.

Although both fire areas that burned at moderate and high severity are currently considered unsuitable habitat for fisher; the number of large diameter snags and down logs left within salvage units could impact fisher use in these stands in the future, once these stands reach a canopy closure of 40% or higher.

Direct and Indirect Effects to Both Robert Fire and Wedge Fire Affected Areas

Alternative 1 (No Action)

Under the No Action Alternative, assuming good growing conditions, it could take over 150 to 250 years to naturally develop mature conifer forest and up to 300 to 500 years to reach decadent, contiguous, old forest habitat that is preferred by fisher. This is assuming no stand replacing wildfires impact the area. In the short-term, all the snags left under this alternative would provide levels of down woody debris that far exceed the levels required by fisher. However, within 50 to 100 years most of this material would be in advanced stages of decay. Since fishers avoid areas of open canopy cover, they would avoid the burned areas within the project areas even though the snags and down logs exist there at least until suitable canopy closure exists. The late seral forest areas with low severity burn (there is no unburned)

habitat within the project areas would not be utilized where they are disjunct and not contiguous with suitable habitat, and/or due to their limited size.

Alternative 2 (Proposed Action)

As mentioned previously, the greatest impact to fisher and fisher habitat in both project areas were the fires themselves. Based on the cover remaining, these burned forests are unsuitable habitat for fisher. If any fisher are present in the unburned forest directly adjacent to project activity, they could be affected by the noise associated with the activities. Other than the noise associated with the activity, disturbance from project activities within treatment units to fisher is unlikely since fisher tend to avoid open habitats. Therefore, the removal of dead trees would not directly affect fisher or their habitat. Both fires effectively eliminated fisher habitat on those acres severely burned by removing the overstory canopy cover and its associated understory shrub and brush layers, as well as down logs and other woody materials. Alternative 2 adheres to the Amendment 21 down wood standards, which would retain adequate amounts of large woody debris for fisher where it is available. This is provided by unmerchantable pre-fire down wood, un-merchantable material left standing, later windfall of leave trees and leave snags, and felled hazard or un-merchantable trees. The Amendment 21 Standards call for the retention of coarse woody debris (woody pieces > 6 feet in length) in treatment areas at the following densities:

- 32 pieces average per acre 9 to 20 inches diameter and
- 15 pieces average per acre \geq 20 inches diameter

Fishers use the large diameter structure for denning and loafing sites, as well as foraging areas. The retention of large diameter western larch and Douglas fir standing snags and down logs as well as the reserve patches, which are part of Alternative 2, would help provide adequate snag and down wood habitat in the future for fisher. In addition all snags in areas outside treatment units that were either lightly burned, not burned at all or where small spot fires burned, contain numerous snags that may be utilized by fisher for denning and foraging, and loafing. There would be a mix of snag species and sizes left over the landscape.

Currently the limiting factor for fisher in the severely burned areas is the non-existence of a forested overstory. Generally, fishers do not utilize areas without overstory canopy. Alternative 2 would reestablish the overstory canopy in a shorter period in areas where trees are planted. The sooner the overstory returns to burned areas, the sooner the fisher prey base and overstory canopy conditions would enable them to utilize the areas. Alternative 2 would plant approximately 644 acres in the Robert Fire and 2,213 acres in the Wedge Fire affected area. It is estimated that in twenty plus years, fisher could begin to utilize the edges of the both fire areas, as prey species reestablish themselves in those areas and cover develops.

The RHCAs would be left intact. The large snags and down logs left within the RHCAs, along ridges and typical fisher travelways would retain legacy structure (large structure from pre-disturbance) fisher would use in the future as the burned areas regenerate into mature forest structure. The largest western larch and Douglas fir snags, large down log habitat and reserve patches would be left for travel, resting, hiding cover, prey habitat, hunting, and denning activities. The tradeoff for not retaining all the snags and down logs is threefold. First, both the Robert and Wedge fire affected areas, which includes some remaining green areas, would be less prone to another stand replacement wildfire. Secondly, this proposal includes restoration projects such as tree planting inside and outside units, which would accelerate the development of mature and late forest structure which fisher require. It also proposes the decommissioning of roads, which would improve security for fisher. Thirdly,

not having excessive amounts of down woody material on the ground would provide better growing conditions for tree re-establishment. Fisher would not utilize all the large down logs and snags that would be salvaged under Alternative 2 due to the lack of moderate to dense canopy cover.

Salvage units should become minimally suitable for travel and resting habitat within 20 years (if cover is adequate) and mature forest habitat would develop within 100 to 150 years. Snags retained in this alternative would provide down woody debris that fisher prefer, although most of the material would be in the advanced stages of decay within 100 years.

The temporary roads proposed in Alternative 2 would not impact fisher since neither fire area currently contains suitable habitat for them. However, when the fire areas reestablish into suitable fisher habitat the proposed road closures and decommissioning would benefit fisher by increasing the security of the areas.

It is highly unlikely a fisher or a fisher den would be found in the vicinity of any of the proposed activities related to the Action Alternative since the proposed activities are within moderate and high severity burned habitat. However disturbance to any potential fisher den from project activities would be avoided by implementing the following mitigation:

- If a fisher den is found within ¼ mile of any project activities associated with the Action Alternative, a limited operating period (LOP), from March 1 to August 31 within ¼ mile of any known fisher den would be implemented. This means that no project activities should occur within ¼ mile of a known fisher denning site from March 1 through August 31.

Cumulative Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Neither fire area currently contains habitat for fisher due to the Robert Fire and Wedge Fire impacts on the vegetation. Within recent years both the Moose and Red Bench fires affected old forest structure in the vicinity of both the Robert Fire and Wedge Fires. A large amount of fisher habitat has essentially been lost or substantially degraded by the fire. Habitat quality was affected by the loss of many structural attributes selected by these species for denning, foraging or resting. The Robert and Wedge fires in combination with the other more recent fires in the vicinity have created a barrier to species movement and dispersal; possibly impacting the ability for genetic interchange between individuals or sub-populations. These factors may contribute to decreased breeding success within sub-populations in the North Fork of the Flathead River drainage and the Flathead National Forest and possibly slightly decrease numbers of individuals in these populations over time. Connectivity of habitat adjacent to the fires would mainly be limited to mostly riparian areas until at least 40% canopy cover exists and mature structure develops. Connectivity would be limited until mature forest develops.

Prior to the fires certain past management activities within both fire areas likely had negative impacts on fisher habitat. Past logging and roading removed potential den sites and forest canopy. Past timber harvest on National Forest system, State, and private lands most often removed large mature trees and snags, which are preferred by this species. However, fire exclusion likely increased tree density, woody debris, and canopy cover over what may have occurred historically, thereby providing several elements that this species favors. The forest roads through both fire areas impacted these species by removing habitat, creating openings, providing access for trappers, and making fisher more vulnerable to predation. 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 fisher security.

Fire suppression activities, especially the creation of dozer line, during both the Robert Fire and Wedge Fire removed some of what was habitat for fisher, but the effort protected more habitat than it removed. The use of fire retardant should not have had an effect on fisher.

The Roadside Hazard Tree Removal Project, BMP projects, routine road maintenance, and activities such as mushroom picking will not impact fisher or their habitat. The Larch Heart Rot Study plans to take up to 100 snags in various size classes throughout both the Robert and Wedge 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 both fire areas and not within riparian areas so the study is not expected to impact future down wood or snag habitat for fisher.

Forest and Regional Level Assessment

There have been three re-introductions of fisher into Montana since the 1950's. Two of them came from Canada in the 1950s and the third was in the early 1990s when 110 fisher were re-introduced from Wisconsin and Minnesota. Fisher are more habitat specific than wolverine so wolverine are thought to be more widely distributed than fisher in Montana. When considering the State of Montana, habitat connectivity for fisher appears to be adequate. Fisher are still legally trapped in Montana although the quota is low. In the northwestern portion of the state there are 2 fisher trapped per year on average. Trapping records continue to be consistent throughout the state with about 7 trapped each year ([Brian Giddings 2004, pers. comm.](#)). When trapping records are considered, it suggests that the fisher population is stable in Montana at this time. However, occurrence records are widely distributed, but without better data on population sizes or trends, the ability to make inferences about the status of the species is limited.

Historic records are scarce for fisher in Montana, but indicate that fisher occurred in western Montana. No fishers were harvested in the state from 1929 to 1959 suggesting that they were extirpated from Montana. Contemporary occurrence data from harvest, snow tracking, and sightings were used to map fisher distribution statewide. The spatial and temporal distribution of these records demonstrates that translocations have been successful in establishing, and /or augmenting, fisher populations in Montana. Verified fisher records exist in the Bitterroot, Coeur D'Alene, Sapphire, Garnet, Mission, Swan, Cabinet, Purcell, Whitefish, Flathead, Livingston, and Beartooth ranges. Contrary to historic data, analysis of mitochondrial DNA sequence data indicated that fisher might not have been extirpated from Montana and/or Idaho prior to the translocations. West-central Montana fisher populations show evidence of isolation and distinctiveness, suggesting that they are descended in part from remnant native populations ([Vinkey 2003](#)). Records indicate fisher were never widespread and have been isolated from Canadian populations for a long time. Fisher remain scarce in the state. The apparent stronghold of fisher populations in Montana is on the border with Idaho in the Bitterroot Mountains.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on fisher or their habitat.

Alternative 2– Implementation of Alternative 2 may impact individual fisher or their habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- Alternative 2 adheres to the Amendment 21 down wood standards, which would retain adequate amounts of large woody debris for fisher where it is available.
- Based on the cover remaining, these burned forests are unsuitable habitat for fisher. If any fisher are present in the unburned forest directly adjacent to project activity, they could be affected by the noise associated with the activities.
- The retention of large diameter western larch and Douglas fir standing snags and down logs as well as the reserve patches, which are part of Alternative 2, should help provide adequate snag and down wood habitat in the future for fisher.
- The large snags and down logs left within the RHCAs, along ridges and typical fisher travelways would retain legacy structure fisher would use in the future as the burned areas regenerate into mature forest structure. The largest snags, large down log habitat and reserve patches would be left for travel, resting, hiding cover, prey habitat, hunting, and denning activities.
- When both fire areas reestablish into suitable fisher habitat the proposed road closures and decommissioning would benefit fisher by increasing the security of the areas.
- The fires themselves had the biggest impact on fisher habitat.
- This alternative, incorporates the Limited Operating Season for fisher should a den site be found within ¼ mile of project activities. No project activities should occur within ¼ mile of a known fisher denning site from March 1 through August 31.

Northern Goshawk (Sensitive/Management Indicator Species)

Affected Environment

The goshawk is a top avian predator of coniferous and deciduous forests that has a circumpolar distribution, mainly north of 30°-north latitude; it is not numerous but occurs in many forest and forest edge communities. The goshawk feeds on both birds and small mammals.

In western Montana and northern Idaho, nesting habitat generally is found on lower to mid-elevation Douglas fir and mixed conifer forests on moist habitat types (Hayward and Escano 1989). In Oregon, goshawks nested in Douglas fir or white fir, pure stands of lodgepole pine or lodgepole mixed with small ponderosa pine, mixed stands of firs and pines, and aspen. Other tree species in Oregon with documented nests included grand fir, western larch, Englemann spruce, ponderosa pine, and subalpine fir (Moore and Henny 1983). In south central Wyoming, goshawks nested in lodgepole pine forests. These nest stands were not classic old growth structure, but rather even-aged, single storied, mature forests with high canopy closure and clear forest floor (Squires and Ruggiero 1996). Across the range of the species, goshawk home range size is generally about 6,000 acres in size (Reynolds *et al.* 1992).

Primary prey for northern goshawk tends to be ground or near ground dwellers and therefore open understory in forested stands facilitate foraging. Ideally, foraging habitat should consist of mature to late-seral stands with at least 40 percent canopy closure in dominant trees with an open understory. High tree canopy closure is characteristic of all goshawk nest stands. Goshawk nests are generally found on gentle to moderate slopes (less than 25 percent). Aspect is another important component in the choice of a nest stand. Nest stands with a north to east aspect are considered optimal. North to northwest and east to southeast are considered suitable. All other aspects are considered marginal (Reynolds *et al.* 1992).

Although there were no known nest sites within either fire area, very limited potential habitat for nesting may still exist in low severity burned mature forest stands adjacent to the fire perimeters or outside the fire perimeters in green forest directly adjacent to the fires. Based on what is known about goshawk ecology, it is possible that some level of habitat suitability exists in the low severity burned islands of green trees if they are close to the fire perimeter. Preliminary monitoring of goshawks on the Bitterroot National Forest since the 2000 fires indicate these islands of green forest offer suitable nest habitat, while the edges of moderate and high severity burn may offer foraging opportunities for goshawks.

Goshawk sightings have not been recorded within either fire area, however it is quite possible goshawks would have used both fire areas prior to the burns. Surveys specific to goshawk have not been completed in either fire area in recent years. Prior to the fires there was approximately 1,643 acres of inventoried old growth within the Robert Fire perimeter and 1,339 acres within the Wedge Fire perimeter. All of the old growth structure burned in both fire areas and the majority of it burned at high to moderate severity. In the Robert Fire approximately 898 acres of old growth burned at high severity, 547 acres burned at moderate severity and 198 acres burned at low severity. In the Wedge Fire approximately 807 acres of old growth burned at high severity, 1339 acres burned at moderate severity and 103 acres burned at low severity. Once the old growth burned it no longer functioned as old growth habitat for goshawk because although there are pockets of trees that may not have burned or just the understory burned, the size of these pockets are not large enough to function as goshawk habitat. This is not to say that these pockets are not valuable because they add diversity to the landscape and as the forest regenerates these pockets will become valuable to goshawks as the canopy cover increases to at least 40% and the new trees mature.

Adult northern goshawks are rarely killed as a direct result of wildfire. Both the Robert Fire and Wedge Fire occurred late enough in the year that their young would most likely have already fledged. The fires nonetheless did destroy large blocks of habitat, which may have left individuals more vulnerable to starvation and predation.

Since most of both fire areas burned at high to moderate intensities nearly all the potential goshawk habitat was destroyed by the fires. It is possible goshawk may utilize the edges of the burn 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). Within the low burn severity areas near the edges of the fires, especially those areas close to water, there is potential foraging habitat for goshawks. However, the canopy closure across the moderate to high intensity burn areas would render the vast majority of both fire areas unsuitable habitat for goshawks. Goshawks would not utilize the interior of either fire area due to the lack of habitat. The desired future condition for goshawks is to restore the mixed conifer forest to a mature forest with at least 40 percent canopy closure, a high number of large snags, and large down logs throughout the area.

Direct and Indirect Effects for the Robert Fire and Wedge Fire Affected Areas

Alternative 1 (No Action)

The greatest impacts to northern goshawk and goshawk habitat in both project areas were the fires themselves. Although no goshawk sightings have been recorded in either fire area, there was potential habitat prior to the fires. Goshawks could potentially utilize the periphery (edges) of both fires for foraging. No issues related to the northern goshawks were identified for either fire area. Since the No Action Alternative has no actions proposed, this alternative would have no direct or indirect effects on northern goshawks.

Alternative 2 (Action Alternative)

It is highly unlikely a goshawk or goshawk nest would be found in close proximity to any of the proposed activities related to the Action Alternative since the proposed activities are within moderate and high severity burned habitat. However disturbance to any potential nesting northern goshawks from project activities would be avoided by implementing the following mitigation:

- If a goshawk nest is found within ¼ mile of any project activities associated with the Action Alternative, a limited operating period (LOP), from March 1 to August 31 within ¼ mile of any known goshawk nest would be implemented.

Within the Robert Fire area there are approximately 813 acres of mature forest, in patches of 20 acres or larger, that burned at low severity. Of that 813 acres, there are approximately 83 acres that are on northerly aspects and have slopes of less than 35%. These 83 acres contain the northerly aspect and flat to gentle slope that goshawks tend to prefer for nesting. The Robert Fire also has approximately 29 acres of old growth structure that burned at low severity. Less than a half an acre of the old growth contained <35% slope and had a northerly aspect. Within the Wedge Fire area there are approximately 669 acres of mature forest, in patches of 20 acres or larger, that burned at low severity. Of that 669 acres, there are approximately 111 acres that are on northerly aspects and have slopes of less than 35%. These 111 acres contain the northerly aspect and flat to gentle slope that goshawks tend to prefer for nesting. The Wedge Fire also has approximately 86 acres of old growth structure that burned at low severity. Less than 3 acres of the old growth contained <35% slope and had a northerly aspect. Since basically the remainder of both fire areas burned at moderate to high severity the acres shown above show that limited habitat exists within both fire areas for goshawks. Since the area surrounding much of the potential goshawk habitat is now in a stand initiation stage, goshawks are less likely to utilize either fire area. If a goshawk remains in either fire area, disturbance to any potential nesting northern goshawks from project activities should be avoided by implementing the mitigation measure outlined above.

Since goshawks utilize green forests and are associated with older mature forests, effects to goshawks and goshawk habitat would be probable if actions were to affect mature forest site conditions. Since harvest prescriptions would be targeting dead trees that would not be utilized by goshawks, it is unlikely that the Action Alternative would have a measurable effect on goshawk habitat or the species. The removal of snags under this alternative may reduce prey diversity for goshawk along edges between burned and unburned forest. Although prey species most preferred by goshawk (i.e. pine/red squirrels), however, are most closely associated with mature forests. The proposed temporary roads would not have a measurable impact on goshawk habitat. Meeting Forest Standards for down wood and the proposed snag prescription is expected to provide adequate habitat for smaller wildlife

species that provide potential forage for goshawks as the forest recovers. Snags and down wood habitat would be available as the forest regenerates. However most of the snags that are left would fall and be in advanced stages of decay by the time the trees reach maturity. Snags and logs near the edge of the fire could be used as perch sites and plucking posts.

Cumulative Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

In addition to wildfire, past timber management and roading may have lessened habitat quality by reducing canopy closure and removing larger size class trees that goshawk tend to prefer for nesting and foraging within both fire areas and within a 5 mile radius of each fire area. Observations of goshawk nest sites on the various National Forests, however, have found numerous nests in second growth forests with medium size (20" dbh) trees. Since goshawks prefer open understories for foraging, past fire exclusion in the fire areas may have reduced habitat quality due to the ingrowth of shade-tolerant species. Human activity from timber management and recreation may have disturbed nesting goshawks, as they are sensitive to disturbance during this period. The impact of this is likely minimal as the human use within both fire areas is generally short term and fairly dispersed.

Probably the highest concentration of human activity in the area was experienced during suppression of the both the Robert Fire and Wedge Fire. The fires began burning in mid and late July, which would be toward the end of the reproductive season for northern goshawk. Most of the young of the year would likely have been out of the nest and mobile by this period. 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 Robert Fire and Wedge Fire protected habitat outside of the fire areas. The use of fire retardant likely had little, if any direct effect on this species.

The loss of goshawk habitat from wildfire could become a threat to the amount, distribution, and quality of goshawk habitat in the North Fork of the Flathead River drainage. Since much of the interior of the fire areas would not be considered suitable for goshawk for a minimum of 150 to 250 years, intraspecific competition for quality foraging sites outside of the recent fire areas may increase between goshawks if any used the project areas prior to the fire.

The cumulative affect of the Moose Fire and the Red Bench Fire as well as other smaller fires that have occurred within North Fork drainage in the last 20 years, in combination with the Robert Fire and Wedge Fire substantially reduced the number of acres of suitable habitat for goshawk a minimum of 150 years. That being said, adequate suitable goshawk habitat still remains in the vicinity of fire areas. As mention earlier, goshawks tend to prefer mature and old forest structure on northerly slopes that are relatively flat or gently sloped for nesting and foraging. Within a 5 mile radius of the Robert Fire there is approximately 5,319 acres of unburned mature forest and 698 acres of unburned old forest structure on northerly slopes that are relatively flat or gently sloped (<35% slope). Within a 5 mile radius of the Wedge Fire there is approximately 3,413 acres of mature forest and 1,181 acres of old forest structure on northerly slopes that are relatively flat or gently sloped(<35% slope). These figures are for areas that are 20 acres in size or larger, which goshawks would tend to prefer for nesting. In addition to these areas there is a total of approximately 36,819 acres of mature forest structure and approximately 3,947 acres of old forest structure within 5 miles of the Robert Fire that is also potential goshawk habitat. Within a 5 mile radius of the Wedge Fire there is a total of approximately 20,176 acres of mature forest structure and approximately 6,797 acres of old forest structure within 5 miles of the Robert Fire that is potential goshawk habitat.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on northern goshawk or their habitat.

Alternative 2– Implementation of Alternative 2 may impact individual northern goshawk or their habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- Alternative 2 would create human related noise and other disturbances within the project area.
- Alternative 2 incorporated the needs of goshawks into the project design and has mitigations that would limit disturbance to the birds. If a goshawk nest is found within ¼ mile of any project activities associated with the Action Alternative, a limited operating period (LOP), from March 1 to August 31 within ¼ mile of any known goshawk nest would be implemented.
- Since most of both fire areas burned at high to moderate intensities nearly all the potential goshawk habitat was changed to an unsuitable condition by the fires.
- It is highly unlikely a goshawk or goshawk nest would be found in the vicinity of any of the proposed activities related to the Action Alternative since the proposed activities are within moderate and high severity burned habitat.

Northern leopard frog (Sensitive/Management Indicator Species)

Affected Environment

The Northern leopard frog is found throughout much of the U.S. and southern Canada. It is still common in many areas and in a diverse array of pristine and disturbed habitats. Populations have declined in some areas due to habitat loss and degradation, overexploitation, interactions with non-native species, and unknown causes, but the overall range remains essentially undiminished ([NatureServe 2004](#)). Historically the northern leopard frog was widespread in Montana, but is now appears to have been extirpated throughout much of the western part of the State. Leopard frogs have not been detected within either the Robert Fire or Wedge Fire analysis areas most probably due their densely forested habitat prior to the fires.

Northern leopard frog habitat typically includes: springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes; usually permanent water with rooted aquatic vegetation. Northern leopard frogs are found in or near non-forest habitats. In summer, they commonly inhabit wet meadows and fields. Typically, the vegetation is a dense sedge wet meadow or cattail marsh. Northern leopard frogs are not known to occur in forested habitats and are known to occur primarily on low elevation marshes and wetland bottoms. Breeding takes place in lakes and ponds (temporary and permanent), springs, and occasionally backwaters or beaver ponds in streams. Leopard frogs tend to take cover underwater, in damp niches, or in caves when inactive. They usually over-winter underwater ([NatureServe 2004](#)). Threats and degree of threat vary greatly across the range. Threats include habitat loss, commercial overexploitation, and in some areas, probably competition/predation by

bullfrogs or other introduced species. Wildfire and salvage logging are not listed as threats to northern leopard frogs in [Natureserve \(2004\)](#).

Habitat for the northern leopard frog is limited within both fire areas due to the forested habitat. The best potential habitat probably exists within the Tepee Lake wetland complex area around Tepee Lake in the Wedge Fire area. For the purposes of this analysis any potential habitat is presumed occupied. Surveys specifically for northern leopard frogs have not been recently conducted in either fire area.

It is assumed that leopard frogs in the fire areas were able to survive the fires within the water. Habitat adjacent to ponds, bogs, lakes and marshes burned in most areas, which may have made individuals more vulnerable to predation immediately after the fires.

Direct and Indirect Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Both the Robert Fire and Wedge Fire project analysis areas contain very limited potential habitat for the northern leopard frog. Leopard frogs have not been detected within either the Robert Fire or Wedge Fire analysis areas and there would be no harvest or other activities proposed in any preferred wetland habitat for this species under either alternative. The preferred habitat would be the same habitat described for boreal toads and northern bog lemmings. No wet or meadow areas within both the Robert Fire and Wedge Fire areas would be entered under the No Action Alternative or in the Action Alternative. In addition, there are no activities proposed in either fire area that directly affect any lotic or lentic wetlands. Therefore, no further analysis of northern leopard frog or its habitat is warranted. Northern leopard frog habitat would not be impacted with the implementation of either the No Action or Action Alternative.

Cumulative Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Because neither alternative is expected to have any measurable impact on northern leopard frog individuals or their habitat, no cumulative impacts could occur as a result of implementing either of the alternatives.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on northern leopard frog or their habitat.

Alternative 2– Implementation of Alternative 2 would have no impact on northern leopard frog or their habitat.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of either Alternative 1 or Alternative 2.
- Leopard frogs have not been detected within either the Robert Fire or Wedge Fire analysis areas and there would be no harvest or other activities proposed in any preferred wetland habitat for this species under either alternative.
- In addition, there are no activities proposed in either fire area that directly affect any lotic or lentic wetlands.

Peregrine Falcon (Sensitive/Management Indicator Species)

Affected Environment

American peregrine falcons occur from Mexico to Alaska. The peregrine falcon was de-listed from threatened status in 1999 and is currently listed as a sensitive species on the Region 1, Regional Forester's Sensitive Species list. It is also a management indicator species on the Flathead National Forest. Peregrines have relatively strict nesting requirements: vertical cliff habitat with large potholes or ledges that are inaccessible to land predators and are preferentially located near habitat that has a high avian prey population such as wetlands, large bodies of water or rivers. They feed primarily on other birds they catch in the air. Peregrines can be sensitive to noise and disturbance, particularly during early phases of courtship and incubation. Peregrines are known to forage near and occasionally within forested habitat types.

There is very marginal limited habitat for the peregrine falcon within the rock outcrops in the northern portion of the Trail Creek in the Wedge Fire area. No peregrine habitat is known to exist within the Robert Fire area. No peregrine falcons are known to utilize either the Robert Fire or Wedge Fire areas or the upper North Fork of the Flathead River drainage. There are no historical records of past use in this area. There are no active eyries on the Hungry Horse or Glacier View Ranger Districts. It is not likely that the peregrine falcon utilize either the Robert Fire or Wedge Fire analysis areas. Although an adequate food source may exist within the fire areas, neither area contains large vertical rock faces and ledges that are required by the peregrine for nesting. The Robert and Wedge Fires likely did not impact peregrine falcon individuals or habitat.

Direct and Indirect Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

As stated above, there is very marginal limited habitat for the peregrine falcon within the rock outcrops in the northern portion of Trail Creek in the Wedge Fire area. No peregrine habitat is known to exist within the Robert Fire area. No peregrine falcon are known to utilize either the Robert or Wedge fire areas or the upper North Fork of the Flathead River drainage and there are no historical records of past use in this area. It is highly unlikely that peregrine falcon utilize either the Robert Fire or Wedge Fire analysis areas. There are no activities planned for the No Action Alternative and none of the proposed activities in the Action Alternative would have an effect on peregrine falcons or their habitat. No cliffs, which are the primary component of peregrine habitat, are located within treatment areas and there are no preferred foraging sites within the watersheds. Therefore, no further analysis of peregrine falcon or its habitat is warranted. Neither the No Action nor the Action Alternative would impact peregrine falcon or their habitat.

Cumulative Effects of Both Alternatives for the Robert Fire and Wedge Fire Affected Areas

Although there is probably sufficient forage available for peregrine falcons in both the fire areas, there isn't any truly suitable nesting habitat in either fire area. There are some rock outcrops up Trail Creek but none are large enough or perched high enough for typical peregrine nesting habitat. Because neither alternative is expected to have any measurable impact on peregrine falcon or their habitat, no cumulative impacts could occur as a result of implementing either of the alternatives.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on peregrine falcons or their habitat.

Alternative 2– Implementation of Alternative 2 would have no impact on peregrine falcons or their habitat.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1 or Alternative 2.
- There is very marginal limited habitat for the peregrine falcon within the rock outcrops in the northern portion of the Trail Creek in the Wedge Fire area.
- No peregrine habitat is known to exist within the Robert Fire area. No peregrine falcons are known to utilize either the Robert Fire or Wedge Fire areas or the upper North Fork of the Flathead River drainage.
- There are no historical records of past use in this area. There are no active eyries on the Hungry Horse or Glacier View Ranger Districts.

Townsend's Big Eared Bat (Sensitive/Management Indicator Species)

Affected Environment

Information on this species is limited for the Robert and Wedge Post Fire Project analysis areas. Townsend's big-eared bats are found in Montana, but details of its distribution are not well known. This species is found in all but subalpine and alpine habitats, and may be found at any season throughout its range. The western big-eared bat has a widespread distribution but is uncommon to rare: a notable decline has been reported in the western United States (Dobkin *et al.* 1995).

Townsend's big-eared bats inhabit a wide variety of landtypes from arid juniper breaks to high elevation forests. Big-eared bats use communal roosts during the winter and migrate short distances (usually less than 40 miles) to summer maternity and roost sites. Primary roost habitat consists of caves and cave-like structures (mine shafts, adits and tunnels) and abandoned buildings or other human-made structures. Tree cavities and rock outcrops are also known to sometimes provide day roost habitat when located near suitable foraging areas. Individual males and non-parous females typically use these tree cavities. Primary and secondary foraging sites are over wet meadows and other areas of water, respectively. Maternity caves tend to consist of warm, moist sites typically used from May 15 to September 15. Hibernacula tend to be cooler, drier caves, used from mid-October through March depending on weather conditions. Small moths are the principle food of this species, however it does feed on a variety of insects and arthropods, which they either capture in flight or glean from vegetation.

A field reconnaissance solely for the purpose of identification of bat species has not been conducted in either the Robert Fire or Wedge Fire areas. Wildlife surveys and field assessments have been completed in both areas in past years for timber sales and other projects. During these surveys no Townsend's big-eared bat were documented, although bat species have been noted foraging for insects along creeks within both fire areas. If Townsend's big-eared were in either fire area, it is expected the adults would have been able to leave the area prior to fire over-taking them, they may also have been able to take refuge in

rock crevices or the small caves in the Trail Creek area. Any young should also have been old enough to also escape the fire. It is not known whether Townsend's big-eared bats occupied either post fire project area prior to the fires, however it is unlikely.

These bats feed almost exclusively on small moths (Dobkin *et al.* 1995) high in living forest canopy, occasionally gleaning beetles, flies, and other insects from leaves. Townsend's big-eared bats could benefit from the flush of insects that come into an area after a fire, if suitable roosting habitat was in close proximity. Day roost sites would be limited in both fire areas and winter or maternity roost sites are not known to exist within either fire area or vicinity. Communal roosting habitat may be provided by bridges and by abandoned buildings. None of the bridges observed in either fire area appeared to be the structure preferred by these bats. This bat is intolerant of human disturbance at both winter hibernacula and summer roosts. There appears to be sufficient snag roosting habitat near wet meadow feeding areas, especially in the Wedge Fire area. However, the green-forested canopy is currently lacking from most of these areas since the fires burned primarily at moderate to high severity and the remaining potential roost sites are limited due to lack of shade. Both fire areas appear to contain suitable forage habitat. The Wedge Fire area contains small caves in the Trail Creek drainage, however no Townsend's big-eared bats have been located within the caves or drainage.

Direct and Indirect Effects to the Robert and Wedge Fires Affected Areas

Alternative 1 (No Action)

Townsend's big-eared bats are not expected to use burned forests. The No Action Alternative snag and down wood retention and riparian habitat would support roosting habitat and prey especially when a green forest recovers. There are no activities planned for the No Action Alternative so this alternative would not change the existing condition. The No Action Alternative would not impact Townsend's big-eared bats or their habitat in either fire area.

Alternative 2 (Action Alternative)

As mentioned above Townsend's big eared bats are not expected to use burned habitat. However if Townsend's big-eared bats were to utilize either fire area the Action Alternative would retain snags and down wood in adequate numbers to support prey especially when a green forest recovers. A sufficient number of large diameter snags would be retained for roosting habitat in the salvage units and outside. The riparian areas would not be entered which would leave the main foraging areas and roosting sites undisturbed. Implementation of this alternative would not be near any caves that may be roosts or breeding areas for bats. The caves above Trail Creek show no sign of bat use. Townsend's big-eared bats can be adversely affected by disturbance or destruction of their roosting colonies and by the use of insecticides (Wisdom *et al.* 2000). Neither of these actions would happen under Alternative 2. There is a slight possibility Townsend's big-eared bats roosting in snags could be displaced or killed during salvage logging activities. This is unlikely since they have not been observed in either fire area or in the vicinity of the fires.

Cumulative Effects of Both Alternatives for the Robert and Wedge Fire Areas

As was stated earlier it is doubtful Townsend's big-eared bats used either fire area prior to the burns due to the lack of an adequate maternity roost or hibernacula. Past timber management activities have not likely impacted cave sites and indentations in rock that may be potential

roost sites because these sites are unsuitable for timber management. However, it is possible that roost trees may have been impacted by road construction and/or timber harvest. Fuelwood harvest could potentially cut down roost trees.

The Roadside Hazard Tree Removal Project removed a limited amount of potential habitat for Townsend's big-eared bats adjacent to open roads soon after the fires burned in both the Robert and Wedge fire areas. The BMP projects, routine road maintenance, and activities such as mushroom picking are not expected to impact Townsend's big-eared bats other than the noise associated with these activities. The Larch Heart Rot Study plans to take up to 100 snags in various size classes throughout both the Robert and Wedge 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 both fire areas and not within riparian areas so the study is not expected to impact Townsend's big-eared bats habitat.

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on Townsend's big-eared bats or their habitat.

Alternative 2– Implementation of Alternative 2 may impact individual Townsend's big-eared bats or habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- Townsend's big-eared bats are not expected to use burned forests.
- In both the No Action and Action Alternatives snag and down wood retention and riparian habitat measures would support prey.
- There is a slight possibility Townsend's big-eared bats roosting in snags could be displaced or killed during salvage logging activities.

Wolverine (Sensitive/Management Indicator Species)

Affected Environment

Adult wolverines are mostly solitary animals that range widely over a variety of habitats. Isolation from human impacts and a diverse prey base seem to be the most important habitat components. The wolverine has historically been considered a species with relatively low density, influenced in part by its need for a large home range with little human intrusion. Wolverines are fierce predators as well as scavengers. Their prey consists of terrestrial animals ranging from deer to rabbits as well as smaller rodents. They are known to utilize a variety of habitat types, including subarctic-alpine tundra, boreal forest, and coniferous forests. There seems to be little use in stands of dense young timber or in openings such as clear-cuts or wet meadows (Butts 1992). Suitable habitat in the vicinity of both fire areas most likely consists of mixed conifer, lodgepole pine and subalpine fir habitat types. Wolverine predominately use coniferous forest types but their substantial use of non-forest alpine habitat distinguishes them from the fisher and marten. They also depend less on large woody structures than fisher or marten (Ruggiero et al. 1994).

Home ranges are very large, averaging approximately 150 square miles in Montana. However, wolverine do not appear to be as territorial as once thought, so several individuals could use the same area as part of their home range (Brain Giddings 2004, pers.comm.). Wolverines feed primarily on rodents and carrion, although they are opportunistic and will consume berries, insects, fish, birds, and eggs when available. Ungulate carrion seems to be particularly important to wolverine in the winter and movements to lower elevations during winter may be to take advantage of ungulate mortalities on winter ranges (Butts 1992). In summer, wolverine in Montana travel to higher elevation forests dominated by subalpine fir.

Both the Robert Fire and Wedge Fire burned large areas of suitable wolverine habitat and created temporarily unsuitable conditions for the period of time it will take until the vegetation recovers and small mammals and birds begin to repopulate the burned areas. It is assumed that big game habitat has been temporarily impacted for the short-term and populations will be lower than before the fire for the short term. Wolverine habitat continues to exist within the watersheds of both fire areas (Robert watersheds – Big and Canyon, Wedge watersheds – Tepee, Trail and Whale) however prey population diversity and quantity have been reduced temporarily until vegetation recovers. Suitable habitat has been reduced until stands of dense young timber mature.

Wildlife observation records indicate that wolverine have been detected within the vicinity of both fires. Trapping records show that wolverine probably occupied this portion of the North Fork of the Flathead River drainage prior to the fires. It is likely that unroaded remote areas are better than roaded and areas that receive considerable human use.

It is possible wolverine could have been in either or both fire areas at the time of the fires. Since they are solitary and have such large home ranges, the number would have been low, if any. The fire areas are currently unsuitable for wolverine due to their current openness.

Due to the fires, wolverines are not expected to stay in the recently burned portions of the North Fork of the Flathead River drainage although they may travel through. This is due to the loss of habitat caused not only by the Robert Fire and Wedge Fire but also the cumulative effect of the Moose and Red Bench fires, all of which are in the vicinity. Once suitable cover and habitat has re-established, wolverine will again inhabit these areas. Since few white-tailed deer, mule deer or elk winter in either fire area wolverine use in the burns during the winter would probably be opportunistic.

Direct and Indirect Effects to the Robert and Wedge Fires Affected Areas

Alternative 1 (No Action)

By far the biggest impact to wolverine and their habitat in both fire areas was the fire itself. Under this alternative, short-term effects on potential live prey and carrion sources would be variable. Short-term effects of limited availability of forage (1-3 years) and loss of thermal cover may benefit wolverine because of potential over-winter mortality of the few big game animals that remain in the fire areas. The potential mortality is entirely dependent on weather patterns that determine forage production levels (growing season precipitation) or/and winter caloric requirements of big game animals (extreme winter temperatures). This alternative would have no direct impacts on wolverine. Additional losses of marginal thermal (see elk/mule deer section) cover that potentially could occur as a result of possible beetle outbreaks would be expected to be negligible in terms of effects on wolverine. Since there would be no changes in the level of motorized access, the current level of road-use related disturbance/less effective habitat use by wolverine would continue. Over the long term there

could be slightly more small prey species available due to the high level of down wood that would be available.

Alternative 2 (Action Alternative)

By far the biggest impact to wolverine and their habitat in both fire areas was the fire itself. Wolverines are not expected to utilize the either burn area until sufficient vegetative structure has reestablished. However it is possible individuals may travel through either fire area and could be disrupted by noise and the presence of human activity associated with the management activities proposed for both fire areas.

Harvest activities would not be conducted in any wolverine denning habitats and would therefore not have any impacts on this habitat component. However, the presence of winter logging activities may create an unknown level of disturbance on seasonally visited areas by wolverine. The effects of this disturbance are unpredictable but could be expected (if they occur) to cause some additional energetic need by wolverine. This need may be met by additional carrion if ungulates or other prey are negatively affected by winter harvest actions.

Wolverines depend fairly heavily on ungulate as prey during the winter. The Action Alternative would not impact the 30 acres of designated winter range for white-tailed deer in the Robert Fire affected area. However, a few ungulates may winter in the lower elevations of both fire areas and winter harvest activities (short-term/one-time event) in those areas could impact big game use. Salvage harvest activities may displace a limited number of animals from salvage areas causing greater energy expenditures by deer and elk. This could lead to higher levels of big game mortality. Displacement caused mortality would, in the short-term, benefit wolverine by increasing their available winter forage. Excessive winter range big game mortality would not be expected in either fire area since neither fire area contains big-game winter range large enough to effect ungulate populations. Reductions in local big game populations and a long-term reduction of the winter carrion forage base for wolverine would not be caused by winter logging in either fire area. Winter ungulate losses are expected to be low, if any, in both fire areas.

The retention of large diameter snags and reserve patches would provide hiding cover for deer, elk, and other wolverine prey thereby reducing hunter caused mortality. Also the snag and coarse woody material on the ground retained in this alternative would also improve habitat characteristics for small mammals and birds and should increase production and diversity of this prey base. 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 to the wolverine since they would be short spurs and open for a short period of time.

The project may impact individual wolverine or habitat, but would not affect natal denning habitat and, therefore, is not likely to contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Cumulative Effects of Both Alternatives for the Robert and Wedge Fire Areas

Prior to management actions (e.g., road building and timber harvesting) within both the Robert Fire and Wedge Fire watersheds, wolverine had unlimited access to the variety of habitats within the drainages and most likely traveled from high elevation summer habitats to low elevation winter big game ranges during winter periods. Past timber harvests altered

habitat characteristics by reducing the amount of small mammal habitat (down logs/snags) and construction of roads, which allowed relatively easy access for trapping opportunities. These past management activities have also had the dual results of providing early succession/foraging habitats for big game but at the same time easier access for hunters during hunting seasons.

The most far-reaching effect may have been the development of road systems and recreational trails and sites that improved access and promoted human use in remote areas. This most likely had the biggest impact on lowering habitat quality for wolverine. However, since the mid-1970s the Forest has closed a number of roads in both fire areas. Closing roads has improved habitat security for wolverine. The advent of recreational snowmobile use and their snow compacting effect has allowed other predators to access areas previously inaccessible to them. They are now able to compete for resources during energy demanding winter periods. Snowmobile use also reduces habitat security for wolverine.

In summary, past management actions that altered vegetative structure probably did not have appreciable effects on wolverine prey abundance because each manipulation of habitat diversified the prey base for wolverine by increasing some species and reducing others. On the other hand, the use of roads by snowmobiles and other motorized vehicles reduced the remoteness of the pre-managed landscape. This may have affected the behavior of wolverine perhaps affecting the energetic needs of the wolverine during critical periods of the year.

Cumulative effects on wolverine have been varied. Past vegetative manipulations probably had minor direct effects on this habitat generalist. However, past forest management harvest activities favored early seral conditions preferred by big game species, an important food source for wolverine. This successional plant stage provided the needed forage in a landscape where fires were being actively suppressed. The change in vegetative structure caused by human harvest created a diversity of conditions: berry patches, ground and tree squirrel habitat and other foraging sources for wolverine.

Human developments such as the campgrounds, cabins, hiking trails, and road development within both fire areas probably had more far reaching effects by increasing human access into once remote areas. Roads that accessed high-elevation basins probably reduced habitat quality the most.

Mushroom picking is an activity that will occur with the potential to displace or influence wolverine use in both fire areas. This activity occurred in the spring/summer of 2002 and 2003 and brought hundreds of people to the Big Creek drainage after the Moose Fire and is expected to happen in both the Robert and Wedge Fire areas during spring/summer of 2004 and 2005.

Best Management Practices work 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. Although unlikely, this work has the potential to displace or influence wolverine use in both fire areas.

The environmental baseline during non-winter appears to be suitable to sustain wolverine use; winter recreational activities may be having displacement effects on wolverine. However, the Action Alternative would not have long-term adverse cumulative effects on wolverine or habitat suitability.

Forest and Regional Level Assessment

The Direct and Indirect effects section disclosed effects at the project scale are minor. Wolverines are habitat generalists, foraging within all elevations and vegetative communities on carrion and small mammals. Wolverines are secretive and avoid contact with humans

(Ruggiero *et al.* 1994). Females den in very remote, high elevation cirque basins in late winter. 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 (Copeland 1996, Ruggiero *et al.* 1994). Krebs corroborated this assumption in British Columbia by demonstrating that wolverine populations had the highest levels of juvenile recruitment (demonstrated by “normal” age class distribution in a trapped population) within areas where there was no human disturbance in late winter.

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 advent of more powerful snowmobiles has resulted in substantially increased late winter disturbance into areas suitable for denning female wolverines (Kennedy 1998).

Since backcountry snowmobilers are capable of covering a 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. That is not the only potential limiting factor. Trapping may be a threat to wolverines since they have a low fecundity rate and are easily trapped (Ruggiero *et al.* 1994). Also, since wolverines are highly mobile, highways may pose a threat from collisions with autos, or may inhibit their mobility. Backcountry snowmobiling, however, constitutes the most likely National Forest-managed limiting factor potentially affecting wolverines.

Ongoing research suggests the relationship of snowmobile disturbance and wolverine denning success is not an absolute. During lynx research in the Pioneer Mountains, Squires and Ruggiero (*in prep*) trapped five wolverines in a landscape that in general receives heavy snowmobile activity. While there was no way of knowing where those wolverines came from, it suggests that the relative intolerance of denning wolverines to human disturbance found by Copeland (1996) may vary by individual.

Hillis and others (*in prep*) identified all potential natal den habitat in Region One. Three other data layers were considered, including: 1) designated wilderness and National parks where winter snowmobiling is prohibited; 2) RARE 2 areas where winter snowmobiling may or may not be prohibited depending on Forest Plan and Travel Plan status; and 3) other areas generally open to snowmobiling. Hillis and others concluded that at the North Fork Flathead River 4th code hydrologic unit, 70% of all natal den habitat was fully protected from winter snowmobile disturbance, primarily by restrictions in Glacier National Park. They also concluded that at the Flathead National Forest scale, 69.9% of all natal den habitat was protected by Glacier National Park and the Bob Marshall Wilderness Complexes and Mission Wilderness. At the Regional scale, Hillis and others concluded that 69.4% of all natal den habitat was protected by National Parks and designated wildernesses.

The Flathead National Forest recently completed an agreement with snowmobile and wilderness advocacy groups, which designated some non-wilderness portions of the Flathead National Forest and particularly the North Fork Flathead drainage closed to snowmobiling. This increased the percentage of natal den habitat protected in the North Fork 4th Code Hydrologic Unit to approximately 95%, and the percentage protected at the Flathead National Forest scale to 84%.

The high percentages of natal den habitat protected at all scales (North Fork Flathead, Flathead National Forest, and Region One) suggest that the majority of reproducing female

wolverines should be successfully producing young at all scales. Furthermore, the approximately 30% that is “unprotected” at the Region One scale includes some additional RARE 2 lands that are closed to snowmobiling in Forest Plans or Travel Plans. Consequently, the actual Region One percentage of natal den habitat protected by provisions that exclude snowmobiles, is higher than the approximately 70% levels projected here.

In the early 1900s wolverine were considered to be vanishing species in the western United States and near extinction in Montana. Changes in wildlife management philosophies and a reduction in predator control programs are believed to have allowed wolverine to re-colonize parts of Montana during the next 50 years. Population expansion continued through the 1970s when the wolverine was classified as a protected state furbearer with a regulated harvest and requirements to collect harvest data. Species distribution has remained relatively stable over the past 25 years with evidence that population expansions have occurred into central and southwest mountain ranges. Harvest data also indicate a stable annual average harvest of 10 wolverine, stable to increasing species distribution, a 50/50 sex ration, and an appropriate age distribution of over 50% juveniles and yearlings represented in the harvest sample. Since 1990-91, Montana Fish, Wildlife and Parks has supplemented harvest information with snow track survey based data and collection of species occurrence records to monitor long-term trends in distribution and population size. The harvest sample continues to provide accurate sex and age data, distribution locations, reproductive data, food habitat information, and genetic samples. Based on this harvest-generated data, new wolverine management strategies may be considered in the future (Giddings 2004).

Determination for the Robert Fire and Wedge Fire Affected Area

Alternative 1 – Implementation of this alternative would have no impact on wolverine or their habitat.

Alternative 2– Implementation of Alternative 2 may impact individual wolverine or their habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for Determinations

- There are no measurable or guaranteed impacts with implementation of Alternative 1.
- Alternative 2 would create human related noise and other disturbances within the project area.
- Wolverines are not expected to utilize the fire areas until sufficient vegetative structure has reestablished.
- Harvest activities would not be conducted in any wolverine denning habitats and would therefore not have any impacts on this habitat component
- The snag and coarse woody material on the ground retained in Alternative 2 would improve habitat characteristics for small mammals and birds and should increase production and diversity of this prey base.
- The proposed temporary roads should have minimal, if any impacts to the wolverine since they would be short spurs and open for a short period of time. The proposed road closures and decommissioning would improve habitat for wolverine.

Sensitive Species Impact Determination Summary

Table 57 below summarizes the sensitive species impact determination by alternative.

Table 57. Biological Evaluation Determinations for sensitive wildlife species.

Sensitive Wildlife Species – Robert Fire	Alt. 1	Alt. 2
Black-backed woodpecker	BI	MIH
Boreal toad	MIH	MIH
Common loon	NI	NI
Fisher	NI	MIH
Flammulated owl	NI	NI
Harlequin duck	NI	NI
Northern bog lemming	NI	NI
Northern goshawk	NI	MIH
Northern leopard frog	NI	NI
Peregrine falcon	NI	NI
Western big-eared bat	NI	MIH
Wolverine	NI	MIH
Sensitive Wildlife Species – Wedge Fire	Alt. 1	Alt.2
Black-backed woodpecker	BI	MIH
Boreal toad	MIH	MIH
Common loon	NI	NI
Fisher	NI	MIH
Flammulated owl	NI	NI
Harlequin duck	NI	NI
Northern bog lemming	NI	NI
Northern goshawk	NI	MIH
Northern leopard frog	NI	NI
Peregrine falcon	NI	NI
Western big-eared bat	NI	MIH
Wolverine	NI	MIH

NI = "No Impact."

MIH = "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."

Management Indicator Species

Elk and Mule Deer (Management Indicator Species)

Affected Environment

A considerable area of mule deer and elk summer range (see Table 59 and Table 60) and a small amount of winter range (Glacier National Park portion), burned in the Robert Fire and Wedge Fire. The long-term effects from both fires will be highly beneficial for both elk and deer. However, there is concern that the short term lack of cover, browse and forage may

lead to higher than normal losses to predation, poaching, winter kill, competition, and hunting pressure.

The main effects of the both the Robert Fire and Wedge Fire on elk and mule deer relates mostly to the resulting proliferation of quality forage (grasses, forbs, and shrubs) and the elimination of thermal and hiding cover. With the relatively high burn severity that affected both fire areas; the full benefits of increased quantities of forage are not expected to occur for several years and last for 15-30 years depending on local site conditions.

Both elk and mule deer are commonly associated with shrub, seedling and sapling habitats. They often utilize small meadows and riparian habitats as fawning/calving areas. In this area, these species tend to be an indicator of early to mid-seral successional stage habitat.

The fires resulted in much of the cover for deer and elk being eliminated. Dead trees provide some hiding cover but little thermal cover. Some browse remains in areas that burned with low intensities and still have forbs and brush in the understory. Habitat in the moderate to high burn severity areas of the fires is considered low, at least for 3 to 5 years after fire. However, it is anticipated that the hillsides will be recovering with young grass, forbs and sprouting shrubs in the spring of 2004. Several of the browse species such as willow, serviceberry, chokecherry and Oregon grape have already begun to regenerate. Most of the browse species should be regenerated within 3-10 years. Observations made within past fires in the vicinity (Red Bench and Moose) showed some revitalized huckleberry, willow, serviceberry, chokecherry and Oregon grape. This is expected to occur within both the Robert Fire and Wedge Fire areas also.

Within a few years, when the browse reestablishes the fires will have enhanced the forage quality and quantity for both deer and elk. However, with the abundance of black and grizzly bear and other forest carnivores within the area and lack of hiding cover in many areas, there is some concern for the survival of fawns and calves.

Prior to the fires, elk and mule deer utilized both the Robert and Wedge post fire project areas for mainly summer range, but also migration, as well as for calving and fawning. High quality calving and fawning areas are typically found in close proximity to meadows and riparian areas. Fawning areas are most sensitive to physical and noise disturbance during the early summer when the fawns are born.

As mentioned above, both the Robert and Wedge fire areas mainly contain important summer habitat for elk and mule deer. They also contain some fall and spring range depending on weather conditions during these seasons. There is no designated mule deer and elk winter range (MA-13) in either fire area, although a small number of both elk and mule deer do stay mainly in the vicinity of the North Fork of the Flathead River and Big Creek during the winter. A few elk will stay along the south facing slopes along Trail Creek but most of the elk from the Wedge Fire area tend to winter just south of the Canadian border, primarily in Glacier National Park where there are more south facing slopes and the snow is not as deep. Elk from the Robert Fire winter along Tremble Creek on Forest Service land and along the river bottom. Both areas are south of the Robert Fire. Robert Fire elk also winter along Camas Creek and Huckleberry Creek in Glacier National Park. Again these areas primarily have south facing slopes and less snow.

Mule deer from the Wedge Fire area cross over the Whitefish Divide, which is to the west and winter in the vicinity of Eureka, MT. There are concentrations of 800 plus mule deer in this area during the winter. Some mule deer also winter in the vicinity of Kintla Lake. Mule deer from the Robert Fire tend to winter along Apgar Ridge and also west of the project area

along Winona Ridge and Demers Ridge. They also winter in Glacier National Park along Apcar Ridge, which was partially burned as a result of the Robert Fire.

A small bit of Huckleberry Creek burned in the Wedge Fire and a portion of Apcar Ridge burned in the Robert Fire (both areas are in Glacier National Park), however for the most part both the elk and mule deer winter ranges from both fire areas have not been impacted by recent fires (Thier 2004, pers. comm.). The migration routes utilized by both the mule deer and elk into and out of both fire areas are not fully understood at this time.

During the formulation of Forest Plan standards for elk and mule deer, it was assumed that standards designed for elk would also be adequate for mule deer because they both tend to use similar habitats. Within both fire areas, mule deer are probably more numerous than elk. Accurate population estimates for the Robert Fire or Wedge Fire areas for either ungulate species do not exist.

Elk and mule deer habitat management considerations at the project level includes providing habitat for elk to exist and reproduce and providing for human enjoyment (photography, viewing and hunting). Spring, summer and fall months are important periods of time for elk as this is the period of time when elk and mule deer give birth to and nurse calves and fawns; grow antlers; build body condition; accumulate fat for enduring the winter months; and endure the stress of the big game hunting season.

Summer Range

Elk summer range habitat analysis units (HAU) were determined for the Flathead National Forest, for the purpose of analyzing summer habitat effectiveness (See Table 58). Wildlife biologists from the Forest and Montana Department of Fish, Wildlife and Parks determined the analysis units. Three Habitat Analysis Units (HAUs) were used in the analysis for the Robert Fire and five HAUs were used in the Wedge Fire analysis (Figure 28 and Figure 29).

The concept of habitat effectiveness (HE) is one that attempts to account for the major factors that are known to dictate/influence elk (and mule deer) use of habitats. A model has been used on the Forest to evaluate management actions on elk habitat. The model uses road density, cover, and the amount of livestock grazing to calculate a habitat effectiveness index (HE) index value. The resulting index value (%HE) provides a baseline which can then be used to compare the relative level of change that would occur based on land management proposals that could/would change important habitat variables known to influence elk habitat use (i.e. road density cover, livestock use). In this context,

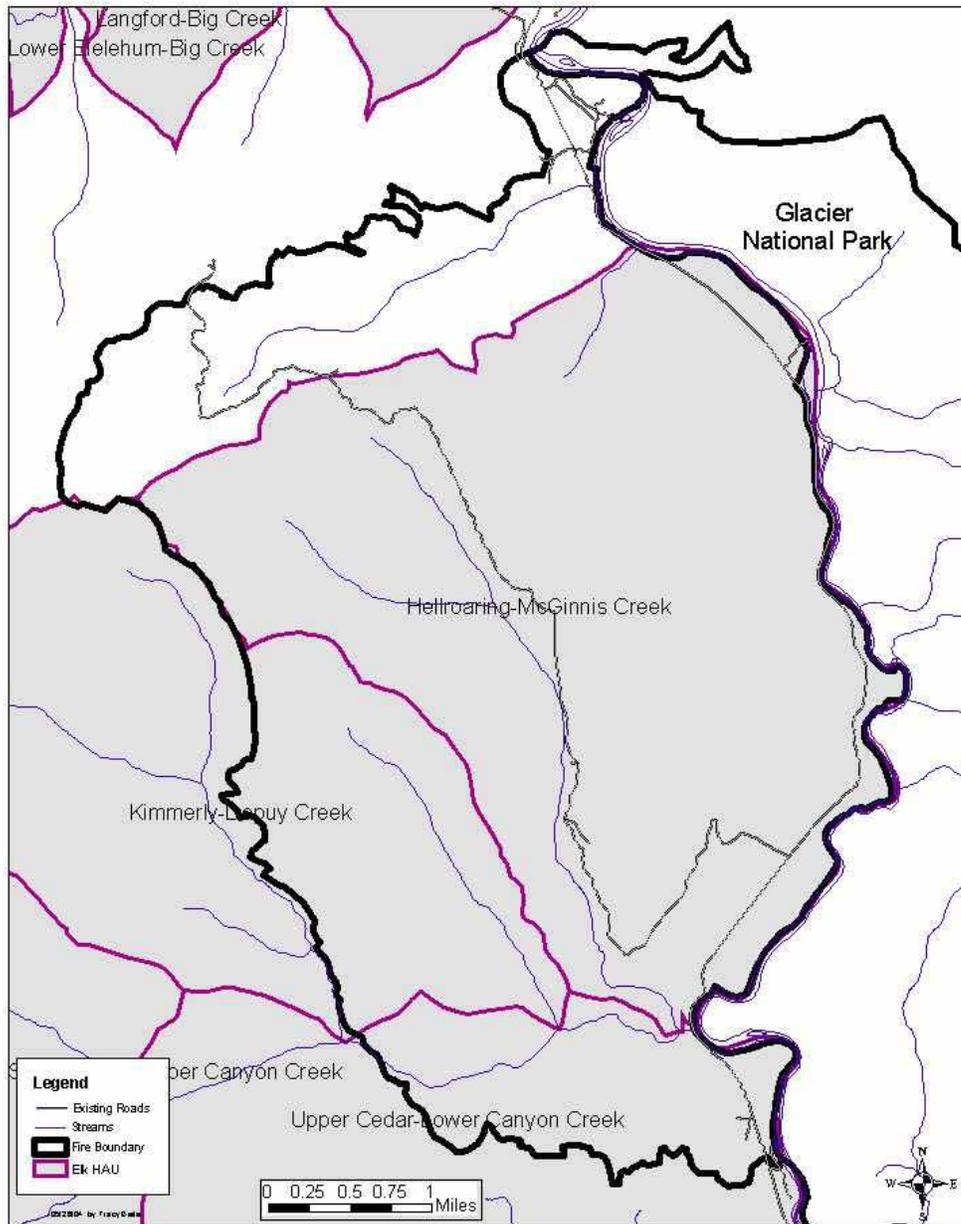


Figure 28. Habitat Analysis Units in Robert Fire Area

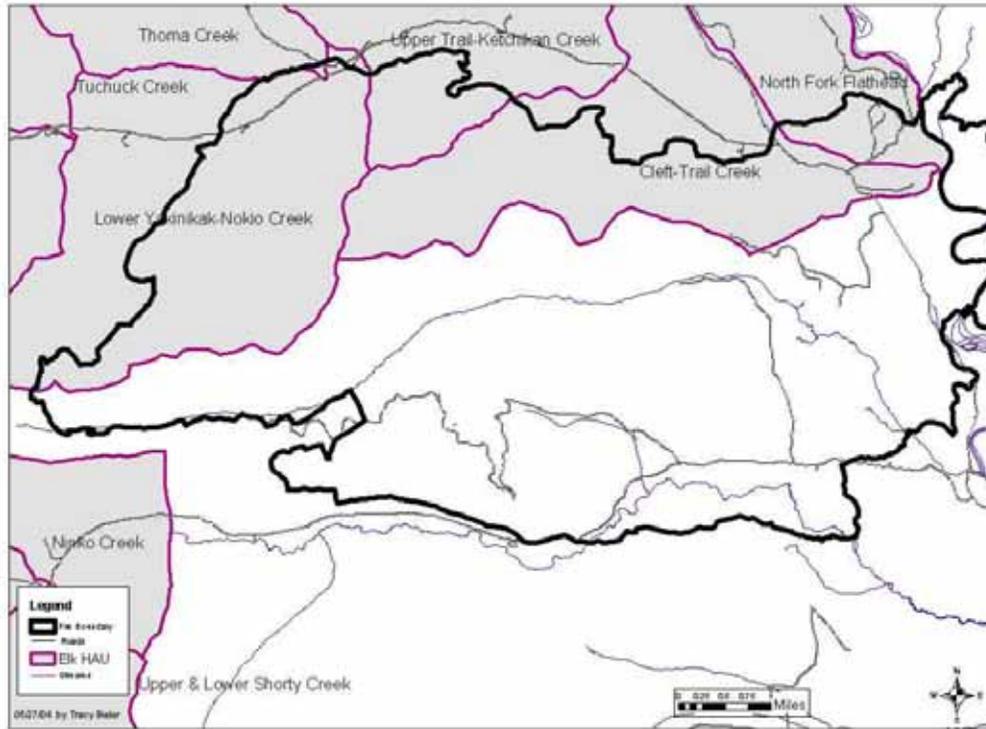


Figure 29. Habitat Analysis Units in Wedge Canyon Fire Area

Table 59 and Table 60 show existing information on the HAUs that were affected by the Robert Fire and Wedge Fire.

Table 58. Existing Habitat Effectiveness (HE) values¹ within elk summer HAUs.

Robert HAU	% Cover ²	Road Density ³	HE Value (%)
Hellroaring-McGinnis Creek	15	1.37	33.0
Kimmerly-Depuy Creek	65	0.43	54.6
Upper Cedar-Lower Canyon Creek	80	1.48	54.0
Wedge HAU	% Cover ²	Road Density ³	HE Value (%)
Cleft-Trail Creek	35	1.48	37.8
Lower Yakinikak-Nokio Creek	52	0.39	48.0
North Fork Flathead	90	1.80	51.0
Thoma Creek	94	0.25	85.0
Upper Trail-Ketchikan Creek	87	0.53	74.0

¹All values are approximate

²Cover=accounts for both summer thermal and hiding cover.

³Road Density=open road density during the summer

Table 59. Robert fire burn severity within elk summer habitat analysis units (HAU).

Robert HAU	Acres	Acres In Burn (%)	Burn Severity Classes (acres)			
			High	Mod	Low	Unburned
Hellroaring-McGinnis Creek	8,056	8,056 (100)	4,126	1,638	2,278	14
Kimmerly-Depuy Creek	5,732	1,897 (33)	672	611	614	0
Upper Cedar-Lower Canyon Creek	6,380	1,318 (21)	786	283	249	0
Robert Fire Total	20,168	11,271 (56)	5,584	2,532	3,141	14

¹High = complete consumption of duff/understory vegetation; 80-100% mortality of over-story canopy.

Mod. = considerable reduction of duff/understory vegetation; 30-80% immediate mortality of over story.

Low = low to moderate duff reduction and large patches of unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%.

Unburned = no evidence of fire

All values are approximate

Table 60. Wedge fire burn severity within elk summer habitat analysis units (HAU).

Wedge HAU	Acres	Acres In Burn (%)	Burn Severity Classes (acres)			
			High	Mod	Low	Unburned
Cleft-Trail Creek	5,344	3,587 (67)	1,226	690	1,671	0
Lower Yakinikak-Nokio Creek	6,981	3,923 (56)	2,565	977	382	0
North Fork	9,252	538	184	135	218	0

Flathead		(6)				
Thoma Creek	7,184	18 (<1)	8	10	0	0
Upper Trail-Ketchikan Creek	6,636	843 (13)	48	691	103	0
Wedge Fire Total	35,397	8,909 (25)	4,031	1,905	2,972	0

¹High = complete consumption of duff/understory vegetation; 80-100% mortality of over-story canopy.

Mod. = considerable reduction of duff/understory vegetation; 30-80% immediate mortality of over story.

Low = low to moderate duff reduction and large patches of unburned or lightly burned vegetation; immediate mortality of over story is less than 30%.

Unburned = no evidence of fire

All values are approximate

As the above tables show, the HAU's with the least amount of cover tend to have the lowest HE values. For this area (i.e. the North Fork), the desired range of HE index value, consistent with the objectives set forth in the Montana Elk Management Plan ([Montana Department of Fish, Wildlife and Parks 1992](#)) is 70-100% within summer range analysis areas. The Thoma Creek and Upper Trail-Ketchikan HAU's were the only HAU's in the desired HE range; this was due to the limited area burned and the low road densities within both HAU's.

Security and Vulnerability During Hunting Season

Fall or transition range is habitat that elk and mule deer use when snow begins to cause them to migrate toward winter range. Where it occurs within the Robert Fire and Wedge Fire drainages tends to be variable, depending highly on the amount of snow. In general, middle elevation forested habitats (4,500-5,500 feet) are the areas where elk will be until deeper snow packs 'push' them further down in elevation.

Under 'normal' conditions in northwest Montana, elk and mule deer security and vulnerability are probably at acceptable levels, especially considering the extensive amount of forest cover. Next to low or no-road density habitat, probably the greatest ally for big game in surviving the five-week general hunting season is the presence of cover. Without cover, elk and mule deer become highly vulnerable independent of whether hunters gain access to them by vehicle, horse, or hiking. Therefore, because of the lack of cover within the Robert and Wedge fire (and Moose Fire) affected areas, security is relatively low and vulnerability to being harvested is high for bull elk and mule deer bucks during the hunting season. This situation is compounded if an early heavy snowfall drives animals down to lower elevations, where hunters have easier access.

The fall of 2003 hunting season had the highest harvest levels in 10 years for both elk and deer. This is attributed to three circumstances ([Thier 2004, pers. comm.](#)):

1. Both the elk and deer populations have continually increased since the hard winter of 1996-1997.
2. The snow came early so it concentrated the animals down lower.
3. The fires displaced individuals and concentrated the animals in the limited cover.

Winter Range

In contrast to the function of summer range, winter is the season when elk and mule deer encounter low amounts of forage, with minimum levels of nutritional value and digestibility, and their main objective is survival. Their strategy for survival is to minimize energy expenditure. This can mean different behaviors, depending on what they have to deal with in terms of forage and cover availability, presence of predators, and human-induced stresses. During severe winter weather, forage availability is often limited and elk seek thermal cover and minimize their movements as a way of conserving energy; in other cases, animals may move to areas where more potential forage exists.

Thirty acres of white-tailed deer winter range burned all at high severity in the Robert Fire, this area would have been likely used by mule deer and to an extent elk also. Although neither the Robert Fire nor the Wedge Fire contained designated elk and mule deer winter range, the Moose Fire, which burned in 2001 and lies in between the Robert and Wedge fires, dramatically affected two elk and mule deer winter ranges. In fact, the critical component of thermal cover was mostly eliminated in both winter ranges. The Forest Plan considers winter range to be acceptable when 30 percent of the area contains winter thermal cover (a stand of evergreen trees having a minimum height of 60 feet and a minimum crown canopy of 70%). The Big Creek winter range contains approximately 25 acres of marginal thermal cover while Demers winter range has no thermal cover remaining. Both winter ranges were severely changed by the Moose Fire and though mule deer (and probably some elk, though not documented) use of the winter ranges occurred these past winters, it seems reasonable to conclude that use and numbers of animals has decreased, as compared to pre-fire use levels.

The main Forest Plan goal for elk and mule deer is to: provide the size, age, diversity, and distribution of cover and forage suitable for elk and mule deer habitat. Considering that approximately 72 percent (approximately 9,389 acres) of the National Forest portion of the Robert Fire and 76 percent (approximately 16,276 acres) of the National Forest portion of the Wedge Fire burned at a severity level of high or moderate, which is basically forest stand replacing, there are few options for diversifying forest age classes, since in the burned areas a single forest age class is expected to develop. The main effects of the Robert Fire and Wedge Fire on elk and mule deer relates mostly to the resulting proliferation of quality forage (grasses, forbs, and shrubs) and the elimination of thermal and hiding cover. With the relatively high severity fires that affected both fires areas, the full benefits of increased quantities of forage are not expected to occur for several years and last for approximately 15-30 years depending on local site conditions.

Direct and Indirect Effects on the Robert and Wedge Fires Affected Areas

Alternative 1 (No Action)

Summer Range

All summer range HE values would remain the same (low) in the short-term until such time as vegetation re-growth begins to provide cover. The time frame for hiding cover to develop is expected to vary, depending on local site factors such as aspect and elevation. A

reasonable time frame for hiding cover to develop could vary between 10-15 years, with cover being most effective in the 15-30 year time frame. The non-forest sites would likely remain in that condition and would become the main foraging sites when forest cover eliminates forage on the rest of the sites capable of growing forest cover.

Fall Range

Fall range would remain the same with security remaining low and vulnerability to hunting pressure remaining relatively high. Over the next 5-10 years, early fall snow events that would likely push animals to the lower elevations would make bulls and bucks highly vulnerable to being harvested during the hunting season because there would not be adequate cover, forcing animals to concentrate in the limited areas with cover.

Winter Range

There is no designated elk and mule deer winter range in either fire area. This alternative would allow natural recovery of both fire-affected areas, where a small number of individuals may spend some portion of the winter months. Since the vast majority of the elk and mule deer from both fire areas winter in areas that have not been recently affected by fire, populations of elk and mule deer should be expected to remain relatively stable due to winter forage and cover availability.

Alternative 2 (Proposed Action)

Summer Range

The main habitat-changing management activity that would occur is the removal of dead standing trees that provide some residual value as hiding cover. These effects are difficult to quantify, therefore, effects to summer range are presented in a qualitative context. Although salvage would occur on approximately 3,090 acres within the Robert Fire and 2,732 acres within the Wedge Fire, these actions are not expected to measurably change the amount of hiding cover remaining within the fire areas. There would be reserve patches left within all units greater than 20 acres in size and within high emphasis units <20 acres in size. In addition to the reserve patches, there would still be large diameter larch and Douglas fir snags as well as small diameter snags remaining throughout the salvage units that would provide some level of cover. Topography, distance from open roads, and the patches of green forest remaining within both fire areas would probably be the best indicator of cover and security within both burns. The proposed road closures to motorized use and decommissioning would benefit both the mule deer and elk that utilize the Robert Fire and Wedge Fire areas by limiting human access into these areas, which in turn would provide increased security and less displacement. The summer range habitat effectiveness should not change as a direct result of removal of dead trees. What these animals need is thermal cover to ameliorate the stress of summer heat and this type of cover is not expected to develop for many decades. However they will be able to find relief from summer heat to a certain extent by utilizing topographic relief such as draws and north-facing slopes. The proposed temporary roads are short spurs and are not expected to have measurable impacts on either mule deer or elk utilizing these areas. The temporary roads would not be open for public motorized access and would be open for a short time period. Management activities within both the fire areas such as salvage harvest and haul may temporarily displace individuals but the impacts of these activities should be minimal. There would also be the possibility individuals could be killed by vehicles; falling snags or fawns/calves could become separated from their mothers during management activities. If such accidents were to happen, they would be minimal and not expected to impact herd numbers. The management activities would be short term in duration. The risk to stand replacement wildfire would be reduced under the Action

Alternative. Table 61 shows that the fire itself had the biggest impact on elk and mule deer habitat. The amount of hiding and thermal cover lost by the fires greatly affected the HEs. Both fire areas are already well below the HE objectives (70-100) for the North Fork.

Table 61. Change in HE values by HAU post-implementation.

Robert Fire HAU	Alt. 1 Existing Condition No Action HE value	Alt 2 During Implementation HE value	Alt.2 After Implementation HE value
Hellroaring-McGinnis Creek	33.0	25.8	33.0
Kimmerly-Depuy Creek	54.6	42.0	59.5
Upper Cedar-Lower Canyon Creek	54.0	50.0	54.0
Wedge Fire HAU	Alt. 1 Existing Condition No Action HE value	Alt 2 During Implementation HE value	Alt.2 After Implementation HE value
Cleft-Trail Creek	37.8	37.8	37.8
Lower Yakinikak-Nokio Creek	48.0	48.0	48.0
North Fork Flathead	51.0	51.0	51.0
Thoma Creek	85.0	85.0	85.0
Upper Trail-Ketchikan Creek	74.0	74.0	74.0

The Kimmerly-Depuy HAU HE improves after the implementation of Alternative 2 due to road closures within the HAU. The Wedge Fire HAUs do not change because they are located in the northern portion of the fire area where there are no actions proposed. Again the Thoma Creek and Upper Trail-Ketchikan HAUs were the only HAUs in the desired HE range. This is due to the limited area burned and the low road densities within both HAUs. Alternative 2 does not alter the existing HE much due to the fact that the fire itself altered the hiding and thermal cover. Although snags would be salvaged, it would not impact the HE to any large extent.

Fall Range

The management of cover and access is extremely influential in hunting success for big game animals. In general, the proposed salvage alternative would create slightly more open conditions than exist now and this would cause elk and mule deer to be more visible to hunters and consequently more vulnerable to being harvested. This effect is expected to last for approximately 10 years, when vegetation re-growth would provide better hiding cover.

The natural tendency for mule deer and elk is to stay in the higher elevations during the hunting season; however, the potential exists for early snow events to push animals to lower elevations. If this occurs, (like it did in the fall of 2003), in any of the fall seasons over the next ten years, a relatively high hunter harvest of mule deer bucks and any bulls would be expected. On the other hand, salvage harvest should make ungulate travel within the units easier due to the decrease in down wood.

The amount of motorized access is an important determinant of big game vulnerability. Over the years since the mid-70's the Forest Service has closed a number of roads in both the Robert Fire and Wedge Fire areas this has benefited both the mule deer and elk in these areas. The Action Alternative proposes to close 2.2 miles of road in the Robert Fire area and 3.4 miles of road in the Wedge Fire project area. This alternative also proposes to decommission 14 miles of road in the Robert Fire area and 0 miles of road in the Wedge Fire project area. Both the road closures and the decommissioning would benefit elk and mule deer security.

Cumulative Effects of Both Alternatives for the Robert and Wedge Fire Areas

Mushroom picking is an activity that may displace or influence elk and/or mule deer use in both fire-affected areas. This activity occurred recently in the Moose Fire area and brought hundreds of people to the Big Creek drainage. Mushroom picking is also expected to take place in both the Robert Fire and Wedge Fire areas and is expected to have a similar level of impact on elk/mule deer.

Best Management Practices work is scheduled to occur in the late spring of 2004 in both fire areas. The work consists of: improving road drainage, upsizing culverts, and removal of fish barriers. It is likely that work related to this project would take three to five years to complete. This work may temporarily displace animals but will be short term in nature and will not adversely impact elk/mule deer habitat. The Roadside Hazard Tree Removal Project increased visibility adjacent to open roads and along trails which slightly reduced habitat security for both elk and mule deer.

The cumulative affect of the Moose Fire and the Red Bench Fire as well as other smaller fires that have occurred within North Fork drainage in the last 20 years, in combination with the Robert Fire and Wedge Fire are all expected to improved spring, summer and fall forage for the next approximately 30 years. Winter range is expected to have a better representation of thermal cover in 50 plus years although for mule deer and elk thermal cover is less important than it is for white-tailed deer.

Regulatory Framework and Regulatory Consistency

Elk and mule deer are identified as Management Indicator Species in the Flathead National Forest Plan. The Montana Elk Management Plan (1992) contains goals, objectives and strategies for perpetuating and managing elk populations for public benefit, as well as other emphasis items.

Riparian area management and Amendment 19 motorized access restrictions will result in maintaining or improving summer habitat conditions consistent with Forest Plan direction. The analysis for Flathead National Forest's Plan Amendment 21 assessed the forest-level viability of elk and mule deer (USDA FS 1999a). There is no Management Area 13 or 13A, winter range in either fire area.

The Action Alternative 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. Regardless of scale, species viability is not a concern for

elk or mule deer. These species are habitat generalists, and habitat occurs literally throughout the western U.S. All indications are that healthy populations are well distributed across the western states, Montana and the Flathead National Forest. In Montana and on the Flathead Forest, this is evidenced by liberal hunting seasons administered by Montana Department of Fish, Wildlife and Parks. In northwest Montana the rapid recovery of the gray wolf is also evidence of substantial ungulate populations, which comprise their primary food source.

Conclusion

Alternative 1 would not have any measurable impacts including cumulative impacts. Alternative 2 would improve the long-term habitat conditions for elk and mule deer by closing roads and decommissioning roads in both the Robert Fire and Wedge Fire analysis areas. There would likely be some short-term adverse impacts due mainly to human activity and the associated noise, however it is felt that the benefit from the long-term improvements outweighs the adverse impacts. The proposed Action Alternative is not expected to change the existing persistence ratings for elk or deer.

Rationale for Persistence Determination

- Alternative 1 would not have any measurable impacts including cumulative impacts.
- Alternative 2 would temporarily increase the amount of human related activities and associated noise throughout the project area but over the long term forage would be improved.
- The risk to stand replacement wildfire would be reduced.
- The fires are expected to improve the forage quantity and quality within the burned areas within 3 to 5 years and the benefits are expected to last for the next 30 years or so.
- No long-term roads would be built and roads would be closed and decommissioned.

White-tailed deer

Affected Environment

White-tailed deer winter in mature forest that provides snow interception, and in riparian or upland sites (Mundinger 1984). The importance of dense coniferous forest habitat to this deer species during winter is well documented (Ozoga 1968, Wetzel *et al.* 1975) and connecting patches of thermal cover appear to be important.

The analysis area for white-tailed deer consists of Forest Plan designated white-tailed deer winter range (MA-9) and unburned potential thermal cover in close proximity to MA-9 habitats. Winter range for white-tailed deer within the analysis area is concentrated on the gentle slopes of the lower elevations (3300'-4000') of the Big Creek watershed. Approximately 30 acres of designed white-tailed deer winter range burned in the Robert Fire. The entire 30 acres burned at high severity and removed all the overhead thermal cover. In addition to this portion of winter range burning, approximately 869 additional acres of the same designated winter range (including Douglas-fir, lodgepole pine, subalpine fir, Engelmann spruce, and white pine) burned in 2001 during the Moose Fire. Over 90 percent of the Moose Fire Big Creek winter range burned at moderate to high severity fire, which removed all overhead thermal cover. Small patches of unburned or low severity burn exists outside of the Robert Fire area and outside of designated white-tailed deer winter range (MA-9), primarily along the North Fork of the Flathead River near the Big Creek Campground.

Deer use in this management area south of Big Creek was light prior to the fires due to a scarcity of forage. Deer use within the designated portion of winter range after the fires has

been similar. White-tailed deer have been documented throughout the burned winter range but the only extensive use is within and adjacent to the campground along the North Fork of the Flathead River. Field surveys have noted moderate use in the second growth western larch and lodgepole pine adjacent to the road. This use appears to mimic past use records (early 1990s) that mention deer use was extremely heavy adjacent to the North Fork road in the more open overstory of Douglas fir and western larch. It appears that wintering white-tailed deer are currently not using adjacent unburned lodgepole pine stands and mixed lodgepole pine, spruce, and subalpine fir.

Outside of the winter season the white-tailed deer affected environment is similar to that described for mule deer and elk except that white-tailed deer do not tend to migrate as far and tend to stay at lower elevations than the elk and mule deer.

Direct and Indirect Effects on the Robert and Wedge Fires Affected Areas

Alternative 1 (No Action)

Under this alternative there would be no short-term effect on thermal cover because there is currently no thermal cover within the 30 acres of designated white-tailed deer winter range within the Robert Fire or to the north in the Moose Fire winter range area. Restoration of both thermal and hiding cover would develop naturally over time.

Indirectly this alternative could decrease thermal cover in areas adjacent to winter range due to a possible increase in beetle activity. This could affect existing green tree areas currently being used by white-tailed deer. If trees continue to die, the remaining live trees should be able to utilize the available nutrients and water to grow lateral branches. This could mitigate some thermal losses by providing increased snow intercepting and thermal retention properties. Since permanent year-round overhead thermal cover in the form of conifers is not expected to recover over the burned area for several decades, deer would be forced to utilize adjacent unburned patches for cover.

Large accumulations of down wood in portions of the burn are expected to result as a consequence of the unharvested snags falling in winter range. This could impede travel and/or use of certain areas, which would effectively reduce winter range suitability. In Montana, Lyon *et al.* (1985) recommended that slash should be reduced to depths below 1.5 feet deep in clearcuts, otherwise elk use would be reduced by 50 percent. The applicability of this data to white-tailed deer in mixed conifer stands is not clear but it is expected that excessive down wood accumulations would reduce winter range habitat use to some extent. It is estimated that although 25 to 50 percent of this winter range has potential for high levels of down woody material accumulations, it is unlikely that this would occur all at once; rather, gradual accumulations of down logs would occur over several years.

In summary, the no action alternative is could reduce habitat suitability over the 30 acre portion of winter range in the Robert Fire due to down wood build up. It is also possible a reduction in adjacent thermal cover due to beetles may occur. However, it is also likely forage will recovery quickly due to nutrients in the soil from the fire and the removal of competing vegetation by the fire. The availability of additional forage for approximately the next 20 to 30 plus years may mitigate for the shortage of thermal cover by allowing for a greater level of caloric intake.

Outside of the winter season the white-tailed deer direct and indirect effects are similar to that described for mule deer and elk except that white-tailed deer do not tend to migrate as far and tend to stay at lower elevations than the elk and mule deer.

Alternative 2 (Proposed Action)

Alternative 2 would basically have the same effects as those described in Alternative 1 except that 19 acres of the 30 acres of the winter range that burned in the Robert Fire would be planted to western larch. This would be done in the spring so it would not impact wintering white-tailed deer. The larch would not add thermal cover for deer in the winter, however it would add some diversity to the structure in this area, which is expected to grow back to lodgepole. There are no salvage harvest units or temporary roads proposed within the designated white-tailed deer winter range (MA-9). No salvage units in close proximity to the winter range are proposed for winter logging that could displace wintering animals. No roads are proposed for closure or decommissioning that could improve habitat security for deer in the winter range since there are only 30 acres in the analysis area. The proposed Action Alternative would not change the existing persistence ratings for white-tailed deer. At this point in time there is no cause to be concerned about the persistence of white-tailed deer in the North Fork of the Flathead River drainage or on the Flathead Forest. The 30 acres of winter range that burned in the Robert Fire will not impact white-tailed deer population numbers.

Cumulative Effects for Both the Robert Fire and Wedge Fire Affected Areas

Past vegetation management activities within this winter range were of the size and location that were intended to benefit white-tailed deer. Past and ongoing snowmobiling activity on the Big Creek road (north of the project area), has probably produced some level of stress on wintering animals. Reasonably foreseeable actions such as mushroom picking and ‘BMP’ implementation are not expected to have any impacts on winter range habitat values because they would occur during the non-winter period.

No salvage harvesting would occur within the Robert Fire portion of the white-tailed deer winter range. However as discussed in the affected environment section a substantial number of acres of this winter deer range recently burned in the Moose Fire. Even though the Big Creek Campground is not designated winter range, field trips during the winter showed that deer were using the area where unburned green forest existed. Some of this area has been affected by a windstorm. Thinning of the campground would be additive to the removal of available winter cover that occurred when the Moose Fire and Robert Fire burned.

No winter range is located within the Wedge Fire area, however the general effects and impacts described for both mule deer and elk from the fires would by and large hold true for the white-tailed deer that utilize both fire areas.

Regulatory Framework and Regulatory Consistency

White-tailed deer is identified as a Management Indicator Species in the Flathead National Forest Plan. The Forest Plan (III-35 to III-38) contains management direction and standards to guide project planning.

The Forest Plan contains a standard that encourages winter logging to better assure a continuous supply of winter food. However, the standard relates to a ‘green’ forest where it has been observed that deer tend to feed on lichen when trees are felled. This standard is not applicable in this situation since the forest consists of dead trees. No salvage logging would take place within the 30 acres of designated winter range in the Robert Fire area. A long-range activity schedule exists; however, it is out of date because the Moose Fire and the Robert completely changed habitat conditions. Because of the existing condition of the winter range, neither alternative would alter either of the two important habitat components

which are thermal cover and forage. The analysis for Flathead National Forest's Forest Plan Amendment 21 assessed the forest-level viability of white-tailed deer (USDA FS 1999a).

Both alternative 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. Species viability is not a concern for white-tailed deer. This species is a habitat generalist, and habitat occurs literally throughout the western U.S. All indications are that healthy populations are well distributed across the western states, Montana and the Flathead National Forest. In Montana and on the Flathead Forest, this is evidenced by liberal hunting seasons administered by Montana Department of Fish, Wildlife and Parks. In northwest Montana the rapid recovery of the gray wolf is also evidence of substantial ungulate populations, which comprise their primary food source.

Conclusion

Alternative 1 and 2 would not have any measurable impacts on white-tailed deer winter range; the Robert and Moose fire already radically changed the thermal cover and distribution of habitats. Alternative 2 proposes no winter activities within the designed white-tailed deer habitat. Western larch would be planted in the spring on 19 acres within the winter range. Alternative 2 would improve the overall long-term habitat conditions for white-tailed deer by closing roads and decommissioning roads in both the Robert Fire and Wedge Fire analysis areas although not in the winter range itself. There would likely be some short-term adverse impacts due mainly to human activity and the associated noise, however it is felt that the benefit from the long-term improvements outweighs the adverse impacts. Neither of the alternatives would change the existing persistence ratings for white-tailed deer. At this point in time there is no cause to be concerned about the persistence of white-tailed deer in the North Fork of the Flathead River drainage or on the Flathead Forest.

Rationale for Persistence Determination

- Neither alternative would have any measurable impacts on the existing condition of the white-tailed winter deer range that burned during the Robert Fire.
- Alternative 2 would temporarily increase the amount of human related activities and associated noise throughout the project areas at various times and places but over the long term forage would be improved.
- The fires are expected to improve the forage quantity and quality within the burned areas within 3 to 5 years and the benefits are expected to last for the next 30 years or so.
- No long-term roads would be built and roads would be closed and decommissioned in both fire areas.

Species of Interest

Cavity Nesting Birds

Affected Environment

Cavity nesting birds (CNB) include a suite of different species that utilize holes in trees, usually snags for nesting. These bird species are divided into two groups, primary nesters and secondary nesters. Primary nesters, such as woodpeckers, excavate a new cavity and secondary nesters, such as bluebirds, utilize existing holes or cavities that were created and abandoned by primary nesters. Because CNB include a large suite of species, it is difficult to give specific population estimates. Land birds can be separated into two groups, moderate and low vulnerability and high vulnerability. An example of moderate to low vulnerability

CNB species that occurs on the Flathead National Forest is the northern flicker and the Lewis' woodpecker. A high vulnerability CNB species that occurs on the Flathead National Forest is the black-backed woodpecker.

Dead trees have many ecological roles in a landscape recovering from wildfire (Beschta *et al.* 1995). The number, species, size, and distribution of available snags strongly affect snag-dependent wildlife (Bull *et al.* 1997). Cavity-using birds can substantially reduce tree mortality and damage caused by forest pest insects (Bull *et al.* 1997, Torgersen 1996, Torgersen, Mason, and Campbell 1990). Too few suitable snags may limit or eliminate populations of cavity-using species (Saab and Dudley 1998, Thomas *et al.* 1979).

To provide habitat for the variety of species that CNB represent, snags in various sizes, stages of decay, and arrangement are needed to provide for individual species needs (Caton 1996, Hitchcox 1996, Hutto 1995, Raphael and White 1984, Saab and Dudley 1998, Thomas 1979,). Also important is the type of habitat surrounding the snag. Some CNB, such as pileated woodpecker, prefer large snags in dense canopy forests while others, such as Lewis' woodpecker, prefer snags in more open environments (Saab and Dudley 1998, Smith 2000).

Numerous studies have been conducted to determine the optimal number and arrangement of snags to provide habitat for CNB. Research by Thomas (1979) in the Blue Mountains in Oregon lead to the development of a matrix of snag requirements to provide for a percent of the maximum potential population for CNB, depending on habitat type. For the mixed conifer type, maximum population levels would be provided for at 2.25 snags/acre in a variety of size classes (Thomas 1979). A study conducted in a fire area on the Tahoe National Forest showed that bird densities increase rapidly as snag levels reached 1.2/acre and then slowly increased to a maximum at about 3 snags/acre (Raphael and White 1984). The Interior Columbia Basin Ecosystem Management Project Supplemental Draft Environmental Impact Statement (USDA FS 2000) came up with several tables for the numbers of large snags and down wood per acre by fire regime. These tables generally had the number of snags slightly higher than what Thomas (1979) recommended.

Most of the research regarding snags and CNB following stand-replacing events has been conducted in the Rocky Mountains. Hutto (1995) found that in forests with a fire regime of infrequent (50-100 years) high-intensity stand-replacing fires, some species, such as black-backed woodpecker, seem dependent on fire-killed forests that have a dense concentration of snags. He noted, "15 bird species are generally more abundant in early post-fire communities than in any other major cover type occurring in the northern Rockies (Hutto 1995)." Another study in Ponderosa pine/Douglas-fir forests in Idaho found that the types of CNB species that invade a fire area depend on the number and arrangement of snags remaining (Saab and Dudley 1998). Caton (1996) indicates that it is important to consider both nesting and foraging habitat to provide for CNB diversity. Finch *et al.* (1997 in Smith 2000) found that a stand-replacing fire results in most of the bird species present prior to the fire being replaced by new species. Within the first five years following a stand-replacing event, there is a high turnover of species (Smith 2000).

Both fire areas provide abundant snags for primary and secondary excavators. All existing snags would be available in several size classes with differing densities. Some opportunistic birds, such as hairy woodpeckers, are capable of excavating nests in harder snags (Raphael and White 1984) and it is expected that they would rapidly invade the fires. Other species, such as the Williamson's sapsucker or the northern flicker, require softer snags for excavating nest sites (Raphael and White 1984) and would expand into the fire areas as snags begin to decay. Future snag recruitment would be forgone for many decades until natural regeneration

occurs and trees develop into the type of functioning mature stands in which natural snag recruitment occurs.

As snags begin to fall, down wood levels would greatly increase thereby increasing denning, nesting, and feeding habitat for down wood dependent species. In the long term the levels of down wood would greatly exceed the minimum standard and guideline Forest Amendment 21 in areas that weren't regeneration harvested in the past.

Both the Robert and Wedge fires created an abundance of snags integrated between limited areas of unburned habitat or low impacted areas that provide cover and forage. The majority of snags are under 16" dbh, however, there are also many large diameter snags (see Snags and Down Wood portion of this chapter). Cavity-nesters that are insectivorous and prefer open habitats have high-quality habitat within the fire area. CNB that require a closed canopy or other mature vegetation in addition to snags would find low capability habitat in the majority of the Robert Fire and Wedge Fire areas.

Direct and Indirect Effects of the Alternatives for the Robert and Wedge Fires Affected Area

Alternative 1 (No Action)

As insects invade the dead trees in the fire areas, insectivorous CNB, such as woodpeckers, will move into the area to take advantage of the abundant forage (Hutto 1995, Saab and Dudley 1998, Smith 2000). As brush develops in the understory, CNB dependent on this habitat element would increase (Raphael *et al.* 1987 in Smith 2000). As snags begin to decay and fall, the diversity of CNB would begin to decline. Bird diversity decreases in burned areas between 8-15 years (Bock *et al.* 1978 in Smith 2000). A few of the largest existing snags (>40" dbh) may persist to support CNB dependent in closed forest, such as pileated woodpecker, when mature forest develops in 150-250 years, however most snags will have fallen within 30 years (Morrison and Raphael 1993). These recently burned areas provide high capability habitat for CNB that prefer dense concentrations of snags, such as black-backed woodpecker. Species that tend to prefer lower snag concentrations, such as white-headed woodpecker and Lewis woodpecker, would find low to moderate capability habitat.

In the absence of artificial reforestation treatments, post-fire habitats would develop through a variety of successional stages over time. For the first five years following the fire, herbaceous habitats would dominate the area where fire intensities were high to extreme (Mayer and Laudenslayer 1988). Forbs and sprouting shrubs would form a mosaic with areas of open ground and snags would provide structural diversity. Two-thirds of the snags less than 10" dbh would have fallen by year five, but most of the larger snags would remain standing. Within 15 years after the fire, shrubfields will dominate the area (Smith 2000). Shrubs will have formed a relatively dense canopy, shading out most of the forbs. Most of the snags less than 16" dbh will have fallen along with about one-half of snags 16"-24" dbh. Small openings in the shrub cover may be created where snags fall and inhibit growth. In 50 years, most snags will have fallen with the exception of about one-half of those greater than 40" dbh.

Alternative 1 would provide for the greatest number of snags for primary and secondary excavators. All existing snags would be available in several size classes with differing densities. Snag levels retained would be higher than 17 snags per acre, so snags levels in the future would likely be above four soft snags per acre after 15 years. It is expected that the large diameter snags would remain standing 20-30 years. This alternative provides the greatest opportunity to provide snag numbers that meet 100% population potential in the

short term and long term (15+ years). Future snag recruitment would be forgone for many decades until natural regeneration occurs and trees develop into the type of functioning mature stands in which natural snag recruitment occurs. For more information related to Cavity Nesting Birds see the Black-Backed Woodpecker and Snags and Down Wood sections of this chapter.

As snags begin to fall, down wood levels would greatly increase thereby increasing denning, nesting, and feeding habitat for down wood dependent species. In the long term the levels of down wood would greatly exceed the standards and guidelines of Amendment 21.

Alternative 2 (Proposed Action)

The true effects of post-fire salvage on CNB in the Northern Rockies are not clear. In northwestern Montana, Hutto (1995), Caton (1996) and Hitchcox (1996) all found that there was increased bird diversity and nesting success in burned areas that were not salvaged as compared to salvaged areas. It is difficult to determine how these studies relate to the Robert Fire and Wedge Fire areas since: 1) the snag levels left in the salvaged area in Caton's study area was not known so cannot be compared to retention levels in Alternative 2; and 2) pre-fire tree density estimates in Hitchcox's study area found that stand densities in salvaged areas were well below the unsalvaged area which may have affected post-fire nesting birds (Caton 1996, Hitchcox 1996, Hutto 1995). Saab and Dudley (1998) looked at this issue in southwestern Idaho in ponderosa pine/Douglas-Fir forests. Three different treatments, standard cut (6 snags/acre on north slopes, 33% of all trees retained on south slopes), wildlife salvage (50% of all trees retained), and unsalvaged, were monitored for CNB. The research found that densities were similar in all treatments but composition differed. Some species (Lewis' woodpecker) was most abundant and successful in standard cut while other species (black-backed woodpecker) favored unsalvaged. Northern flicker and western bluebird were the most successful in wildlife salvage (Saab and Dudley 1998).

Beschta *et al.* (1995) has recommended that at least 50% of dead trees in each size class be retained along with all trees over 20" dbh. As evidenced in Saab and Dudley (1998), this may not provide for the suite of CNB species that may invade a post-fire area. In a review of the Beschta recommendations, Everett (1995) indicated that the number and size of snags retained should be based on the natural range of variability, fire regime, and pre-fire species composition for the site rather than a blanket prescription for every fire area.

Based on this and other research, the removal of snags to varying degrees within the fire areas would benefit some CNB and have a negative effect on others. The over-riding goal for what would be left after salvage harvest in Alternative 2 was to leave a diversity of conditions while working with natural pre-fire variations in vegetation, as well as the variation in fire severities. Alternative 2 provides for variability and diversity of snags and down wood within and between salvage units (see Table 62 below). In research conducted on the effects of post-fire salvage, one species was consistently found only in unsalvaged areas, the black-backed woodpecker (Caton 1996, Hitchcox 1996, Hutto 1995, Saab and Dudley 1998). Other CNB species, such as northern flicker, the white-headed woodpecker and Lewis' woodpecker, show a preference for snags that are less dense in arrangement (McIver and Starr 2000, Saab and Dudley 1998). Lewis' woodpecker has shown that it prefers a clumped arrangement rather than dispersed (Saab and Dudley 1998). As Table 62 shows, all existing large diameter larch and Douglas fir would be retained across the landscape of both fire areas. Research has shown that for these fire areas, western larch and to a lesser extent Douglas fir snags will be the tree species predominately used by cavity-using birds and mammals. Large diameter snags are considered an especially important component of a burned landscape. Cavity-nesters consistently select larger snags for nesting than expected based on availability.

Large snags are used by more species and are much longer lasting, both when standing and after falling.

In addition to retaining the large diameter western larch and Douglas fir snags, depending on the size of the salvage harvest unit and the snag emphasis level additional reserve patches would be retained (see Table 62 below). The variety of sizes and species of snags retained would result in varying decay rates. The variety of size class of snags retained in the reserve patches and in areas outside salvage units, along with their distribution across the fire areas, should also provide adequate foraging opportunities for CNB (Blake 1982, Caton 1996).

Table 62. Snag retention prescriptions based on snag emphasis level.

Element	Prescription by Snag Emphasis Level			Rationale
	1 ("High")	2 ("Moderate")	3 ("Low")	
Western Larch Snags 1	Wherever safe, leave standing all \geq 20" DBH and \geq 10 feet tall.	Wherever safe, leave standing all \geq 22 DBH and \geq 10 feet tall.	Leave only if have holes or decay (wildlife snags). Paint and sign snags if within 200 feet of an open road.	Western larch is highly preferred by cavity users and for foraging. \geq 20" DBH nest trees are very important for pileated woodpecker nesting. Many secondary cavity users are dependent of pileated woodpecker holes.
Douglas-fir Snags 1	Wherever safe, leave standing all \geq 23 DBH and \geq 10 feet tall.	Wherever safe, leave standing all \geq 23 DBH and \geq 10 feet tall.	Leave only if have holes or decay (wildlife snags). Paint and sign snags if within 200 feet of an open road.	Douglas fir is preferred by cavity users and for foraging.

Element	Prescription by Snag Emphasis Level			Rationale
	1 ("High")	2 ("Moderate")	3 ("Low")	
Severely or moderately burned units smaller than or equal to 20 acres. 2	Leave irregularly shaped reserve patches to bring the total to at least a minimum 10% of the unit acreage located around the largest snags where feasible. 1	Additional reserve patches not required.	Reserve patches not required.	Due to the small size of these units, the retention of reserve patches was less valuable to wildlife than larger units.
Units larger than 20 acres that were: a) severely or moderately burned OR b) spruce dominated stands that burned at low intensity. 2	Leave irregularly shaped reserve patches to bring the total to at least a minimum 25% of the unit acreage, located around the largest snags where feasible. 1	Leave irregularly shaped reserve patches to bring the total to at least a minimum 15% of the unit acreage, located around the largest wildlife snags where feasible. 1	Reserve patches not required.	Research has shown much higher use and nest success in post-fire salvage reserve patches as opposed to individual snags left scattered across the units. Low intensity burns in western larch and Douglas fir stands should have enough green trees to provide for natural snag recruitment.

1 When possible, reserve patches will be placed within and adjacent to linear and patchy riparian areas, around unsafe large-diameter wildlife snags, on ridges, in and around archeological sites, in and around sensitive plant species areas within and adjacent to units, in blind leads and other inoperable areas, and adjacent to unburned or low intensity burn areas. Interior patches are preferable, particularly if they can be large.

2 Acreage and percentages are based on original Proposed Action unit size. Reserve patches are to contain mainly snag habitat.

Trees that were wildlife snags (nest holes, broken tops, conks, or pre-fire decay) prior to the fires would be left standing wherever it would be safe to do so. Alternative 2 would also plant

new trees in specific areas both inside and outside of salvage harvest units so that snags would become available sooner than if trees were not planted. The planted trees would also begin to provide canopy closure for CNB that need dense cover sooner than if trees were to regenerate naturally.

The newly constructed temporary road segments that are proposed with Alternative 2 would not impact the CNB to a detectable degree. Alternative 2 does not remove snags from the remaining green habitats or snags that develop later due to stress caused by either fire.

Studies show that bird species selected nest sites with higher tree densities and cavity nesters as a group selected clumps of snags as opposed to single snags retained in uniform, evenly spaced distribution (Johnson and O'Neil 2001). Studies show that cavity excavators prefer nest trees that are generally larger in diameter compared to randomly selected trees (McIver 2000). Alternative 2 retains the large western larch and Douglas fir snags in all units where they exist and leaves reserve patches in most units.

Some opportunistic birds, such as hairy woodpeckers, are capable of excavating nests in harder snags (Raphael and White 1984) and it is expected that they would rapidly invade the burned area. Other species, such as the Lewis' woodpecker or the northern flicker, require softer snags for excavating nest sites (Raphael and White 1984) and would expand into the fire as snags begin to decay. Most cavity-nesters show consistent patterns of decrease after logging, including the mountain bluebird, black-backed woodpecker, hairy woodpecker, and downy woodpecker, while the abundance of Lewis' woodpeckers increased after fire salvage logging (McIver 2000, Saab *et al.* 2002).

As recommended by Saab and Dudley, retaining a range of stand conditions characteristic of black-backed (dense snag conditions) and Lewis' woodpeckers (open snag conditions) would most likely incorporate local habitat features necessary for successful nesting of other members in the bird community (1998). Therefore, species viability for CNB would likely be maintained under both alternatives.

Non-fire hardened snags are sparse throughout the harvest units contained in the Action Alternative. However, within the no-harvest areas including the reserve patches, RHCAs, and adjacent green areas that burned light to moderate, non-fire hardened snags would be retained to provide for existing foraging and future nesting habitat.

The Robert Fire was about a 52,874-acre fire, of which Forest Service land amounted to about 13,123 acres and of that, 3,090 acres has been proposed for treatment. The Wedge Fire was about a 52,405-acre fire, of which Forest Service land amounted to about 21,526 acres and of that, 2,731 acres has been proposed for treatment. The entire area north of Trail Creek would not be harvested. It should be noted that snag size, quality and quantity varied considerably across both fire landscapes. No riparian areas would be salvage harvested. Riparian areas are utilized proportionally more by CNB than the uplands. In addition to the set aside acres, well-dispersed areas of snags on steep slopes, inoperable areas, snag patches and other untreated inclusions in and around the units would be provided for CNB. The units themselves would be managed to provide snags and down logs at levels that meet habitat requirements for snag dependent species by implementing Amendment 21 for down wood. The reduced risk of fire would help ensure that snags would be available as mature conifer habitat develops. Live trees retained would help provide for future large snags.

Salvage harvest activities between May and August may have direct effects on individual nesting CNB. Snags with existing cavities (wildlife snags) would be retained wherever it is safe to do so, however some would be removed for safety reasons. If a CNB were to be utilizing the snag at the time of salvage operations, the nest and/or birds could be destroyed.

Depending on the time of year the birds could re-nest elsewhere. Although little is known about the effects of salvage logging in stand replacement fires on CNB nesting success, it is expected that salvage of snags under this alternative could have a slight negative effect on potential population numbers of certain species of CNB due to the reduced number of snags. Individuals may be displaced and made more vulnerable to predation. Noise from the various activities proposed in the Action Alternative during the breeding season could disrupt birds in the area, especially at nest sites. However, noise associated with these activities would be short term and in the long run benefit a variety of wildlife species. Noise may impact juvenile dispersal, may cause premature displacement of young or cause young to be prematurely abandoned, however, this would be expected to be limited. Some temporary displacement CNB is likely to occur. More information related to cavity nesting birds can be found in the Snag and Down Wood plus the Black-Backed Woodpecker sections of this chapter.

Cumulative Effects of Both Alternatives for the Robert and Wedge Fire Areas

Past timber management activities likely removed large snags that provided habitat for CNB. Estimates of snag levels prior to the fire indicated, however, that numbers were at least adequate for CNB. Historically, fires that occurred in this area would have been mainly stand replacing. Within the Robert Fire area there is approximately 355 acres of private land and the Wedge Fire contains approximately 1,467 acres of private land. At this time it is not known what the various landowners plan to do with their property, however many of them have thinned trees or plan to thin around their property. The relatively small size of the private land will have little effect on the numbers of CNB that utilize the fire project areas. The State will log a considerable portion of their land. Glacier National Park will not salvage log their burned areas. Robert Fire burned approximately 39,395 and Wedge Fire burned approximately 30,316 acres, all of which will provide habitat for CNB.

There are several projects that are being planned or have implemented in the both the Robert Fire and Wedge Fire areas. The Hazard Tree Abatement projects have been implemented. This project removed fire-killed trees that posed a safety hazard to users on Forest roads, trails, and administrative sites within the both fire perimeters. This project removed a substantial number of snags in areas that pose safety hazards to people and Forest Service facilities. Generally speaking, due to the proximity of these snags to roads or concentrations of people, these areas are less secure from harassment by people than other locations within the burn. Species that prefer more open habitats, such as white-headed woodpecker, may be found in areas that were selectively harvested in the past or possibly in the vicinity of the Hazard Tree Abatement Project. Across the landscape, a mosaic of different snag concentrations will be present.

The BMP projects, routine road maintenance, and activities such as mushroom picking are not expected to impact CNB other than the noise associated with these activities. The Larch Heart Rot Study plans to take up to 100 snags in various size classes throughout both the Robert and Wedge 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 both fire areas so the study is not expected to measurably impact CNB habitat. See the Snag and Down Wood section of this chapter for more information pertinent to cavity nesting birds.

Conclusion

By leaving a diversity of stand and snag conditions across both the Robert Fire and Wedge Fire landscapes, it would be expected that a large suite of CNB species would be retained. This would be achieved under both the No Action and Action Alternative in both fire areas. The species mix and numbers would vary between alternatives but overall both alternatives would provide sufficient habitat for a suite of different cavity nesting species. Snag retention on this scale will likely not have a noticeable effect on CNB populations as a whole.

Neotropical Migratory Birds

Affected Environment

Neotropical Migratory Birds (NTMB) live in a wide variety of habitats. Several NTMB species occupy the project area. In recent years, concern has grown over widespread declines of numerous NTMB populations. Neotropical migratory birds are defined as those birds that regularly winter south of the Tropic of Cancer and summer in North America. The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds, including nests and eggs, is unlawful. A list of NTMB protected by the Migratory Bird Treaty Act is provided in 50 CFR 10.13.

In January 2001, an executive order was signed outlining responsibilities of federal agencies to protect migratory birds under the Migratory Bird Treaty Act. As a complimentary measure to the Executive Order, the Forest Service and the U.S. Fish and Wildlife Service entered into a Memorandum of Understanding (MOU) the purpose of which is to strengthen migratory bird conservation through enhanced collaboration between the agencies, in coordination with state, tribal, and local governments. This MOU serves as guidance for the two federal agencies until more detailed direction is developed pursuant to the Executive Order.

The Flathead National Forest provides habitat for a variety of NTMB. Some of the species from the Migratory Bird Treaty Act (50 CFR 10.13) that are commonly found in this area are mountain and western bluebirds, dark-eyed juncos, red-tailed hawks, American kestrel, and red-breasted nuthatch, to name a few. Prior to the fires, the project areas provided habitat for those NTMB that prefer closed coniferous such as goshawks. The fire areas also provided habitat for those species that utilize more open young seedling and pole size stands. After the fires, the burned areas are more suitable for NTMB requiring snags in a more open environment, such as American kestrel. Many birds that feed on insects will likely benefit over the short-term. This is due to the flush of insects that come into an area after a fire.

It is assumed that NTMB were present in the project area during the Robert and Wedge fires. Those birds that were able to flee the fire would probably have experienced increased predation and/or vulnerability due to limited habitat available after the fires. In those drainages where most of the understory was lost, there would have been immediate effects for neotropical migrants and resident species due to the loss of hiding cover and thermal cover, as well as nesting and foraging habitat. Birds would have been displaced into less suitable habitats and/or concentrated in those riparian areas that remained relatively intact.

Most of the impacted grass, forb and shrub vegetation is expected to re-sprout fairly quickly; however there will be increased intra- and inter-specific competition for that habitat until it fully recovers. These effects will continue for several breeding seasons. In the short-term, depending on the extent to which various plant species recover, and the distribution of this recovered habitat, breeding birds may be displaced into less suitable habitat or leave the area

entirely. These factors will likely cause lower breeding success. Competition for nesting habitat will be increased, at least in the short-term, especially for those species that prefer ground and shrub vegetation because it will take a few years for this structure to re-establish. Some neotropical birds will have benefited from the fire while others will have lost habitat.

Direct and Indirect Effects on Both Robert Fire and Wedge Fire Affected Areas

Alternative 1 (No Action)

The direct and indirect effects of this alternative on neotropical migratory birds (NTMB) would essentially be the same as described for CNB. Alternative 1 would provide the greatest opportunity for maintaining nesting and foraging habitat for those species that respond well to fire. Local populations of NTMB that utilize burned areas should increase. Alternative 1 would be most beneficial to those NTMB, such as black-backed woodpecker that have been found to prefer high densities of snags in open environments. Alternative 1, however, would have a negative impact on those NTMB species that prefer lower snag densities.

Alternative 2 (Proposed Action)

Bird species richness has already decreased due to the fire. Salvage logging is known to further reduce overall species richness (Sexton 1998). Due to the differing responses of individual species to tree size class and density, leaving variable clump sizes, variable diameter sizes, and non-treated areas under this alternative would help assure that suitable habitat is maintained for a variety of species.

As mentioned previously, local populations of NTMB that utilize burned areas should increase. Alternative 1 would be most beneficial to those NTMB, such as black-backed woodpecker that have been found to prefer high densities of snags in open environments. Alternative 1, however, would have a negative impact on those NTMB species that prefer lower snag densities. This is addressed in the Action Alternative by providing a variety of snag levels across the landscape to support a diversity of NTMB species. Since the Action Alternative incorporates conservation measures to protect NTMB, the intent of the MTBA and the 2001 executive order and MOU to conserve and protect NTMB would be met.

Salvage harvest activities between May and August may have direct effects on nesting NTMB. Although little is known about the effects of salvage logging in stand replacement fires on NTMB, it is expected that salvage of snags under this alternative could have a slight negative effect on potential population numbers of cavity nesting neotropical migratory birds due to the reduced number of snags. Potential population numbers for grass and shrub nesting NTMB is expected to increase within the next 5 to 10 years due to increased ground vegetation.

Noise from the various activities proposed in the Action Alternative during the breeding season could disrupt birds in the area, especially at nest sites. However, noise associated with these activities would be short term and in the long run benefit a wide variety of species. Noise may impact juvenile dispersal, may cause premature displacement of young or cause young to be prematurely abandoned, however, this would be expected to be limited. Some temporary displacement NTMB is likely to occur, but is expected to be minimal.

Cumulative Effects of Both Alternatives for the Robert and Wedge Fire Areas

NTMB habitat in both the Robert Fire and Wedge Fire areas has been influenced by human activity over the past century. Fire exclusion since the 1920s has likely led to an increased level of woody debris on the forest floor and a change in forest structure. Timber management has occurred over much of both fire areas. Treatments have included a mix of clearcut, overstory removal, seed tree, shelterwood, and thinning prescriptions. These treatments have simplified stand structure, reduced snag levels, and regenerated patches of forest to early-seral conditions. Even with these treatments, a diverse forested habitat was still present prior to the fire. A large portion of the analysis area favored NTMB preferring mid- to late-seral conditions.

Under the No Action alternative, habitat would remain in early seral conditions for a number of years as the successional stages advance. Snags would be present in high densities for 10-20 years providing abundant habitat for those bird species dependent on this feature. After 30 years, most snags would have fallen contributing to a high concentration of down woody debris. Trees surviving the fire would continue to mature and provide legacy large trees as new stands develop. As these trees die, they will provide future large snags and logs.

Development of late-seral habitat may be affected by future wildfires. High concentrations of snags would lead to high fuel loads as they fall and present a challenge for fire suppression efforts. This would result in the loss of both current and future snags and down logs. This would retain early-seral habitat conditions in the area for an extended period.

Conclusion

Both the No Action and Action Alternative provide a variety of habitats for NTMB within both fire areas. Each alternative would benefit some NTMB species more than others but each would provide suitable habitat for NTMB. The intent of the MTBA and the 2001 executive order and MOU to conserve and protect NTMB would be met under both alternatives in both the Robert Fire and Wedge Fire areas.

Snags and Down Wood Habitat

Affected Environment

General Dead Wood Habitat

National forest system lands within the Robert and Wedge Post Fire Area were considered for the evaluation of direct and indirect effects on snags and down wood material habitat. The project area contains approximately 21 square miles (13, 123 acres) of Forest Service lands within the Robert Fire area and approximately 38 square miles (21,526 acres) in the Wedge Fire area. The total Robert Fire burned approximately 83 square miles (52,874 acres) and the total Wedge Fire burned about 85 square miles (54,405 acres). Both the Forest Service land fire areas are large enough to include the home range of numerous wildlife species that use snag and down wood material habitats.

Snags, broken-topped live trees, down logs, and other wood materials are an important habitat component for wildlife, especially for cavity-using birds and mammals. DecAID (Marcot *et al.* 1999) lists 57 wildlife species plus 4 species groups associated with snags and 20 wildlife species associated with hollow living trees. These lists are for eastside mixed conifer forests of the Rocky Mountains with an open canopy; other wildlife species would be

associated with closed canopy forests such as what was present prior to the fires. It is estimated that about one third of the bird and one third mammal species that live in the forests of the Rocky Mountains use snags for nesting or denning, foraging, roosting, cover, communication, or perching. On the Flathead National Forest, at least 42 species of birds and 10 species of mammals are dependent on dead wood habitat for nesting, feeding, or shelter. Size (diameter and height), tree species, age (time standing since tree death) and condition, and location (exposure, microclimate, and surrounding habitat) are major factors that contribute to the relative value of individual snags to wildlife. The abundance of cavity-nesting birds, in particular, largely depends upon the abundance of suitable snags. Successful management and conservation of snag-using wildlife depend upon maintenance of a sufficient number of large-diameter snags (greater than 15 inches DBH) per acre on a continuing basis.

Dead trees have many ecological roles in a landscape recovering from wildfire (Beschta *et al.* 1995). The number, species, size, and distribution of available snags strongly affect snag-dependent wildlife (Bull *et al.* 1997). Cavity-using birds can substantially reduce tree mortality and damage caused by forest pest insects (Bull *et al.* 1997, Torgersen 1996, Torgersen, Mason, and Campbell 1990). Too few suitable snags may limit or eliminate populations of cavity-using species (Saab and Dudley 1998, Thomas *et al.* 1979).

Snags with old nesting cavities, broken tops, and decay are more likely to be used than intact snags (Bull *et al.* 1986). Snags and logs with heart rot characteristics are not only important to cavity-nesting birds. A myriad of mammalian species (bats, squirrels, pine martens, fishers, bears) rely on these structures for den and rest sites (Bull *et al.* 1997). Maintaining these structures even after forests have burned is critical for them because they can persist for so long on the landscape. Although these areas have burned, the decay characteristics within these stands are the ones most likely to provide critical habitat components to many wildlife populations over the coming decades until newly generated stands mature and develop the necessary decay characteristics. Areas such as these may also provide important wildlife corridors once the shrubs and trees regenerate.

Cavity nesters consistently select larger snags than expected, based on what is available. Large snags are used by more species and are much longer lasting, both when standing and after falling. The larger the diameter of the snag, the less the nestlings are crowded and the better they are protected from weather and predators. Large snags also tend to be less of a fire hazard. These snags provide food and shelter to wildlife, fish, and numerous insects, microbes, and fungi that are vital to post-fire recovery and long term site productivity, they help retard surface runoff and help retain and build soil, they help cycle nutrients and water to plants and soil, and snags that fall across streams provide links between terrestrial and aquatic ecosystems (Ingalsbee, *no date*). Logs also provide critical shade for newly established seedlings during the hot, dry summer months. In addition, log retention may eliminate the need for thinning once the trees reach the sapling /pole stage (Bull *et al.* 1997). Large snags and logs are needed for healthy wildlife and plant populations, fertile soil, and clean water.

Large diameter snags are considered an especially important component of a burned landscape. Large snags (especially western larch and ponderosa pine) remain standing longer, increasing the chance that suitable decay conditions will develop for cavity-using species. Although smaller creatures can use many sizes of dead trees, larger birds and mammals require larger snags. The pileated woodpecker builds cavities, which they abandon and then subsequently used for many years by various other species. However, pileated woodpeckers have very low nestling survival in snags or trees smaller than 20" DBH. The various species of cavity users all appear to use different microhabitats. Homogenously managed stands are likely to not provide habitat for many species (Hutto 1995b). Likewise, any one stand would

not be expected to provide habitat for all cavity-using species. Vegetation and snag conditions are naturally diverse across a forested landscape, including both the Robert Fire and Wedge Fire areas. Maintaining this diversity would provide a wide variety of habitat conditions for bird and mammal use.

Riparian habitats are found throughout the Robert and Wedge Post Fire Project area. Riparian habitat benefits most wildlife species. They serve as migration corridors and fawning areas for deer, hunting and travel corridors for mammals, and roosting, foraging, and nesting areas for bats, owls, raptors, neotropical migratory birds and many resident bird species. There were approximately 2,112 acres of all classes of riparian habitat (from ephemeral to year-round creeks) that burned at moderate or high severity within the Robert Fire project area. There were approximately 2,842 acres of all classes of riparian habitat (from ephemeral to year-round creeks) that burned at moderate or high severity within the Wedge Fire project area. As a result of the Robert and Wedge Fires, most of the RHCAs have reverted from mid or late-seral forest conditions to early-seral conditions. It will take at least 100-150 years to re-establish large trees (greater than 24 inch dbh) and at least 200-250 years to develop old trees with decadence features beneficial to wildlife. These time frames are the best-case scenario and are based upon no additional stand replacement wildfires. The RHCAs generally contain higher concentrations of large diameter snags than the uplands, which make the RHCAs especially important for many snag dependent wildlife species. These large snags are expected to provide legacy structure as new stands of trees regenerate.

Down logs and other woody material are also critically important for many species. Logs and stumps are required for resting and denning, are vital for hunting below the snow in winter (Buskirk and Ruggiero 1994), and are also used as travel cover, particularly when living plant cover is absent. For instance, American marten often den and forage in the under-snow cavities that occur under logs. All 13 of the Canada lynx dens found thus far in the Seeley-Swan area are associated with abundant woody debris, usually large diameter logs. Several amphibians and reptiles make use of large woody debris for shelter and breeding sites (Bull *et al.* 1997). Many ant species that need large-diameter down logs prey on defoliating insects such as western spruce budworm (Torgersen and Bull 1995). Longer and larger-diameter down wood is generally most important because it provides stable and persistent structure as well as better protection from weather extremes. A variety of sizes and decay classes are needed in down wood “in order to conserve functional processes that foster sustainable forest ecosystems” (*ibid.*).

Dead wood habitat management in post-fire situations differs from that of green forests in several ways. Often, few or no green trees exist to replace snags that fall over time. Snags in such stands would not become available again until a new forest develops that has trees that are large enough and with sufficient decay. In areas where most trees were killed, it will take a minimum of 100 + years to recruit snags greater than 15 inches DBH. Some species, such as black-backed woodpeckers and olive-sided flycatchers, appear to respond positively to the high densities of snags in burned forests and may depend on them. Hutto (1995b) found that 15 species of birds were more frequently found in post-fire habitats than in any other major cover type in the northern Rockies.

The snag and down wood habitat over all ownerships in the Robert Fire and Wedge Fire areas has been influenced by human presence such as; introduced tree diseases, fire exclusion, timber harvest, firewood cutting, and roads. About 24 percent (3,169 acres) of the 13,123-acre Robert Fire analysis area and about 21 percent (4,465 acres) of the 21,526-acre Wedge Fire analysis area had commercial timber harvest or salvage prior to the 2003 fires. None of this harvesting was done after Flathead Forest Plan Amendment 21 (USDA 1999a) came into

effect in January 1999, although the prior shelterwood and salvage harvests may have met the later Amendment 21 standards for snags and down wood.

Fire was the dominant disturbance in these watersheds prior to the 1930s. Large larch snags still stand from fires between 1910 and 1926, yet few snags now exist where old fires overlapped. Fire exclusion had been effective for over 80 years, and much of the area had not had a large fire since 1864, until the Moose Fire in 2001. See the Vegetation and Fire sections of this document for more information.

Snag Habitat

Across both fire areas, the overall availability of snag habitat is currently very high. On lands administered by the Flathead National Forest, the Robert Fire burned about 3,514 acres at low severity, 2,932 acres at moderate severity, and 6,457 acres at high severity (refer to Figure 10). The Wedge Fire burned about 5,177 acres at low severity, 5,481 acres at moderate severity, and 10,795 acres at high severity (refer to Figure 14). Most of the previously harvested areas also burned, killing the trees that had been left for seed trees or shelter and to provide a legacy of larger-diameter wood across the landscape, however most of the thinned tree plantations survived. In Glacier National Park approximately 14,400 acres burned at high severity, 15,115 acres burned at moderate severity and 9,880 acres burned at low severity during the Robert Fire. Approximately 3,220 acres burned at high severity, 23,470 acres burned at moderate severity and 3,626 acres burned at low severity during the Wedge Fire in Glacier National Park. State lands burned in the Wedge Fire area but not in the Robert Fire. Of the approximate 1,094 acres of State land that burned during the Wedge Fire about 567 acres (52%) high-severity, 154 acres moderate severity and 283 acres burned at low severity. Only about 355 acres of private land burned in the Robert Fire (151 acres at high severity, 66 at moderate and 136 acres at low severity). During the Wedge Fire approximately 1,467 acres burned (961 acres at high , 116 at moderate, and 331 at low severity). Except for designated slash piles, all National Forest System Lands in the Robert and Wedge Fire areas are currently closed to firewood cutting. This closure order is expected to persist until salvage logging is completed.

Both the Robert Fire and the Wedge Fire created expansive snag habitat that did not exist prior to the fires. There were approximately 9,794 acres of live forest that had pole size trees or larger on Forest Service lands prior to the Robert Fire and approximately 17,275 acres of forest that was pole size trees or larger on Forest Service lands prior to the Wedge Fire (See Table 63 below). The Robert Fire and Wedge Fire affected areas are considered to have moderate or high-quality snag habitat if they burned at high or moderate fire severities, had trees 9 inches dbh or greater and had canopy closure of 40% or more prior to the fires. The Robert Fire on Flathead National Forest created approximately 7,260 acres of quality snag habitat. This is 55 percent of the Robert Fire affected area on Forest Service land. The Wedge Fire on Flathead National Forest created approximately 13,340 acres of quality snag habitat. This is 62 percent of the Wedge Fire affected area on Forest Service land. Snag conditions in the low intensity burn areas are quite varied. Stand that were dominated by spruce tended to have more snags than those stands dominated by Douglas fir and western larch.

Table 63. Approximate acres of pre and post-fire pole and mature forest habitat; and post-fire snag habitat.

Habitat	Robert Fire	Wedge Fire
Total Pole and Mature Forest Habitat Prior to	9,794 acres	17,275 acres

Habitat	Robert Fire	Wedge Fire
Fire		
Pre-Fire Mature Forest Habitat	5,708 acres	9,656 acres
Pre-Fire Immature Forest Habitat	4,086 acres	7,619 acres
Post Fire Mature Forest Habitat	1,708 acres	2,068 acres
Post Fire Immature Forest Habitat	2,025 acres	3,350 acres
Post Fire Large Snag Habitat	4,000 acres	7,588 acres
Post Fire Moderate Sized Snag Habitat	2,061 acres	4,269 acres
Total Snag Habitat	6,061 acres	11,857 acres
Total Live Tree Habitat	3,733 acres	5,418 acres

As mentioned earlier most of what was old growth habitat burned at moderate or high severity. The old growth habitat that remains unburned or at least containing enough characteristics to be classified as old growth is too small in size to function as old growth habitat for wildlife dependent on old growth habitat. These small pockets of live old growth are still valuable wildlife habitat. The old growth habitat that burned provides some of the best concentrations of large snag habitat and some of the better wildlife snags (trees that were dead prior to the fires).

Few acres within both the Robert Fire (14 acres) and Wedge Fire (73 acres) perimeter were not burned. Little of it is expected to have large numbers of larger-diameter snags. Unburned pole-sized stands, seedling/sapling stands without a large amount of overstory, or other non-forested areas such as shrubfields, rock, rivers, and wetlands make little contribution towards snag habitat. In addition, moderate or severe fire burned most of the stands that had been previously harvested by clearcutting, seedtree, or shelterwood methods. These stands typically had 5 to 30 larger trees left per acre, and post-fire surveys revealed that 25 to 100 percent of them are now snags.

Down Wood Habitat

Many areas burned by the fires are currently low to very low in large down wood habitat, especially where timber was harvested before the fire. These areas probably do not currently provide habitat for species like the marten, which appear to depend on living forests that are rich in large down wood (Bull and Blumton 1999, Buskirk and Ruggiero 1994). Due to the fire, this situation will change dramatically over time. This is because the newly created snags would fall over time (Harrington 1996, Lyon 1984) and the rate varies by species, age, pre-fire vigor, type and extent of fire injury, exposure to wind, slope position, soil moisture, water table depth, etc. Wind buffering by neighboring snags or trees helps keep a snag standing, as do the interconnected roots of neighboring snags. Field inventory of current down log conditions in most of the burned areas would not provide information of value for this analysis, as fire-killed trees have only just begun to fall. It was assumed that, unless salvaged or cut for firewood, they would eventually be full-length down logs.

Once a log is on the forest floor, its size seems to be more important than its species. Areas of potential high quality down log habitat typically had pre-fire overstory trees averaging 16 inch DBH or larger that burned at moderate or high fire severities. Also included are stands with large spruce that burned at low severity, since high mortality levels are expected in these trees. Larger Douglas fir and western larch are typically not killed by low-severity fire, although, as noted above, insects and disease may kill them a few years after the fire. Areas of moderate quality down log habitat had 9 to 16 inch DBH overstory trees with at least 20% canopy cover and burned with a fire severity level of low, moderate, or high. The sizes, species, and condition of down wood vary considerably within and between stands, forest types, seral/structural stages, and fire regimes. These stands are not indicative of historical conditions; as they reflect many years of fire suppression, tree harvest, and firewood cutting across the landscape.

Direct and Indirect Effects to Both Robert Fire and Wedge Fire Affected Areas

Alternative 1 (No Action)

The effects of the No Action Alternative on wildlife would vary over time. In the short term, this alternative would favor species associated with recent burns and the resulting large numbers of snags and down wood material. Black-backed, three-toed, and hairy woodpeckers would find an abundance of habitat and would excavate cavities for many secondary cavity nesters such as mountain and western bluebirds, kestrels, and mountain chickadees. As snag attrition occurs and vegetation succession proceeds, the abundance of bird species associated with the recent burn would decline. Mammals and birds that use coarse woody debris for denning, feeding, and dispersal would increase, especially as vegetation recovers. As the new forests mature and age, the remaining large snags and down logs would again make the fire areas highly suitable for pileated woodpeckers, brown creepers, northern flying squirrels, southern red-backed voles, and many of the other species identified as old-growth associates ([Flathead Forest Plan Amendment 21, USDA 1999a](#); [Warren 1998](#)).

In this alternative, no additional snags would be felled except where they pose a serious threat to human safety, such as along trails and near administrative sites. No additional down logs would be removed. This would leave snag and down wood habitat to continue with relatively natural processes, along with future fire suppression and firewood cutting. Spruce beetle and Douglas fir beetle populations would be expected to increase, with some of the surviving Douglas fir trees killed by beetles over the next few years. This would create more snags over a larger landscape. Refer to the Vegetation section of this chapter for more information on insect infestations. In most areas, the bulk of the fire-killed trees are expected to be down within 15 to 50 years. Many of the larger, wind-throw resistant snags such as western larch and Douglas fir would likely still be standing after 50 years. By that time, some of the trees that were not injured by the either fire would also have become snags, but most of the trees would still be too small to be of significant value as snags.

The moderate and high quality down wood habitat areas are expected to have large amounts of persistent, large down wood in 15 to 50 years. Some riparian spruce bottoms areas already have extensive blowdown. Soil conditions would likely improve as the organic matter from the logs is incorporated. Down logs, shading from snags, and lack of seed sources may delay the regeneration of new trees in some stands. The intensity of a future fire would increase as snags fall and new understory growth contributes more fine fuels. Under this alternative, ecosystem function would move in the direction of historical ecological cycles.

Preliminary research suggests that about half of the snags within 200 feet of roads are felled for firewood, especially when vegetative cover has been removed (Bate and Wisdom 2004). Large western larch, ponderosa pine, and Douglas fir snags are very rare in such corridors in northwest Montana. Firewood cutters can easily access standing or down logs year long and seasonally and yearlong open roads within both fire areas. Many of the larger new snags created by the fires are vulnerable to firewood cutting. After the temporary road closures are lifted, there are approximately 24 miles (total) of seasonally open roads (11 miles) and yearlong open roads (13 miles) within the Robert Fire and approximately 60 miles (total) of seasonally open roads (2 miles) and yearlong open roads (58 miles) within the Wedge Fire perimeter that would be vulnerable to the removal of snags and down wood by fuelwood cutters. Firewood cutting is prohibited within 300 feet of any stream, river, or lake across the Flathead National Forest. This should protect snags and down wood along the riparian areas. No additional motorized access changes are planned with implementation of Alternative 1.

Alternative 2 (Proposed Action)

The Action Alternative would leave a diversity of conditions while working with natural pre-fire variations in vegetation, as well as the variation in fire severities. Scientific literature and experts in post-fire ecological processes, timber salvage systems, and safety were consulted in developing the snag prescription for the Robert and Wedge Fire areas (Refer to Deadwood Habitat Prescription Matrix in Appendix F.). Fires or other larger scale mortalities are opportunities to restore snag and down wood habitat to a landscape. Research has shown that cavity dependent species (e.g., black-backed woodpeckers) use dense clumps of snags while others (e.g., Lewis' woodpecker) use snags in more open stands. This alternative would provide for the ranges of habitats. DecAID (Marcot *et al.* 1999) recommends that a diversity of patch sizes should be retained, as well as multiple clumps. Professional judgment that considers multiple factors including wildlife species that use such densities of snags and their home range size, terrain, logging systems that would be used, safety during logging, and planting operations would be applied to make decisions regarding sizes and numbers of retention patches (clumps). The location of dead wood reserve patches may be determined to large degree by operational considerations. However reserve patches that contain wildlife snags, linear and patchy riparian (wet areas), ridges and other areas preferred by wildlife would also be given preference. By doing so, habitat for the range of species that use clumps of snags at varying densities should be provided in a mosaic across the analysis areas.

The snag and down wood prescription for Alternative 2 would help to retain a wide mix of snag numbers within burned and unburned areas. The prescription would provide variability and diversity within and between the salvage units. Successful management and conservation of snag-using wildlife depend upon maintenance of a sufficient number of large-diameter snags on a continuing basis. Management practices would have negative effects on some species and ecological processes as well as positive effects on others. Leaving a diversity of conditions within both fire areas is the way to ensure that all pieces will remain. Most of the proposed salvage units in both fire areas are within close proximity to areas that were previously harvested and contain limited to no large diameter snags or are adjacent to other proposed salvage. This was taken into account during the formulation of the snag prescription and the snag emphasis level determination for the individual unit.

For both the Robert and Wedge Fires the proposed snag and down wood retention prescription remained the same. However approximately 99% of the Robert Fire unit acres would have a high snag emphasis, while approximately three quarters of the Wedge Fire acres would be in the high snag emphasis prescription. Most of the remaining quarter of the Wedge Fire would have a moderate snag emphasis prescription. The differences between the

fires has to do with differences such as: the juxtaposition of the past and proposed harvest units, unit size, large diameter snag availability, unit proximity to roads, and wildlife movement corridors.

Units that have a high snag emphasis level in these fire areas would retain all western larch snags that are greater than or equal to 20 inches DBH and greater than or equal to 10 feet tall. Units that have a medium snag emphasis level will retain all western larch snags that are greater than or equal to 22 inches DBH and greater than or equal to 10 feet tall. Units that have a low snag emphasis level will retain western larch snags that were snags prior to the fire (wildlife snags with broken tops, nest holes etc.) where it is safe to do so. Snags within 200 feet of an open road may be cut for salvage since they would likely be removed for firewood anyway. Wildlife snags left within 200 feet of an open road would be signed with a wildlife tree tag for retention. No snags would be harvested from riparian areas. The number of remaining western larch snags would vary considerably between salvage units due to natural pre-fire variations in vegetation, the stand site potential and burn severity.

Alternative 2 would retain the largest diameter western larch and Douglas fir snags across both fire landscapes. Research has shown that for these fire areas western larch and to a lesser extent Douglas fir snags are the tree species that will be predominately used by cavity-using birds and mammals. Historically, large-diameter western larch has been harvested because of its high value as a timber commodity and for fuelwood (Hann *et al.* 1997). In these fire areas western larch is the most valuable species for a suite of vertebrates. Large diameter western larch is strongly selected by many species of cavity-using wildlife because it provides some of the most suitable nest and roost sites, owing to the characteristics of the wood and its decay patterns (Bull *et al.* 1997, McClelland 1979). Specifically, western larch is much more susceptible to heart rot making it strongly selected for by a suite of wildlife species. These snags are also known to last longer on the landscape. Large Douglas fir snags provide both nesting and foraging habitat. These snags are also known to last longer on the landscape. Large Douglas fir snags provide both nesting and foraging habitat.

Snags not proposed for harvest would be left standing wherever it is safe to do so for forest workers. Those snags that would be a hazard left standing will be cut but maintained on the ground with as little bucking as possible. The larger the log the more valuable it is to wildlife, as well as other resources.

Due to safety concerns, reserve patches were prescribed for this alternative as a mechanism to assure that wildlife snags (broken tops, pre-existing cavities and rot, etc.) would be left standing within harvest units. This is particularly true of the decayed and breaking western larch, ponderosa pine, black cottonwood, and aspen trees and snags that are by nature most valuable to wildlife (Caton 1996, Hitchcox 1996). Reserve patches inside units are also very important in stands lacking classic wildlife snags. Research has shown higher use and nest success in post-fire salvage leave patches as opposed to individual snags left scattered across the landscape. This may be due to the reduction in territorial disputes and less distance to cover within units. Patches left intact along unit boundaries provide more interior habitat, less edge effect, less nest predation, and more effective connectivity between units.

There are no hard and fast rules for the determination of the number/size of snags and/or the size/ number of reserve patches needed for wildlife. The reserve patch size was determined by taking into account past harvest in the fire area and vicinity, wildlife species known to utilize these areas, desire for a economic return for the salvage sale, the juxtaposition of the proposed salvage units and past harvest units, the number of roads in the area, the latest available science, discussion with snag research scientists, large snag availability, forest worker safety etc.

Studies have shown that reserve patches (clumps) get more use (Bunnell *et al.* 2002, Saab and Dudley 1998) than individual snags. Retaining 15 to 25 percent of the proposed high and moderate snag emphasis units in reserve patches should retain adequate amounts of patches across the fire area. The reserve patches would mainly be positioned around highly valuable un-safe large diameter wildlife snags, riparian/wet areas, and adjacent to unburned or low intensity burn areas. The variety of patch sizes should retain habitat for the needs of the diverse species that have various habitat needs, which include home range size and territories. Unsalvaged areas around the units, adjacent to RHCAs and in roadless areas would provide sufficient habitat for black-backed woodpeckers and other species that rely on dense, severely burned post-fire habitat (see the Black-Backed Woodpecker section of this chapter)

The Action Alternative would retain legacy structures (large structure that existed prior to the fire) and components of ecosystems that existed prior to the fires. Legacies would provide important temporal connectivity within a stand, allowing organisms present in a pre-disturbance community to persist in an area following disturbance. In addition, the retained legacy wood would provide structural elements and complexity in stands that would otherwise require very long periods to develop. In areas where most trees were killed, it will take a minimum of 100 + years to recruit snags greater than 15 inches DBH, even if the sites are planted. In managed forests, wood legacies, including large diameter trees, snags, and down wood, are ecologically important structures that play central roles in diverse ecosystem processes, and functions, such as geomorphic processes and functions, hydrology, nutrient recycling and habitat for fish and wildlife (Rose *et al.* 2001).

Alternative 2 would use the default Amendment 21 coarse woody debris standards for Moist PVG in the salvage harvest units. This would be provided by un-merchantable pre-fire down wood, un-merchantable material left standing, later windfall of leave trees and snags, and felled hazard or un-merchantable trees. The standards call for the retention of coarse woody debris greater than 6 feet in length in the treatment areas at the following densities: 32 pieces average per acre 9 to 20 inches diameter and 15 pieces average per acre \geq 20 inches diameter. Hydrologists and soil scientists determined these standards were appropriate for these fire areas. These standards retain adequate numbers and distribution of large downed logs for wildlife. It should be noted that the log distribution would be highly variable across both fire landscapes due to pre-fire variations in vegetation, as well as the variation in fire severities.

Table 64 shows the size and average number of western larch snags and western larch combined with Douglas fir snags across both fire areas. In the Robert Fire across the acres where larger diameter larch occurs, an average of approximately 5 to 6 western larch snags per acre \geq 20 inches DBH would be left within the high emphasis units. Approximately 4 to 5 western larch snags per acre \geq 20 inches DBH would be left within the Wedge Fire in the high emphasis units. It should be understood however that some units may not have any standing large diameter western larch snags left after salvaging and others could have as many as 20+ snags per acre over 20 inches DBH. This would be due to pre-fire variability of trees and the hazard condition of the snags. On average across the Robert Fire area, approximately 4 to 5 western larch snags per acre \geq 22 inches DBH would be left within the moderate emphasis units. Approximately 3 to 4 western larch snags per acre \geq 22 inches DBH would be left within the Wedge Fire in the moderate emphasis units.

Table 64. Estimated Average Trees (Prior to the Fire) Per Acre of Larger Diameter Larch and Douglas Fir Within Proposed Salvage Units in the 2003 Robert and Wedge Fire Areas.

Fire Name	Acres of proposed salvage harvest	Acres in salvage units with past exams	Acres in salvage units with past exams AND with >=1 tpa LDF >17" dbh	AVERAGE TREES PER ACRE ACROSS THE ACRES WITH PAST EXAMS within SALVAGE UNITS (L= larch; LDF = larch and Douglas-fir combined)								Est. TPA of LDF 17+ dbh on acres with NO past exam ¹	Acres in salvage units with NO LDF 17+
				L17+	L21+	L23+	L25+	LDF17+	LDF21+	LDF23+	LDF25+		
ROBERT	3,089	1,651	1,483	8	5	4	2	10	6	5	3	9 (1158 acres)	448
WEDGE	2,734	2,181	1,768	6	4	3	2	12	6	5	3	5 (255 acres)	711

Data compiled by Heidi Trechsel, 3/2004 All values are approximate

Both fire areas would also retain the largest Douglas fir snags. Douglas fir is also preferred by cavity users and for foraging although not quite to the extent that western larch is. Douglas fir also remains standing much longer than most tree species in this area. Large diameter Douglas fir snags are not as predominate as western larch in either fire area although the Wedge Fire appears to have a few more than Robert. This was taken into account in the determination that both the high and medium snag emphasis levels would retain Douglas fir snags 23 inches DBH and higher. Units that have a low snag emphasis level would retain Douglas fir snags that were snags prior to the fire (wildlife snags) where they are not a hazard. Snags within 200 feet of an open road may be cut for salvage since they would likely be removed for firewood anyway. Unmerchantable portions of the snags will be left on the ground for down wood in areas within 200 feet of an open road. Douglas fir wildlife snags left within 200 feet of an open road would be signed with a wildlife tree tag for retention.

Table 64 shows that in units where the larger Douglas-fir exists, an average of approximately 1 Douglas fir snag \geq 23 inches DBH would be retained per acre in the Robert Fire and approximately 2 Douglas fir snags \geq 23 inches DBH would be retained per acre in the Wedge Fire area. Again the number of remaining Douglas fir snags after salvage would vary considerably between units due to natural pre-fire variations in vegetation, the stand site potential and burn severity.

Bate and Wisdom (2004) studied snag resources in relation to roads and other indices of human access on the Flathead National Forest and found that:

- Stands with no history of timber harvest had three times the density of snags as stands that were selectively harvested, and 19 times the density as that in stands that had undergone a complete harvest. These results suggest that past timber harvest practices have substantially reduced the density of snags, and that snag losses have not been effectively mitigated under past management.
- Stands in the late-seral stage had three times the density of snags as stands in the mid-seral stage, and almost nine times that of stands in the early-seral stage. Stands in the late-seral stage provide essential snag habitat for wildlife that does not appear to be consistently present in younger stands.
- Stands far from roads had almost three times the density of snags as stands adjacent to open or closed roads. No difference in snag density existed for stands adjacent to open versus closed roads. Rather, snag density declined with increasing proximity to nearest road. Consequently, the presence of any road near or adjacent to a stand is an important predictor of substantially reduced density of snags. Ease of access for firewood cutting and other forms of timber harvest is the most likely explanation for reduced snag density near roads.
- Stands closer to the nearest town had a lower density of snags than those farther from nearest town. This finding implies that stands closer to town, and therefore more accessible to human activities, also are likely areas where firewood cutting is concentrated, resulting in reduced snag density.
- Stands adjacent to private land had a lower density of snags within mid- and late-seral stages, in contrast to a higher density in stands surrounded by Forest Service land. These results are likely explained by safety and fire management policies, which call for removal of snags along property boundaries, where such snags often are deemed to pose safety or fire hazards. In addition, increased human access likely contributes to lower snag densities in stands adjacent to private land.

This information was considered in determining both the unit snag emphasis level as well as reserve patch size.

In addition to retaining large diameter western larch and Douglas fir, reserve patches would also be retained in high and moderate snag emphasis units greater than 20 acres in size. Reserve patches would also be retained in high emphasis units smaller than or equal to 20 acres in size. Reserve patches may also be retained in units not meeting the above descriptions but would not be required. The reserve patch retention prescription for both the Robert and Wedge Fires remained the same.

DecAID (Marcot *et al.* 1999) states that wildlife data offer no guidance on the number or size of clumps that should be managed. Agee (1998) suggests patch size in habitats subjected to a moderate severity fire regime ranges broadly from 6.2 to 620 acres. In order to manage for all wildlife species in post-fire habitats, research has shown the landscape should be managed for a variety of snag densities across the burned area (Saab and Dudley 1998 and Saab *et al.* 2002). To match historic or “natural” conditions, a mix of clumps and more widely distributed snags should occur within and among stands. Saab and Dudley (1998) found substantial use of post-fire habitats by a variety of species when 50% of the trees > 9 inches were retained in salvage units. Successful management and conservation of snag-using wildlife depend upon maintenance of a sufficient number of large-diameter snags on a continuing basis.

Robert Fire

Table 65 illustrates that approximately 13,270 acres of the Robert Fire area burned on Forest Service lands. It should be noted that approximately one third of the Robert Fire area had burned in 1929 due to a human caused fire. That fire burned at high severity, killing the vast majority of the trees. Other fires burned within the Robert Fire perimeter but the 1929 burned the large area within the Forest Service land portion of the Robert Fire. Prior to forest management, which began in the 1940’s, approximately 7,307 acres or 55% of the Robert Fire area is estimated to have had moderate to high numbers of larger diameter western larch and/or Douglas fir trees (more than 4 trees per acre that were greater than 17 inches DBH). Approximately 49% (3,577 acres) of these larch/Douglas-fir trees greater than 17 inches DBH (>4 trees/acre) were regeneration harvested between the 1940’s and 2001. Essentially all these large trees were removed. This left about 3,730 acres of forest containing larger diameter western larch and Douglas fir within the Robert Fire area by 2002, prior to the 2003 Robert Fire. Approximately 1,820 acres of this larch/Douglas-fir forest is proposed for salvage, out of the total 3,089 acres of proposed salvage harvest. This equates approximately 49% of the remaining 3,730 acres of forest containing at least 4 western larch or Douglas fir snags >17 inches DBH per acre. After the proposed salvage harvest, approximately 1,910 acres of forest with larger diameter western larch and Douglas fir would remain intact (unaffected by any past or proposed harvesting) within the Robert Fire area. This represents 26% of this forest type that was originally in the area in the 1940s, or 14% of the total Robert Fire area.

Table 65. Condition of Larger Diameter Larch and Douglas Fire Forests Over Time (Trees >17" DBH >4 TPA) Within the 2003 Robert and Wedge Canyon Fire Areas

FIRE NAME	TOTAL FIRE AREA	PRE-MGMT (1940s)		HARVEST REMOVAL OF LARGER TREES (1940s – 2001)		PRE-2003 FIRES (year 2002)		PROPOSED FIRE SALVAGE			POST-FIRE-SALVAGE Acres unaffected by proposed salvage harvest		
		Acres LDF17 +	% of total fire area	Acres LDF 17+	% of 1940s large LDF area harvested	Acres LDF 17+	% of total fire area	Total Acres Salvaged	Total large LDF acres salvaged	% of 2002 large LDF area salvaged	Acres LDF 17+	% of total fire area	% of 1940s large LDF area left
ROBERT	13,270	7,307	55%	3,577	49%	3,730	28%	3,089	1,820	49%	1,910	14%	26%
WEDGE (total area)	24,088 (21,533 Forest Service)	11,361	53% (FS lands)	5,753	51%	5,608	26% (FS lands)	2,734	1,646	29%	3,920	18% (FS lands)	35%
WEDGE (outside most of Trail Cr)	17,711 (15,163 Forest Service)	9,886	65% (FS lands)	5,349	54%	4,537	30% (FS lands)	2,734	1,646	36%	2,849	19% (FS lands)	29%

Data compiled by Heidi Trechsel, 3/2004 All values are approximate.

When the patch retention snag emphasis prescription is incorporated, an additional approximately 400 acres of the larger larch and Douglas-fir snags (2,310 acres total retained) would be maintained the fire area. This would change the 3,730 acres of larger diameter larch/Douglas fir forest left intact to 2,310 or 32% of the original amount that existed prior to 1940.

Approximately 62% of the available larger diameter larch and Douglas fir that existed immediately prior to the fire would be left. This figure may appear high however, one must consider that approximately 49% of what was available was harvested previously and no longer has standing or down wood available. That 49% has minimal to no value to snag dependent wildlife species and other resources dependent on larger decaying matter. Retaining the patches leaves 32% of what was available prior to management that began around 1940. From the wildlife standpoint this area had the potential to produce many more thousands of acres of wildlife snag habitat. This is considered when evaluating the effects of salvage harvesting on wildlife species.

As mentioned previously, reserve patches (clumps) are used more frequently by wildlife than isolated snags. With the removal of 49% of the original amount of larger diameter western larch and Douglas fir trees through past harvesting, and the potential of the proposal to affect an additional 49% of what is left through fire salvage, it is critical to retain not only the larger diameter western larch and Douglas fir snags but also adequate amounts of reserve patches in areas that are heavily cut over. In the Robert Fire area in general the proposed salvage units tend to be clumped together to form large contiguous areas of harvest. Directly adjacent to harvest “cluster” areas are stands that were harvested prior to the fire. Due to the juxtaposition of the proposed salvage harvest units and the substantially reduced numbers of large diameter snags outside the units, leaving 25% of the high snag emphasis units in reserve patches and 15% of the moderate snag emphasis units in reserve patches is warranted.

Of the approximately 3,090 acres proposed for salvage harvest (includes all snag sizes and tree species), approximately 2,406 (78%) would actually be harvested when the snag emphasis level for each specific unit is incorporated. A total of approximately 688 acres (22%) would be retained in reserve patches for wildlife. The largest unit with a high snag emphasis level is approximately 183 acres in size. Using the snag prescription this unit would be reduced to approximately 137 acres that would be salvaged harvested, with approximately 46 acres retained in reserve patches. The smallest unit with a high snag emphasis is approximately one acre. Approximately .10 of an acre would be retained in a reserve patch in this unit. As mentioned previously many of the proposed harvest units are directly adjacent to one another. Reserve patches would be highly variable in size and shape and juxtaposition across the fire area. Across the landscape in all high and moderate snag emphasis units large diameter larch and Douglas-fir snags would be retained outside the reserve patches (where they exist). These snags will be left standing or on the ground if they are felled for safety reasons.

Wedge Fire

Table 65 illustrates that approximately 21,533 acres within the Wedge Fire area is on Forest Service lands. It should be noted that approximately 4,870 acres of the Wedge Fire area burned in 1910, in the 1910 Fire. The 1910 Fire started burning in Idaho and burned millions of acres. Other fires burned within the Wedge Fire perimeter but the 1910 burned the largest number of acres. That fire burned at high severity, killing the vast majority of the trees in the portion of the Wedge Fire area that burned. Prior to forest management, which began in the 1940's, approximately 11,361 acres, or 53% of the Wedge Fire area, is estimated to have had

moderate to high numbers of larger western larch and/or Douglas fir trees (more than 4 trees per acre that were greater than 17 inches DBH). Approximately 51% (5,753 acres) of this larch/Douglas-fir forest was regeneration harvested between the 1940's and 2001, with essentially all these large trees removed. This left about 5,608 acres of forest containing larger diameter western larch and Douglas fir within the area by 2002, prior to the 2003 Wedge Fire. Approximately 1,646 acres of this larch/Douglas-fir forest is proposed for salvage, out of the total 2,734 acres of proposed salvage harvest. This is approximately 29% of the remaining 5,608 acres of forest containing at least 4 western larch or Douglas fir snags >17 inches DBH per acre. After the proposed salvage harvest, approximately 3,920 acres of forest with larger diameter western larch and Douglas fir would remain intact (unaffected by any past or proposed harvesting) within the Wedge Fire area. This represents 35% of this forest type that was originally in the area in the 1940s, or 18% of the total fire area.

A large portion of the Wedge Fire is in an Inventoried Roadless Area, which includes most of the Trail Creek watershed. It is also within MA11, which is grizzly bear habitat. This area would not be directly affected by the proposed salvage harvest. Table 65 illustrates that there is approximately 15,163 acres within the Wedge Fire area that is outside of the Inventoried Roadless Area. This area (south of Trail Creek) is the area that would most directly be affected by the salvage harvest. Prior to management, which began in the 1940's, approximately 9,886 acres or 65% of this area outside Trail Creek is estimated to have had moderate to high numbers of larger western larch and/or Douglas fir trees (more than 4 trees per acre that were greater than 17 inches DBH). Approximately 54% (5,349 acres) of this western larch and Douglas fir forest was harvested and the large trees removed between the 1940's and 2001. This left about 4,537 acres of forest containing larger diameter western larch and Douglas fir within the area by 2002, prior to the 2003 Wedge Fire. The approximately 1,646 acres of large western larch and Douglas fir proposed for salvage harvest is about 36% of the remaining 4,537 acres. This would leave approximately 2,849 acres of the larger diameter larch/Douglas-fir forest intact (unaffected by past or proposed harvest), or about 29% of the original amount that existed prior to forest management (1940).

When the snag emphasis prescription is incorporated and unharvested patches retained, approximately 313 acres of additional larger larch and Douglas-fir forest would be left intact, within the fire area. This would increase the large diameter larch and Douglas fir left in the area outside Trail Creek to approximately 3,162 acres. This represents 32% if the original amount prior to 1940 and 70% of the amount of the amount existing prior to the Wedge Fire.

Approximately 69% of the available larger diameter larch and Douglas fir that existed immediately prior to the fire would be left. This figure may appear high however, one must consider that approximately 54% of what was available in 1940 was harvested previously and no longer has standing or down wood available. That 54% has minimal to no value to snag dependent wildlife species and other resources dependent on larger decaying matter. Retaining the reserve patches leaves 32% of what was available prior to management that began around 1940.

With the removal of 54% of large diameter western larch and Douglas fir trees available in the Wedge Fire outside of the Trail Creek area prior to the fire and the potential of the proposal to remove an additional 36% of what is left through fire salvage, it is important to retain not only the larger diameter western larch and Douglas fir snags but also adequate amounts of reserve patches. In the Wedge Fire area in general the proposed salvage units tend to be slightly less clumped together than the Robert Fire, however there are still areas of large contiguous proposed harvest areas. Directly adjacent to harvest "cluster" areas are stands that were harvested prior to the fire. Due to the juxtapositioning of the proposed salvage harvest units and the reduced numbers of large diameter snags outside the units,

leaving 25% of the high snag emphasis units in reserve patches and 15% of the moderate snag emphasis units in reserve patches is warranted.

Although the Wedge Fire does not have as many proposed contiguous salvage harvest units as the Robert Fire, the proposed units for the most part are where the large trees are located and most of the area outside the units have no larch or Douglas-fir trees over 17 inches DBH or relatively low numbers (between 1 and 3 trees per acre) over 17 inches DBH. The portion of the Trail Creek that is not proposed for fire salvage contains approximately 6,370 acres of that, a total of approximately 5,300 acres (83%) have no snags larger than 17 inches DBH. Although these snags are not commercially valuable these area will be extremely important for black-backed woodpeckers.

Of the 2,731 acres proposed for salvage harvest (includes all snag sizes and tree species), approximately 2,228 (82%) would actually be harvested when the snag emphasis level for each specific unit is incorporated. A total of approximately 503 acres (18%) would be retained in reserve patches for wildlife. The largest unit in the Wedge Fire that has a high snag emphasis level is approximately 341 acres. With the reserve patch retention this unit will salvage harvest approximately 256 acres and retain approximately 85 acres in reserve patches. The smallest unit with a high snag emphasis level is approximately 2 acres. This unit would retain approximately .2 acres in a reserve patch and harvest 1.8 acres.

Cumulative Effects of Both Alternatives for the Robert and Wedge Fire Areas

Throughout the Interior Columbia River Basin, densities of large-diameter snags (>21 inch DBH) have been reduced in roaded areas with a history of timber sales ([Hann et al. 1997](#), [Hessburg et al. 1999](#), [Quigley et al. 1996](#)). Fire suppression efforts, salvage of fire-killed or insect-infested trees, beetle control efforts, firewood harvest, and prior harvest of extensive areas of dead and dying lodgepole pine and fire-killed trees have reduced the habitat potential for species that rely on dead and down wood in northwest Montana ([Harris 1999](#)). Until the Moose Fire in 2001, very few fires have occurred in the vicinity of either fire analysis area since 1926. Besides the Robert Fire and the Wedge Fire, the Red Bench (1988) and the Moose Fire (2001) were the only fires in this area that burned over 200 acres since 1926. The Moose Fire increased the number of snags within the vicinity of both fires substantially.

Across the Flathead National Forest, wildfires, insects, disease, and other natural processes have created innumerable snags and down logs. Although some snags have been salvaged, others were left within and between cutting units. An extensive amount of dead trees still occur in wilderness and other areas that are not in the timber base. The analysis for Flathead National Forest's Forest Plan Amendment 21 individually assessed the viability of old growth associated species and many others that use snags and down wood habitat ([USDA FS 1999a](#)).

Past timber harvest and roading on Federal, State, and private lands within the drainages associated with the Robert Fire (Big Creek and Canyon) and Wedge Fire (Tepee, Trail and Whale) areas reduced the acreage of potential dense snag habitat that could have been created by both fires. Proposed and ongoing salvage, prescribed burn projects, and firewood cutting are expected to reduce this further. On the State land in the Wedge Fire perimeter, salvage logging is planned. Open roads continue to provide access for firewood cutters, decreasing snags, although the chance of firewood collection is greatly reduced when roads are bermed or decommissioned. The cumulative effects area includes about 39,630 acres burned by the Robert Fire and about 30,317 acres burned by the Wedge Fire in Glacier National Park, where timber salvage and firewood cutting is precluded.

Other actions have or are expected to directly affect snag habitat. Fire suppression efforts in 2003 for the both the Robert Fire and Wedge Fire affected snag and down wood habitat through fireline construction. In addition, hazard tree felling along open roads in 2003 reduced snag numbers. A Larch Heart Rot Study plans to take up to 100 snags in various size classes throughout both the Robert and Wedge Fire areas during the field seasons of 2004 and 2005. About 50 snags 20 inches DHB or greater will be taken across both fire areas. These snags will not be taken in any proposed salvage harvest units and will be taken in close proximity to roads. Individual snags will be taken in separate areas dispersed throughout both fire areas so the study is not expected to measurably impact snag numbers across the either fire landscape.

Insects and diseases would continue, sometimes modifying stand conditions drastically. The potential of bark beetle-caused mortality in stands outside the burn perimeter may result in further actions in the future. It is unknown to what extent this would occur.

Some actions would have minor or negligible effects on snags and down wood habitat. These include pre-commercial thinning, tree and shrub planting, Christmas tree harvesting, noxious weed treatment, and periodic maintenance of fuel reduction zones. Road maintenance and the construction and maintenance of trails would cause some hazard trees to be felled and fallen trees to be cleared from travel ways.

As the new post-fire forests mature and age, the remaining large snags and down logs in salvage units and across the landscape would again make the Moose Fire area highly suitable for pileated woodpeckers, brown creepers, northern flying squirrels, southern red-backed voles, and many of the other species identified as old-growth associates (*Flathead Forest Plan Amendment 21*, USDA FS 1999a; Warren 1998).

Regional and Forest Scale Assessment

The effect of the Action Alternative on snag-dependent species at larger scales can be considered by evaluating: 1) the management standards applied to old growth forest stands that have the highest density of large diameter snags, and/or the highest potential to produce large snags in the event of a wildfire or other natural process; and 2) the comparison of un-salvaged burns against the historic average, assuming that wildfires are the major process that recruits snags.

At the Flathead National Forest scale, Amendment 21 (USDA FS 1999) provides direction for the management of old growth forests. Key elements of that direction include: 1) treatments within old growth forests are limited to those that “*maintain or restore* old growth composition and structure, consistent with native succession and disturbance regimes”; 2) “*provide an amount* (of old growth forest) that is within the 75% range around the median of the historical range of variability”; and 3) manage for natural patterns, processes, snags and coarse, woody debris. Since old growth forests provide the best opportunities for snag recruitment, Amendment 21 suggests that there is excellent potential for long-term recruitment of snag habitat for snag-dependent species, consistent with historic conditions at the Forest scale.

At the Flathead National Forest scale, fires from 1995 through 2001 within stands greater than 9” (trees large enough to provide a potentially-suitable snag) occurred at 125.5% of the average historic conditions (Hillis *et al* 2002b). Looking just the North Fork Flathead 4th Code Hydrologic Unit, fires within the within the same timeframe, within stands greater than 9” occurred at 230% of average historic conditions. The Robert and Wedge Fires substantially increased that average even more.

Regulatory Framework and Consistency

Pursuant to the National Forest Management Act, national forests must maintain habitat for viable populations of all native plant and animal species occurring in the planning area. A wide variety of wildlife species are dependent on the existence of standing snags and down woody material. The Flathead's Forest Plan Amendment 21 (USDA FS 1999a) provides the current direction for snags and down wood material. Sufficient vegetation structure is to be retained, including large diameter trees in timber harvest areas other than personal-use firewood permits. To comply with Amendment 21, the retention amount must be consistent with native disturbance and succession regimes and provide for long-term snag and coarse woody debris recruitment, essential soil processes, species habitat (including feeding and dispersal habitat for small mammals and birds), and long-term structural diversity of forest stands. The numerical standards offered in Amendment 21 do not apply when a site-specific landscape analysis has been used to derive retention levels for this standard. A site-specific analysis was conducted for snag retention for both the Robert Fire and Wedge Fire areas. Amendment 21 standards were followed for down wood in both fire areas.

Additional standards in Amendment 21 include managing for wildlife dependent on old growth. Both fires burned up the old growth habitat within both fire areas. The lose of this habitat due to wildfire precludes the management of existing old growth in both fire areas, however adequate levels of legacy structure would be provided under both the No Action and Action Alternative.

A site-specific analysis of snags was done for Robert and Wedge Post-Fire Project in accordance with Amendment 21 of the forest plan. Therefore, the minimum numerical standards for snags offered in Appendix A (page 27) of Amendment 21 do not apply to this project. Site-specific prescriptions for snags are given in Chapter 2 of this document. Features common to the Action Alternative contribute to snag and down wood habitat conditions at the landscape scale. These include retention of all material in Riparian Habitat Conservation Areas and contiguous unroaded areas, signing of high-quality snags along roads, and log-length skidding. In consideration of all direct, indirect, and cumulative effects described above, the Action Alternative complies fully with Amendment 21 of the Flathead National Forest's forest plan. Both 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..

3.4 THREATENED AND ENDANGERED TERRESTRIAL WILDLIFE SPECIES

3.4.1 Introduction

This section discusses the existing condition of habitats and the analysis areas for threatened and endangered species found in the two project areas. This report also describes the effects of the proposed action and no action on habitats for these species.

Table 66. Threatened and Endangered Species in the North Fork

Species	Scientific name	Status	Occurrence
Grizzly bear	<i>Ursus arctos horribilus</i>	Threatened	Resident

Species	Scientific name	Status	Occurrence
Gray wolf	<i>Canis lupus</i>	Endangered	Resident
Canada lynx	<i>Lynx canadensis</i>	Threatened	Resident
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	Resident

Field Surveys/Resource Contacts

Post-fire field reviews were done in the fall of 2003. Where previous field surveys have been done for threatened and endangered species, results have been included and referenced. Resource contacts were made with Henry Rivera, Hungry Horse/Glacier View District Wildlife Biologist; and Tim Thier MFWP Wildlife Biologist.

Forest Plan Direction/Other Direction

The Robert Fire project area lies in several Forest Plan Management Areas. Less than 1% of the project area is in MA 9. MA 9 consists of timberlands capable of providing white-tailed deer winter habitat. Timber harvest can be used to improve or maintain the optimum relationships of cover to forage. Specific standards include retention of thermal cover, and size and regeneration of units. There are no proposed activities in MA9.

The Wedge Canyon Fire project area lies in several Forest Plan Management Areas. Management Area 11 is about 32% of the project area. MA 11 consists of lands providing good grizzly bear habitat which consists of natural, relatively open, undisturbed (by humans) areas with good cover and an abundance of perennial succulent herbs and/or fruit-bearing shrubs. The Trail Creek Grizzly BMA (MA 11) consists of about 69,812 acres. Goals for this area are to maintain and enhance habitat, and to manage habitat of approximately 40% security cover and about 60% open. These lands are classified as unsuitable for timber management, but harvest may be used to improve or maintain proper cover and forage ratios, or to provide a sustained yield of grizzly bear habitat components. Management of resources must be compatible with grizzly bear management objectives. Proposed units that were located in MA11 in the initial proposed action were dropped based on resource concerns and public comments.

In 1995, Amendment 19 was approved and included forest-wide objectives for grizzly bears for open motorized access, total motorized access and security core areas. The specific objectives are to 1) limit high density (> 1 mile/square mile) open motorized access to no more than 19% of a BMU Subunit within 5 years; 2) limit high density (> 2 miles/square mile) total motorized access to no more than 24% of a BMU Subunit in 5 years, and no more than 19% in 10 years; and 3) provide security core areas that equal or exceed 60% of each BMU Subunit in 5 years and 68% in 10 years. These objectives are for subunits with more than 75 percent National Forest System lands. Subunits with less than 75% NFS lands have an objective of “no net loss”.

3.4.2 Affected Environment

Overview

Grizzly Bear

The project area is within the Northern Continental Divide Grizzly Bear Ecosystem (NCDE) and has been designated in the Flathead Forest Plan as Management Zone 1 (an area needed for the survival and recovery of the species, where management actions would favor the needs of the survival and recovery of the grizzly bear).

The analyses of direct and indirect effects were done at two spatial scales. Bear Management Areas (BMA) are areas that range between 5,000 to 15,000 acres in size and are used for site-specific direct and indirect effects and for determining consistency with Forest Plan standards. Subunits are areas that approximate the size of a female home range (about 30-50 sq mi) and are used for implementing Amendment 19 motorized access/security core objectives and for cumulative effects.

Data used in the analysis were from existing information sources, research literature, post-fire aerial photos and field reviews. Data layers from geographical information systems (GIS) were used for quantification of habitat characteristics. ArcView GIS was used to quantify various habitat characteristics.

Grizzly bear ecology in the Swan Mountains was studied between 1987 and 1996 (Mace and Waller 1997). During the spring, avalanche chutes were used more than they were available, by both sexes. In these areas they were using herbaceous forage adjacent to riparian areas, plus the visual security and temperature moderation provided by dense alder. During the summer and fall, avalanche chutes, slabrock, cuts, and shrublands were used more than predicted based on availability. In the slabrock areas they forage on plants like spring beauty, glacier lily and biscuitroot. The shrublands (created by cutting or fires) provide berries on globe huckleberry, mountain ash and serviceberry. Other important seasonal habitats include riparian vegetation, including dense spruce stands, along the North Fork and major tributaries, and patches of berry-producing shrubs, including huckleberry, widely-dispersed throughout the area. Grizzlies also make opportunistic use of available ungulate carrion or live animals, especially deer fawns or calves of elk or moose. Fish apparently form little if any of the diet of grizzly bears in this area.

Denning habitat is characterized by steep, relatively inaccessible slopes at high elevations (Mace and Waller 1997). In their study area, mean den entry and exit dates were November 5 and April 11. Females generally denned earlier and left later. Modeled denning habitat on the Forest is over 5,900 feet elevation and over 45 percent slope.

The moderate and high severity burned portions of the wildfire areas will be at the beginning of the “forest life cycle” and grizzly bears would use whatever forage and cover resources that are available. There has not been much research documenting grizzly bear response to and use of post-fire habitats; but what has been used for this analysis is the best available science. Data collected from radio-collared bears from 1989 to 1992, following the 1988 wildfires in Yellowstone showed that bears tended to avoid burned sites during 1989, but not during subsequent years. Based on their research, bears used burned habitats in proportion to their availability within their ranges after the first year (Blanchard and Knight 1993). Rates of movement were lower than those recorded prior to the fires, indicated adequate native food supplies (Blanchard and Knight 1996). The 1988 fires had no apparent harmful short-term affects on Yellowstone grizzly bears, and were likely beneficial, largely due to increased

production of grizzly bear diet items such as forbs and tuberous root crops (Blanchard and Knight 1993).

It should be expected that bears would continue to use the area and find whatever forage resources are available to them. It is unlikely that bears would abandon their home ranges unless they were displaced due to excessive human disturbance. There may be some predictable shifts in seasonal habitat use in response to available food resources. For example, bears may spend more time in or near ungulate winter ranges seeking out winter kill; and they may spend considerable time on the southerly aspects and riparian areas because these areas should be providing relatively high spring range values, especially during the first few years post-fire. During summer, habitat values may be relatively low as berry producing shrubs may take a few years to recover. Bears may concentrate their use into unburned forests that have high densities of huckleberries and other berry-producing shrubs.

Motorized access was recognized by the Forest Plan in 1986 as a major factor affecting grizzly bear habitat security and has been confirmed by research conducted in the Swan Mountains of Montana (Mace and Waller 1997). Other studies have also found that grizzlies tend to avoid open roads (Mace *et al.* 1996, Wielgus *et al.* 2002, Kasworm and Manley 1990). Zager (1980) found that road management and distance to cover were more important in determining grizzly use patterns than availability of food.

Amendment 19 (1995) to the Forest Plan addresses habitat security. Amendment 19 includes forest-wide objectives for grizzly bears for open motorized access, total motorized access and security core areas. The specific objectives are to 1) limit high density (> 1 mile/square mile) open motorized access to no more than 19% of a BMU Subunit within 5 years; 2) limit high density (> 2 miles/square mile) total motorized access to no more than 24% of a BMU Subunit in 5 years, and no more than 19% in 10 years; and 3) provide security core areas that equal or exceed 60% of each BMU Subunit in 5 years and 68% in 10 years.

The effects indicators used to focus the grizzly bear analysis and disclose relevant environmental effects include 1) whether Forest Plan management direction would be met; 2) the potential loss of habitat values associated with removal of dead trees and 3) effects of timing of project activities and associated disturbance.

Gray Wolf

The analysis areas used for wolves are the BMU subunits. These were used because 1) like grizzly bears, wolves have large home ranges; and 2) there are no formally recognized analysis areas for wolves. These subunits were determined to be an appropriate scale for analyzing effects because they encompass seasonal and year-round habitats of ungulate prey species.

Data used in the analysis were from existing information sources, research literature, post-fire aerial photos and field reviews. Data layers from geographical information systems (GIS) were used for quantification of habitat characteristics.

The project areas are within habitat that has been designated in the Flathead Forest Plan as Management Zone 1 (contains key habitat components in sufficient abundance and distribution on an annual basis to sustain a viable wolf population) and is in the Northwest Montana Recovery Area.

The first documented wolf den in Glacier National Park in 50 years was found in the North Fork in 1986. In response to an abundant prey base, wolf numbers increased until the mid-1990's. During the winter of 1996-7 a combination of severe weather, hunter harvest, and predation by wolves, mountain lions and other predators accelerated a decline in deer and elk

numbers by significantly reducing the ungulate prey base (Gniadek and Waller, 2003). The three North Fork wolf packs were reduced to one. Subsequent gradual increases in white-tailed deer and elk numbers has resulted in a slow increase in wolf numbers, though disease and human-caused mortality have slowed this increase.

One study that included the North Fork found that 80% of wolf mortalities were caused by humans and wolves killed by humans died closer to roads than wolves that died from other causes (Boyd and Pletscher, 1999).

Table 67 shows the number of packs that have used part of the greater North Fork area over the last few years. Some of the variation is due to changes in distribution on a yearly basis (Grave Creek pack) rather than decreases in pack numbers.

Table 67. North Fork wolf packs (USFWS et al, 1999 to 2003)

Year	Number of packs	Number of wolves	Natural Mortality	Human caused mortality	Unknown mortality
1999	3	17	1	0	0
2000	4	17	0	2	2
2001	3	14	0	1	1
2002	2	12	1	1	0
2003	2	11	0	0	0

White-tailed deer make up the greatest proportion of the wolf diet (83%) in the North Fork, followed by elk and moose (Kunkel 1997); mule deer and smaller mammals or birds may be preyed upon opportunistically throughout the year.

Ungulate distribution and density affects wolf distribution. However, other physical habitat attributes can also be used to predict wolf presence. Boyd-Herger (1997) found that wolves appeared to select for landscapes with relatively lower elevation, flatter terrain and closer to water and roads at both smaller and larger scales in the central Rocky Mountains. She found that wolves selected for roads (unpaved or low standard roads with low traffic volumes) but there was an increased chance of human-caused mortality with road use.

The existing status of elk/mule deer and white-tailed deer habitat as well as motorized access/habitat security for grizzly bear should be considered the baseline for wolf habitat. In general, the existing condition of ungulate habitat is one of lowered habitat capability because of lack of forage and cover as a result of wildfire.

The effects indicators used to focus the gray wolf analysis and disclose relevant environmental effects were 1) the effect on ungulate habitat; and 2) the change in habitat security.

Canada Lynx

The analysis area for lynx is the Lynx Analysis Unit (LAU). LAU's were mapped on the Forest in 2000 and approximate the size of an area used by an individual lynx (USFS 2000). These LAU's include preferred habitat, as well as non-habitat. Habitat was mapped, considering habitat types, winter snow depths and elevation. Non-habitat includes dry forest habitat types, areas with less than 24-30 inches of snow (roughly 3700' elevation), high elevation habitat types on specific sites and other sites (permanent water, permanent non-forest vegetation, rock and human development).

Primary lynx habitat in the Rocky Mountains and on the Flathead National Forest includes lodgepole pine, subalpine fir and Engelmann spruce (Ruediger et al, 2000). Secondary vegetation interspersed within subalpine forests; including cool, moist Douglas-fir, grand fir, western larch and aspen, may also contribute to lynx habitat. Moist Douglas-fir types are considered secondary habitat that can provide red squirrels, an alternate prey species for lynx during periods when snowshoe hare (primary lynx species) densities are low.

Lynx seem to prefer to move through continuous forest, and frequently use ridges, saddles, and riparian areas. Although cover is important, lynx often hunt along edges (in Ruediger et al, 2000, pg. 1-4).

The status and trend of lynx in the Flathead National Forest is not known. Track surveys along the North Fork road in the winters of 2000-01 and 2001-02 documented lynx to the north of Polebridge, but none south of Polebridge (Edmonds *et al.* 2002). Track surveys during the winter of 2002-03 to the north of Coal Creek documented tracks (63 sets) of lynx in all the drainages surveyed, as well as several observations of lynx (Edmonds *et al.* 2003). Winter track surveys in 2002-3 detected only three sets of tracks on the east side of the North Fork (Edmonds *et al.* 2003) while the remainder were on the west side, lands managed primarily by the Flathead National Forest. They propose three possible reasons for the increased activity on the west side of the North Fork; 1) habitat on the Forest may support higher densities of snowshoe hares because of its diverse age and structure of the forest; 2) the availability of compacted travel routes; and 3) avoidance of wolves, which may make greater use of Glacier National Park. The majority of these observations were from the Trail Creek, Whale Creek and Tepee Creek drainages.

The effects indicator was used to focus the lynx analysis and disclose relevant environmental effects (based on Conservation Measures in Lynx Conservation Assessment and Strategy, Ruediger *et al.* 2000) in the event of a large wildfire, conduct a post-disturbance assessment prior to salvage to evaluate potential for lynx denning and foraging habitat. This post-disturbance assessment was then used as a baseline to analyze effects of salvage on lynx habitat.

The following effects indicators were used to focus the lynx analysis and disclose relevant environmental effects (based on Conservation Measures in Lynx Conservation Assessment and Strategy, Ruediger *et al.* 2000): 1) identify potential denning, and foraging habitat (snowshoe hares and red squirrels) and topographic features that may be important for lynx movements (major ridge systems, prominent saddles and riparian corridors); and 2) in the event of a large wildfire, conduct a post-disturbance assessment prior to salvage to evaluate potential for lynx denning and foraging habitat.

Other Conservation Measures were considered for use; 1) maintain denning habitat in patches larger than 5 acres, comprising at least 10% of lynx habitat. Where less than 10% is present, defer actions that would delay development of denning habitat structure; 2) management actions shall not change more than 15% of lynx habitat within an LAU to an unsuitable condition within a 10-year period; and 3) following a disturbance, do not salvage harvest when the affected area is smaller than five acres. However, these are not relevant as the wildfires are what affected habitat within the LAU. Current denning habitat is not proposed for harvest, management actions will focus on currently unsuitable habitat and because of the scale of the wildfires, the last is not relevant.

Bald Eagle

The analysis area for direct and indirect effects on bald eagles is the North Fork of the Flathead River corridor within the fire perimeters. For cumulative effects, project areas were

used as these areas include all of the proposed salvage and associated activities. Two bald eagle nest sites are found between these two fire areas. One is around Cyclone Lake (Forest GIS coverage) and the other, the North Fork nest, was within the Moose Fire perimeter but was not affected by the fire (Moose FEIS, pg 3-139).

Data used in the analysis were from existing information sources, research literature, post-fire aerial photos and field reviews. Data layers from geographical information systems (GIS) were used for quantification of habitat characteristics.

The Montana Bald Eagle Management Plan (MBEWG 1994) provides direction for management around nest sites; the nest site area; primary use area (1/4 to 1/2 mile from the nest); and the home range (1/2 to 2 miles from the nest). The Forest Plan prohibits disturbance-causing activities such as road construction and logging within one half mile of active bald eagle nests during the nesting period from February 1 to August 1.

Bald eagle numbers vary by season and include breeding, migration and wintering populations. The breeding season begins in late February or March, with juveniles fledging between mid-July and early September. They generally leave the nest area between late August and late September. Migration generally peaks during March-April in the spring, and October-November in the fall (Gniadek and Waller, 2003).

The main food source for bald eagles during the breeding season is fish, therefore habitat of most importance during this period are areas near large bodies of water and major river systems. They use large diameter, mature trees and snags for perching/foraging, nesting and resting/roosting. Summer foraging habitat requirements include perch sites and unobstructed flight paths to the river. The emphasis is to maintain perch trees within 300 feet of the river.

During the fall and winter, opportunistic foraging in upland habitats may occur, taking advantage of hunter kills of big game and winter mortality of ungulates.

The Moose (2001), Red Bench (1988), Robert and Wedge Canyon wildfires have impacted bald eagle habitat along the North Fork over the last 15 years. There are over 40 miles of river from junction with Middle Fork to Canadian border. About half of this has been affected by wildfire to varying degrees. The Moose wildfire burned at high severity above the North Fork road but became more of a mixed (high and low) severity between the North Fork River and road. The Moose wildfire burned in the vicinity of a nest, but it had no apparent effect on the nest site (USFS 2002).

Human use on the North Fork of the Flathead occurs yearround. This includes road traffic, residential use, and recreational use in the river corridor (recreational cabins, camping, fishing, and floating)

The effects indicators used to focus the bald eagle analysis and disclose relevant environmental effects will be the amount of habitat alteration within the habitat zone adjacent to the North Fork Flathead River. Other factors were considered (the probability that management activity would disturb nesting bald eagles and adherence to Montana Bald Eagle Management Plan nest territory guidelines) but there are no nest territories that would be affected by any project activities.

Robert Fire

Grizzly Bear

Very little of the Robert fire occurred in denning habitat, and almost all of the National Forest portion is over 2000 meters from modeled denning habitat (GIS denning layer). One small

area at the extreme northeastern edge of the fire perimeter is within 2,000 meters from modeled grizzly bear denning habitat.

Other seasonal habitat components affected by Robert fire include riparian vegetation, especially dense spruce stands (about 2,111 acres of moderate and high severity fire in RHCA's), and patches of berry-producing shrubs, especially huckleberry, widely-dispersed throughout the area. About 33% of the length of the riparian in the two subunits was burned at moderate or high severity. In addition, there was about an 8,000 acre increase in grass/forb that will provide spring foraging habitat at the lower elevations.

Two radio-collared bears were using the Robert fire area during 2002, and employee sightings were documented in the fire perimeter in 2002 (pre-fire). Bears are expected to be using the fire area, with forage conditions dependent on moisture levels and burn severity. Spring foraging opportunities will improve during the first few years post-fire. Berry production will begin making a significant contribution to grizzly bears within 5-20 years (in areas burned with a light or moderate vegetation severity) and persisting as an important food source for 30-40 years (Gniadek and Waller 2003). Studies have found that in areas burned with a high (and some moderate) severity, it may take 25-70 years (Martin 1979 and Zager 1980) to provide summer foraging habitat for grizzly bears. Over the short-term there will be a shortage of summer food sources in proportion to acres that burned at high (or moderate) severity.

BMA Characterization

The Robert fire burned portions of four BMA's to varying severity levels (Table 68).

Table 68. Fire Severity levels of forested stands within BMA's

BMA	Total Acres	% of area burned	High severity	Moderate severity	Low severity	Unburned within perimeter
McGinniss	12,619	90%	5,623	2,540	3,223	14
Crystal	10,390	9%	504	216	231	0
Kimberly	4,980	15%	396	240	122	0
Lower Big	7,848	2%	84	2	73	0

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

Table 69 shows the percent of the BMA's that could be providing cover. As shown in the above table, each of the BMA's burned to varying degrees of fire severity. Areas that burned at moderate or high severity were assumed to be moved to a "non-cover" status. It was assumed that the low category probably contains enough understory vegetation to still function as security cover.

Table 69. Amount of the BMA that was affected by moderate or high fire severity.

BMA	Acres that burned at moderate or high vegetation severity	Percent that burned at moderate or high vegetation severity
McGinniss	8,163	65%
Crystal	720	7%
Kimmerly	636	13%
Lower Big	86	1%

Forest Plan guidelines applicable at the BMA scale deal with cover, security areas/disturbance and habitat diversity. These guidelines were originally developed for harvest of green trees where it was possible to manage for percent cover, distance to cover and habitat diversity. These three guidelines were affected by the wildfire and are not directly applicable to salvage of trees burned by wildfire. However, the security area and activity guidelines are still applicable and will be analyzed further in the effects section.

Aspect, elevation, burn-severity, pre-fire vegetation and habitat security will determine when bears resume using the area. Based on studies in Yellowstone, bears would tend to avoid, but still use burned areas in the summer of 2004, but by 2005 use in burned habitats would be in proportion to their availability.

There is no salvage proposed in the Lower Big BMA and it will not be carried forward into effects analysis.

Subunit Characterization

The Robert fire occurred within the Lower North Fork BMU and impacted three subunits on the Flathead.

Table 70. Robert fire severity by subunit.

Subunit	Total Acres	% of area burned	High severity	Moderate severity	Low severity	Unburned
Canyon-McGinniss	33,238	37%	49%	23%	27%	<1%
Cedar Teakettle	31,738	3%	53%	23%	24%	0
Lower Big	30,375	<1%				

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

Amendment 19

Total and open motorized access densities and percent security core areas by subunit are displayed in Table 71 below. Canyon-McGinnis and Lower Big subunits are currently not meeting objectives for open motorized access, total motorized access or security core areas (except that Lower Big is meeting OMD). However, once actions from the Moose Decision are fully implemented (expected by 2009), Lower Big would meet these objectives, as shown below, by the numbers in parentheses. The Cedar-Teakettle subunit is less than 75% National Forest System lands, and the objective is no net loss.

Table 71. Existing Condition

Subunit	Open motorized access density	Total motorized access density	Security core
Amendment 19 objectives at 10 yrs	19	19	68
Canyon-McGinnis	22	42 (41)	31 (38)
Cedar-Teakettle	26	20	20
Lower Big	19	33 (19)	56 (68)

1) limit high density (>1 mi/mi²) open motorized access to no more than 19% of a BMU subunit within 5 years; 2) limit high density (>2 mi/mi²) total motorized access to no more than 24% of a BMU subunit in 5 years, and no more than 19% in 10 years; and 3) provide security core areas that equal or exceed 60% of each BMU subunit in 5 years, and 68% in 10 years.

Gray Wolf

The analysis area used for wolves is the Canyon-McGinnis subunit. Only very small portions of two other subunits (Cedar-Teakettle and Lower Big) were affected by the Robert fire and are not analyzed here. See Table 70 for information on fire severity for the Canyon-McGinnis subunit.

There is one wolf pack known to use the general vicinity of the Robert fire. The Whitefish pack ranges roughly from Polebridge south to Camas Creek in the North Fork Flathead River valley. They denned in the Big Creek drainage in 1999, but denned in Glacier National Park in 2000, 2001 and 2002 and in 2002 produced at least four pups. In the fall of 2003, the pack consisted of 4 adults, 2 yearlings and an unknown number of pups (Gniadek and Waller,

1 Security core area is an area at least 0.3 miles from open roads and high intensity non-motorized trails. Restricted roads may occur within the security core area, provided they have substantial immobile closure devices and legal closure to motorized use during the non-denning period.

2003). In December 2003, FWS reports the pack consisting of 3 adults and 5 pups (USFWS et al, 2004). Based on their work, the home range for this pack is largely in GNP. The Flathead portion of the Robert fire perimeter does not overlap this packs home range.

Flathead National Forest GIS maps of MA9 and MA13 show limited areas of big game winter ranges within the Robert fire. None of the Robert fire is in elk and mule deer winter range (MA13) management area but there is a small area on the extreme northeast edge of the fire that is in MA 9 (Big Creek Whitetail deer winter range).

Prior to the Moose and Robert fire, this subunit had dense vegetation. Most of the Robert fire is within 1 mile of potential denning habitat as mapped on Forest GIS layers (<4100' elevation and slopes <20%).

Canada Lynx

The Robert fire burned the east side of the Canyon LAU. This LAU is 28,168 acres in size. Approximately 12,685 acres of the Canyon LAU were affected by Robert Fire. There are small areas of two other LAU's that burned as well (Teakettle and Lower Big).

It is assumed that moderate and high severity fires created currently unsuitable habitat for lynx by killing most live trees. Low severity fires removed some understory cover but remaining vegetation continues to provide some overhead cover and features favored by red squirrels and snowshoe hares.

Table 72. Robert fire severity by LAU

LAU	Total Acres	% of area burned	High severity	Moderate severity	Low severity	Unburned
Canyon	28,168	45%	6,288	2,908	3,476	14
Teakettle	31,175	<1%	237	87	100	0
Lower Big	23,950	1%	83	2	74	0

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

Table 73 displays the existing condition for the Canyon LAU. Because less than 1% of the other two LAU's were affected, and proposed salvage is less than this, effects are minor and will be discussed qualitatively in the effects section. This table displays conditions both inside and outside of the fire perimeter.

Table 73. Post-fire Lynx Habitat within the Canyon LAU*.

LAU	Outside the fire perimeter				
	Non-habitat	Currently unsuitable	Foraging	Foraging and denning	Travel Habitat
Canyon (25,979)	110 (<1%)	245 (<1%)	2,626 (10%)	8,602 (33%)	1,697 (6%)

LAU	Inside the fire perimeter				
	Non-habitat	Currently unsuitable	Foraging	Foraging and denning	Travel Habitat
Canyon (25,979)	64 (<1%)	9,185 (35%)	913 (3%)	767 (3%)	1,746 (7%)

***assumptions used to categorize lynx habitat is found in Appendix B**

** 25,979 acres used as there are 2,180 acres of unclassified vegetation classes

In summary, the Canyon LAU is currently unsuitable over 36% of the area, with around 49% potential foraging habitat, about 13% travel habitat and about 36% potential denning habitat. Most of the potential foraging and denning habitat occurs outside of the fire perimeter. Currently unsuitable areas within the fire perimeter are expected to receive more use after 10 to 15 years when shrubs and small trees become reestablished and provide cover and foraging habitat.

Bald Eagle

The Robert fire burned an area around the Lake McDonald bald eagle nest, in Glacier National Park, but no other bald eagle nest sites were affected (Gniadek and Waller, 2003). That nest area is over 5 miles from the project area and no effects to this nest territory would be expected.

There is one nest along the North Fork that was within the Moose Fire perimeter (North Fork nest). This nest area is over 4 miles to the north of the Robert Fire, and would not be affected by project activities. Further analysis will focus on salvage harvest and activities along the North Fork River corridor.

Wedge Fire

Grizzly Bear

Very little of the Wedge fire affected grizzly bear denning habitat, but the extreme western points are within 2,000m of mapped potential denning habitat (GIS denning layer).

Other seasonal habitat components affected by Robert fire include riparian vegetation, especially dense spruce stands (2,842 acres of moderate and high severity fire burned in RHCA’s), and patches of berry-producing shrubs, especially huckleberry, widely-dispersed throughout the area. About 34% of the length of riparian areas within the four subunits was burned at moderate or high severity. In addition, there was about a 15,000 acre increase in grass/forb that will provide spring foraging habitat at the lower elevations.

No radio-collared bears were relocated in the Wedge fire area during 2002 or 2003, however there were numerous sightings reported. Bears are expected to be using the fire area, with forage conditions dependent on moisture levels and burn severity. Spring and summer foraging opportunities will improve during the first few years post-fire. Berry production will begin making a significant contribution to grizzly bears within 5-20 years (in areas burned with a light or moderate vegetation severity) and persisting as an important food source for 30-40 years (Gniadek and Waller 2003). Studies have found that in areas burned with a high (and some moderate) severity, it may take 25-70 years (Martin 1979 and Zager 1980) to provide summer foraging habitat for grizzly bears. Over the short-term there will be a shortage of summer food sources in proportion to acres that burned at high (or moderate) severity.

BMA Characterization

The Wedge fire burned portions of seven BMA's but Ketchikan burned <1% of the area and won't be analyzed further.

Table 74. Fire Severity Levels of Forested Stands within Affected BMA's

BMA	Total Acres	% of area burned	High severity	Moderate severity	Low severity	Unburned within perimeter
Upper Trail	15,582	24%	2,429	968	350	0
Lower Trail	8,538	60%	1,610	936	2,628	0
Tepee	5,708	81%	2,640	981	1,027	0
Mid Whale	9,016	9%	400	390	59	0
Whale Buttes	9,722	44%	2,289	991	969	0
Tepee Lake	6,173	87%	2,961	1,477	748	222

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

Table 75 shows the percent of the BMA's that could be providing cover. As shown in the above table, each of the BMA's burned to varying degrees of fire severity. Areas that burned at moderate or high severity were assumed to be moved to a "non-cover" status. It was assumed that the low category probably contains enough understory vegetation to still function as security cover.

Table 75. Amount of the BMA that was affected by moderate or high fire severity.

BMA	Acres that burned at moderate or high vegetation severity	Percent that at moderate or high vegetation severity
Upper Trail	3,397	22
Lower Trail	2,546	30
Tepee	3,621	63
Mid Whale	790	9
Whale Buttes	3,280	34
Tepee Lake	4,438	72

The Upper Trail BMA does not have any proposed salvage, and this BMA will not be carried forward into the effects section. Lower Trail BMA has only one unit in it (unit 123).

Forest Plan guidelines applicable at the BMA scale deal with cover, security areas/disturbance and habitat diversity. These guidelines were originally developed for harvest of green trees where it was possible to manage for percent cover, distance to cover and habitat diversity. These three guidelines were affected by the wildfire and are not directly

applicable to salvage of trees burned by wildfire. However, the security area and activity guidelines are still applicable and will be analyzed further in the effects section.

Aspect, elevation, burn-severity, pre-fire vegetation and habitat security will determine when bears resume using the area. Based on studies in Yellowstone, bears may tend to avoid, but still use burned areas in the summer of 2004, but by 2005 use in burned habitats would be in proportion to their availability.

Subunit Characterization

The project area lies in the Upper North Fork BMU. There are 9 subunits on the Flathead and the Wedge fire affected portions of four of these subunits.

Table 76. Wedge Fire Severity by Subunit.

Subunit	Total Acres	% of area burned	High severity	Moderate severity	Low severity	Unburned
Ketchikan	24,147	28%	41%	20%	39%	0
Lower Whale	19,036	66%	53%	26%	19%	2%
Upper Trail	25,874	14%	66%	18%	16%	0
Upper Whale Shorty	33,856	3%	47%	46%	7%	0

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

Amendment 19

Total and open motorized access densities and percent security core areas by subunit are displayed below. One subunit, Lower Whale does not meet Plan objectives for open motorized access, total motorized access and security core areas. Existing conditions for Lower Whale, Upper Trail and Upper Whale Shorty subunits will change once decisions for Center Mountain and Hornet Wedge are fully implemented on the ground, as shown in parentheses in Table 77 below.

Table 77. A19 Existing Condition

Subunit	Open motorized access density	Total motorized access density	Security core
Amendment 19 (10 years)	≤19	≤19	≥68
Ketchikan	19	3	68
Lower Whale	44 (43)	25 (16)	24 (45)
Upper Trail	17	5 (4)	85
Upper Whale Shorty	12	11 (10)	82 (85)

1) limit high density (>1 mi/mi²) open motorized access to no more than 19% of a BMU subunit within 5 years; 2) limit high density (>2 mi/mi²) total motorized access to no more than 24% of a BMU subunit in 5 years, and no more than 19% in 10 years; and 3) provide security core areas that equal or exceed 60% of each BMU subunit in 5 years, and 68% in 10 years.

Gray Wolf

The analysis areas used for wolves are the Ketchikan, Lower Whale, and Upper Trail subunits. Upper Whale Shorty was not included as a very small percentage of the subunit was affected by the Wedge fire. Table 78 shows the approximate percent of the subunit that was burned.

Table 78. Wedge fire severity for wolf analysis areas

Subunit	Total Acres	% of area burned	High severity	Moderate severity	Low severity	Unburned
Ketchikan	24,147	28%	41%	20%	39%	0
Lower Whale	19,036	66%	53%	26%	19%	2%
Upper Trail	25,874	14%	66%	18%	16%	0

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

One wolf pack is known to reside near areas impacted by the Wedge Canyon fire. The Kintla pack ranges roughly from Polebridge north to the Canadian border, and often ventures north of the border. The pack uses both east and west sides of the North Fork Flathead River, but is usually located in Glacier National Park (Gniadek and Waller, 2003 and USFWS et al, 2004). Recent information suggests that this pack did not breed in 2003, and the pack was made up of 3 adults in December 2003 (USFWS et al, 2004).

None of the Wedge fire is in within whitetail deer (MA 9) or elk and mule deer winter range (MA13) management areas. There is one whitetail deer winter range area mapped by Kunkel that is located on private and public lands to the southwest of the confluence of Trail Creek with the North Fork (Kunkel 1997).

About half of the Flathead portion of the Wedge fire is within one mile of potential denning habitat as mapped on Forest GIS layers (<4100 feet elevation and slopes <20%).

Canada Lynx

The Wedge fire burned portions of three LAU's (South Trail Tepee, Lower Whale and North Trail). The Wedge fire affected the LAU's to varying degrees (see Table 79). Winter track surveys before the Wedge Canyon fire found that lynx were using the lower elevations of all three LAU's in the winter of 2002/3 (Edmonds *et al.* 2003). It is assumed that moderate and high severity fires created currently unsuitable habitat for lynx by killing most live trees. Low severity fires affected suitable lynx habitat and removed some understory cover but

remaining vegetation continues to provide some overhead cover and features favored by red squirrels and snowshoe hares.

Table 79. Wedge Canyon Fire Severity by LAU

LAU	Total Acres	% of area burned	High severity	Moderate severity	Low severity	Unburned
South Trail Tepee	22,544	78%	8,973	4,131	4,345	188
Lower Whale	20,701	26%	2,732	1,434	1,086	35
North Trail	32,956	4%	619	185	352	0

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

Table 80 displays the existing condition for the LAU's affected by the Wedge Canyon fire. It displays conditions both inside and outside of the fire perimeter.

Table 80. Post-fire lynx habitat by LAU

LAU	Outside the fire perimeter				
	Non-habitat	Currently unsuitable	Foraging	Foraging and denning	Travel Habitat
South Trail Tepee (22,494)	67 (<1%)	84 (<1%)	658 (3%)	1,763 (8%)	2,303 acres (10%)
Lower Whale (20,689)	238 (1%)	586 (3%)	3,314 (16%)	6,798 (33%)	4,461 acres (22%)
North Trail (32,842)	549 (2%)	691 (2%)	3,984 (12%)	4,506 (14%)	22,013 acres (67%)
LAU	Inside the fire perimeter				
	Non-habitat	Currently unsuitable	Foraging	Foraging and denning	Travel Habitat
South Trail Tepee (22,494)	417 (2%)	12,944 (58%)	928 (4%)	646 (3%)	2,745 acres (12%)
Lower Whale	10 (<1%)	4,195 (20%)	492 (2%)	175 (<1%)	389 acres (2%)

(20,689)					
North Trail (32,842)	193 (<1%)	763(2%)	90 (<1%)	65 (<1%)	42 acres (<1%)

* assumptions used to categorize lynx habitat is found in Appendix H

While 4% of the North Trail subunit was affected by the Wedge Canyon fire, no harvest is proposed in this LAU and it is dropped from further analysis.

In summary, the South Trail Tepee LAU is currently unsuitable over 59% of the area, with around 17% potential foraging habitat, about 22% travel habitat and about 11% potential denning habitat. Currently unsuitable areas within the fire perimeter are expected to receive more use after 10 to 15 years when shrubs and small trees become reestablished and provide cover and foraging habitat.

The Lower Whale LAU is currently unsuitable over 23% of the area, with around 52% potential foraging habitat, about 24% travel habitat and about 33% potential denning habitat. Most of the potential foraging and denning habitat occurs outside of the fire perimeter. Currently unsuitable areas within the fire perimeter are expected to receive more use after 10 to 15 years when shrubs and small trees become reestablished and provide cover and foraging habitat.

Bald Eagle

No bald eagle nests were directly affected by the Wedge Canyon fire, although the fire was close to a nest at the head of Kintla Lake in Glacier National Park. That nest area is over 7 miles from the project area. The Cyclone Lake nest area is over 12 miles to the south of the project and activities associated with this project would have no effect on the nest territory. Further analysis will focus on salvage harvest and activities along the North Fork River corridor.

3.4.3 Environmental Effects

Alternative 1: No Action

Direct and Indirect Effects

Grizzly bear

Since a large proportion of a grizzly bear’s diet is plant material, the post-fire conditions of the Robert and Wedge fires should be expected to be relatively attractive to grizzly bears after the first year and especially over the long-term. One study in the North Fork found that shrubs that provide key grizzly foods were higher on sites burned by wildfire 35-70 years ago than compared to undisturbed old growth forest (Zager 1980, Zager *et al.* 1983). Another study on the Flathead (Martin 1979) found that mature stands or stands that burned 60 to 100 years ago were unproductive. Berry production increased if forested areas with some huckleberry plants, on mesic northern or eastern aspects were burned by wildfire 25 to 60 years ago. Under this alternative, the areas would be relatively disturbance-free (no salvage logging) and available for bears to use. Ungulate carcasses may be more available in the spring when big game move back into the project areas, as they may be stressed due to low forage availability and lack of thermal cover on winter ranges.

This alternative would maintain the overall habitat condition and most Forest Plan guidelines would not be met for the affected BMA's (see discussion in Affected Environment section). Adequate habitat security, as defined by the full implementation of the 10-year objectives of Amendment 19 would not be implemented under this alternative. Compared to the proposed actions, this alternative would have lower levels of human activity over the next three years (no harvest or related actions), but higher levels over the long-term since road closures and decommissioning would not occur without further NEPA analysis and a new decision.

An important aspect of the existing condition concerns the usability of the burned landscape as a result of habitat security. Aspect, elevation, burn severity, pre-burn vegetation and habitat security levels will determine when bears resume use of burned habitats. Because the understory vegetation of the areas that burned at low and moderate severity levels will recover sooner than areas that burned at high severity, it is likely that they will become the first habitat areas to be used.

Another factor in predicting habitat use is the effect of roads open to motorized use. Although grizzly bears generally avoid open roads, they move through these areas and may be vulnerable to mortality, due to lack of cover, especially during the black bear hunting season. To evaluate this, a 500 meter buffer was placed along all open roads. Table 81 and Table 82 below show the amount of area within the buffered areas in each BMA, by fire area.

Table 81. Fire Severity levels of buffer along open roads within Robert fire BMA's

BMA	Total Acres in BMA	Acres in buffer along open roads	Acres in moderate or high vegetation severity within buffer	% of open road system where grizzlies would be more vulnerable
McGinniss	12,619	5,982	3,865	65%
Crystal	10,390	7,184	389	5%
Kimmerly	4,980	1,461	332	23%

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

Table 82. Fire severity levels of buffer along open roads within Wedge Fire BMA's

BMA	Total Acres in BMA	Acres in buffer along open roads	Acres in moderate or high vegetation severity within buffer	% of open road system where grizzlies would be more vulnerable
Lower Trail	8,538	3,574	1,135	32%
Tepee	5,708	1,014	439	43%
Mid Whale	9,016	2,291	426	18%
Whale Buttes	9,722	5,404	2,088	39%
Tepee Lake	6,173	3,869	2,556	66%

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

As shown in Table 81 and Table 82, the risk of mortality due to lack of cover along open roads is greatest in the McGinnis, Tepee Lake and Whale Buttes BMA's.

Gray wolf

This alternative would maintain current habitat conditions and would allow for natural recovery. Ungulate carrying capacity would remain low but would increase with time as forage and cover becomes reestablished. Habitat security would generally be low until vegetation recovers and provides cover. Many of the roads open to motorized access in the analysis area are located on flatter terrain where wolves are likely to be. The combination of this with lack of cover would increase the mortality risk, until vegetation reestablished and provides cover.

Table 83 shows the acreage of moderate and high vegetation severity burns within 500 meters of open roads, where wolves could be more vulnerable, especially during the hunting season.

Table 83. Acreage within the open road buffer lacking cover as a result of fire

Subunit	Total acres in subunit	Acres in buffer along open roads	Acres in moderate or high vegetation severity within buffer	% of open road system where wolves would be more vulnerable
Canyon-McGinnis	33,238	10,541	4,198	40%
Ketchikan	24,147	9,984	1,569	16%
Lower Whale	19,036	9,526	4,849	51%
Upper Trail	25,874	3,948	277	7%

The Canyon-McGinnis and Lower Whale subunits both have over 4,000 acres along open roads lacking cover. Wolves moving through these areas may be vulnerable, especially during the general hunting season. The risk is considered low, as the packs spend most of their time in Glacier National Park.

Canada Lynx

See the Affected Environment section for habitat conditions in the affected LAU's. Under this alternative there would be no harvest and burned areas would recover naturally into combinations of foraging and denning habitat as vegetation establishes and trees fall to create patches of cover across the burned area. It is expected that this alternative would provide a high level of den habitat material (downed logs). As trees seedlings and shrubs recover across the burned areas, snowshoe hares should begin to recolonize the area, creating foraging

habitat for lynx within 10-30 years, depending on site productivity, forest type and severity of the fire (Ruediger *et al.* 2000). This habitat component would be expected to decline when trees and shrubs grow out of reach of hares and shade out understory saplings. The number of years that foraging habitat would be provided is variable, depending on site productivity and forest type.

Numerous lynx tracks were observed in the Wedge and Tepee Creek drainages in the winter of 2002/03, before the fire. Additional surveys may suggest how this has affected winter distribution of lynx in the project area.

If additional trees die as a result of beetle activity, effects are not expected to be negative, as additional snags would eventually fall and provide more downed logs for denning habitat. In addition, an increase in tree seedlings and shrub understory would favor snowshoe hares, the primary lynx prey species.

Bald Eagle

This alternative allows natural processes to dominate the habitat recovery process along the North Fork River corridor. Habitat changes would occur as trees weakened or killed by the fire would eventually fall to the ground. These trees would no longer be available for perch trees. If beetle outbreaks occurred, existing live spruce or Douglas-fir trees may also be killed and eventually fall to the ground. Unburned portions of the corridor would continue to provide nesting and perching trees.

Alternative 2 (Proposed Action)

Robert Fire

Direct and Indirect Effects

Design criteria

- Timber sale contracts include a provision that prohibits the hunting or transportation of big game animals by the purchaser in closed areas and for protection of habitat for endangered species
- If wolves are detected and it is determined that denning is occurring, no logging activities would be allowed within a one-mile radius of the den and/or rendezvous sites during March 15 to July 1 (Forest Plan, p. II-44).
- To address downed wood and snags, refer to the Deadwood Habitat Prescription Matrix found in Appendix F
- There will be no motorized activities (except helicopter) in security core habitat during the non-denning period.
- Roads 1679, 5224, 5271, 5274, 5295, 5295A, 803C, 803F and 803G have been identified as accessing high spring value grizzly habitat (BMP Biological Assessment, 2004). Activities off of these road systems will be restricted between April 1 to July 1.
- This proposal includes about 645 acres of planting. About 160 acres of this would be whitebark pine. Over the long-term, these trees could provide additional fall foraging habitat. There is also some planting of spruce in three units that could result in a quicker return to forested riparian habitats. These actions would generally benefit

grizzly bears over the long-term; effects analysis will focus on the human activity associated with the planting.

Assumptions

- Some of the units could feasibly be winter logged but there is no timing requirement now. It is assumed for this analysis that units will be logged during the non-denning period.
- The assumption is made that currently restricted roads and new temporary roads would be gated to restrict use by the public during project activities
- Scarification is generally considered a detrimental post-logging treatment for huckleberry regeneration, as it results in almost total destruction of the remaining root system (Martin 1979, Zager 1980). However, a small-scale treatment will evaluate effects of scarification. The location of this project has not been identified yet, but it will be less than 40 acres and in a proposed salvage unit. Site-specific locations will be determined in the summer of 2004 and evaluated in the FEIS.
- It is assumed that disturbance (scarification) associated with logging could delay the regeneration of huckleberry shrubs for a year or two, as activities may trample new sprouts/seedlings. However, over the long-term, based on studies on huckleberry regeneration, there would no measurable effect.
- The timber contract would have a three year term, but salvage activities would be expected to be completed in the first 18 months beginning in the fall/winter of 2004 at the earliest.

Grizzly bear

Several factors contribute to effects to grizzly bears. These include long-term access management, disturbance during activities associated with the proposal, activities within specific seasonal habitat components, activities within security core habitat during the non-denning period, use of restricted roads during project activities, and effects from other ongoing activities (mushroom harvest, BMP work etc).

Chapter 2 identified a significant issue related to grizzly bear habitat; the amount of road restrictions and decommissioning proposed and the effects on security for grizzly bears. In addition, effects indicators used to focus the grizzly bear analysis and disclose relevant environmental effects include 1) whether Forest Plan management direction would be met; and 2) the potential loss of habitat values associated with removal of dead trees.

A review of literature on dead trees, including the Grizzly Bear Compendium (Interagency Grizzly Bear Committee 1987), did not yield any information on dead-standing trees and grizzly habitat potential. It can be concluded that the removal of standing dead trees on 24% of the fire on NFS lands (or 6% of the total fire area) would not have a significant effect on grizzly bear habitat. Additionally, riparian areas would not be harvested, and units have snag retention guidelines. Additional analyses of removal of dead trees will focus on cover values.

Planting would generally shorten the time period for the early succession grass/forb period, which is important for spring grizzly forage. However, only 645 acres are proposed for planting, out of a total of 8,000 acres of grass/forb within the project area and spring foraging habitat is not likely to be limiting.

BMA Effects

Forest Plan guidelines used to address direct and indirect affects are the presence of security areas and activity timing. The security area guideline addresses access to an adjacent 5,000 acre area with an open road density of less than 1 mi/mi²

This proposal would remove standing dead trees from about 3,090 acres through a combination of tractor, cable and helicopter logging systems (with use of snag retention guidelines). The Proposed Action would not affect how the areas are meeting Forest Plan guidelines for hiding cover. Salvaging burned dead standing trees would reduce the residual levels of screening cover on the salvages units but would not remove “hiding cover”. The main effect of this is that bears are more visible to humans and are more vulnerable to being illegally killed or mistaken for a black bear during black bear hunting seasons. Table 84 shows the acreage of moderate and high vegetation severity burns within 500 meters of open roads, where grizzlies could be more vulnerable, especially during the hunting season.

Table 84. Fire Severity Levels of Buffer Along Open Roads Within Robert Fire BMA’s

BMA	Total Acres in BMA	Acres in buffer along open roads	Acres in moderate or high vegetation severity within buffer	% of open road system where grizzlies would be more vulnerable
McGinnis - existing	12,619	5,982	3,865	65%
McGinnis – post-project		5,914	3,842	65%
Crystal - existing	10,390	7,184	389	5%
Crystal – post-project		7,184	389	5%
Kimmerly - existing	4,980	1,461	332	23%
Kimmerly – post-project		1,190	332	28%

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

***= Result of closing roads in areas of low fire severity and unburned areas**

The revised Biological Opinion on the Forest Plan (1989) recommended a “3&7” rule for Management Situation 1, that would guide activity scheduling by BMA. The “3&7” rule refers to human activities within BMA’s that last longer than 30 days. These activities should only occur for a maximum of three consecutive non-denning periods and then rest for seven. In theory, this assures that only one litter of cubs out of a 10-year period will not get familiar

with the mothers home range because of displacement. This rule is to be used until security core areas per Amendment 19 are identified and effective on a site-specific basis.

McGinnis

About 45% of this BMA burned at a high fire severity and the majority of the harvest is proposed in this BMA. Road management changes would reduce the total acres of moderate and high vegetation severity within the buffer along open roads (23 acres) and would somewhat reduce the vulnerability of grizzlies to human-caused mortality.

Activities in this BMA would take longer than 30 days. Major activities began in the late summer of 2003 with fire suppression. In 2004, BMP's, roadside salvage, and mushroom harvesting are expected to occur. At the earliest, this proposal could begin in the fall/winter of 2004 and would be expected to occur for up to three years (although probably much shorter). This would not meet the "3&7" rule. Displacement of bears in this BMA would be expected.

There is a large security area in Kimmerly BMA to the west (see Robert security core map).

Roads 1679, 5224, 5271, 5274, 5295, 5295A, 803C, 803F and 803G have been identified as accessing high spring value grizzly habitat (BMP Biological Assessment, 2004). Activities off of these road systems will be restricted between April 1 to July 1.

Part of unit 323 lies within 2,000 meters of mapped potential denning habitat. This is a helicopter unit and would be harvested during the non-denning period. Salvage of dead trees would not affect this area's physical potential for denning habitat. However, disturbance associated with helicopter salvage could cause displacement if harvest occurred late in the season when bears would be using the area around their den sites.

Crystal

Only about 5% of this BMA burned at a high fire severity. There are five proposed salvage units in this BMA (303, 304, 324, 325 and 348). They would require a mix of harvest systems (helicopter, tractor and cable) and use existing roads for access. It is expected that it would take 11 days to harvest these units. This would be considered a minor activity and would not influence the "3&7" rule.

Kimmerly

About 8% of this BMA burned at a high fire severity. Units 307, 308 and 326 lie in this BMA, along with parts of units 305, 306, 349 and 351. These are largely helicopter units and use existing roads for access. Even though four of the units are only partially in this BMA, it is expected that it would take 11 days to harvest all of these units. This would be considered a minor activity and would not influence the "3&7" rule.

Subunit Analyses

The 10-year numerical objectives for A19 would not be met for one of the three subunits analyzed. The road strategy with this proposal moves Canyon-McGinnis closer to A19 objectives, but would not meet total motorized access density or security core objectives (Table 85).

Table 85. Existing and proposed (with implementation of previous Decisions)

Subunit	Open motorized access density	Total motorized access density	Security core
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	Existing	Proposed	Existing	Proposed	Existing	Proposed
Amendment 19 objectives- 10 yrs		19		19		68
Canyon-McGinnis	22	19	42	33	31	53
Lower Big	19	19	33 (19)	19	56 (68)	68
Cedar-Teakettle	26	26	20	20	20	20

1) limit high density (>1 mi/mi²) open motorized access to no more than 19% of a BMU subunit within 5 years; 2) limit high density (>2 mi/mi²) total motorized access to no more than 24% of a BMU subunit in 5 years, and no more than 19% in 10 years; and 3) provide security core areas that equal or exceed 60% of each BMU subunit in 5 years, and 68% in 10 years.

Canyon-McGinnis

Of the approximately 3,090 acres proposed for harvest, 2,291 acres (or 98%) are in this subunit. If the skyline and tractor logging system harvest went concurrently, they could be completed in 90 days, while helicopter logging would take another 73 days, for a minimum of 163 days of logging and hauling.

Roads 1679, 5224, 5271, 5274, 5295, 5295A, 803C, 803F and 803G have been identified as accessing high spring value grizzly habitat (BMP Biological Assessment, 2004). Activities off of these road systems will be restricted between April 1 to July 1.

One hundred two acres or about 3% are located in, but on the edge of existing grizzly bear security core areas. These units (320, 321 and 323) are all proposed for helicopter harvest. Vegetation management may occur within security core areas so long as the objectives for security core continue to be met. Security core habitat would be affected by disturbance from chainsaw tree felling and helicopter yarding operations. Helicopter logging isn't considered a disturbance for security core calculations. There are no temporary roads or landings in security core, and there would be no hauling through security core habitat.

Access use levels must be met during the non-denning period, and requires that all motorized activities occur during the denning period. However, these units cannot feasibly be winter logged due to their isolated location and associated winter helicopter logging difficulties. It is estimated that it would take about 5 days to salvage these units. Because these units could not be winter logged (denning period), re-consultation with FWS is required.

During project activities Open Motorized Access Density would increase to 40%, Total Motorized Access Density would increase to 43%, and effective security core would decrease to 30% (from 31% existing). Several road systems that are currently restricted would be reopened during project activities. Some of the major ones include 5225, 5271, 1679, 1688 and 5224. These roads would be used for project activities but would be restricted from use by the public.

As shown in Table 85, the Canyon-McGinnis subunit would meet OMD, and would move closer to TMD and security core standards, but would not meet them upon completion of the project. There are around 15 miles of road that are currently restricted that would be decommissioned. Other restrictions include changing about 6 miles of road from gated closures to berm closures. There are also about 3.6 miles of open road that would have

seasonal restrictions implemented and another 1.4 miles of currently open road that would be gated.

Cedar-Teakettle

The standard for Cedar-Teakettle is no net loss. There are 5 units (303, 304, 324, 325 and 348) that would be accessed through a yearlong, gated road. Restricting activities to less than 30 days (minor activity as defined by LRMP Implementation Note #12) or winter logging (denning period from Nov 15 to March 15) would meet the intent of these standards. It is estimated it would take about 10 days to harvest these units. An analysis of the feasibility of winter logging indicated that it would not be feasible to winter log these units.

During project activities Open Motorized Access Density would increase to 30%, Total Motorized Access Density would remain at 20%, and effective security core would remain 20%.

Lower Big

There is only part of one salvage unit (323) and one planting unit (R-1) in this subunit. The salvage unit is a helicopter unit; logs would be flown to a landing on road 5290 (in this subunit). During project activities Open Motorized Access Density would increase to 22%, Total Motorized Access Density would remain at 33%, and effective security core would remain at 56%.

Summary

The risk of grizzly bear mortality is rated as **low** for these projects. Most activities will include machinery and considerable activity by humans. Bears would be expected to be displaced during most of the activities and chances for encounters between bears and humans are considered low. In addition, many activities will take place within the first couple of years after the fire, and some displacement could naturally occur due to lack of forage (especially during the first year). Restrictions in high value spring habitat are incorporated (see subunit analysis) and chances for displacement and increased mortality during the spring black bear hunting season would be reduced.

Gray wolf

Management activities associated with salvage logging that may affect ungulate availability could indirectly affect wolves (see ungulate section). The allowance of winter logging would not add much stress to wintering ungulates, as winter range is limited in the vicinity of the project. Reduction of residual screening cover that dead trees provide, especially along the major open roads, may result in an increased hunter harvest of ungulates, reducing the prey base available to wolves.

This proposal would improve habitat security for wolves over the long-term. Assuming that grizzly bear security core habitat also provides functional security habitat for wolves, there would be an increase of 22% core in the Canyon-McGinnis subunit. Through implementation of seasonal or yearlong closures on currently open roads, there will be an increase in security. This is especially important at the lower elevation, flatter terrain areas (like the 9898 road system) as these areas are used disproportionately. In addition, these areas are closer to ungulate winter ranges and also closer to the current home range area of the Whitefish pack, which largely uses Glacier National Park.

Table 86 shows the acreage of moderate and high vegetation severity burns within 500 meters of open roads, where wolves could be more vulnerable, especially during the hunting season.

Vulnerability would not be expected to increase during project activities, as any newly opened roads would not be open to the public. After implementation of all the actions (this Proposed Action as well as previous Decisions), the total acres lacking cover within the open road buffer would decline by 22 acres. This would have no measurable effect on changing vulnerability of wolves during hunting season.

Table 86. Acreage within the open road buffer lacking cover as a result of fire

Subunit	Total acres in subunit	Acres in buffer along open roads	Acres in moderate or high vegetation severity within buffer	% of open road system where wolves would be more vulnerable
Canyon-McGinnis under existing conditions	33,238	10,541	4,198	40%
Canyon-McGinnis after implementation of the project and previous decisions	33,238	10,253	4,176	41%

Canada Lynx

Salvage harvest that leaves coarse woody debris and snags at or above Forest Plan standard levels is predicted to be adequate to retain woody material to supply denning habitat features for lynx over the long-term. These sites would still provide potential travel and summer foraging habitat over the shorter term, once understory vegetation becomes re-established.

The proposed salvage units are largely in moderate and high severity burned areas. These areas are already currently unsuitable for lynx due to the loss of overstory and understory vegetation. About 3,050 acres of salvage are proposed, out of 9,400 acres of currently unsuitable habitat created by the wildfire, or about 30% (or 12% of the Canyon LAU). Because of the low acreage proposed for treatment in low severity burn areas (23 acres) there will be no significant changes to conditions portrayed in Table 73

Part of unit 323 is in the Lower Big LAU. It burned with a high vegetation severity and will receive a high emphasis for snag retention. Because <1 percent of this LAU was affected by the Robert fire, and only part of one unit is in this LAU, there would be little overall affect on lynx foraging and denning habitat in this LAU.

All of unit 348 and part of unit 324 are in the Teakettle LAU. These units both burned at a moderate vegetation severity, and have a moderate or high emphasis for snag retention. Because only 1 percent of this LAU was affected by the Robert fire, and only parts of two units are in this LAU, there would be little overall affect on lynx foraging and denning habitat in this LAU.

Indirect effects from winter logging as a result of compacted snow roads are possible. These compacted roads may provide a path for other predators that were previously excluded by deep snows, to reach lynx prey species. Snow track surveys along the North Fork (outside of either project area) found that over two winters, about 90% of the transects along the North Fork road had coyote tracks. Wolves, red fox and bobcats were found on less than 10% of the

transects. In comparison, surveys on roads on the Forest over the same two year period, found 84% of the transects had coyote tracks, 16% had bobcat tracks, and wolves and red fox were found on less than 3% of the transects. These results have no statistical significance and do not account for differences based on snow compaction, but do suggest what competitor species might be present.

This proposal includes 645 acres of planting (whitebark pine, larch, spruce, white pine and shrubs). This would speed recovery of lynx foraging habitat as the seed source in some areas is limited due to the fire severity. Planting is expected to speed recovery by five or more years, thereby enhancing production of cover, travel and foraging habitat.

Bald Eagle

Since the closest nest territory is 4 miles to the north, there will be no vegetation management or disturbance effects on any pairs home ranges (up to 2 ½ miles in MBEWG 1986). Effects analysis will be based on the amount of habitat alteration within the habitat zone along the North Fork. There are about 7 miles of river corridor on the east side of the project area. There are no proposed units within the corridor (between the river and the North Fork road).

The nearest are two cable units and one helicopter unit within ¼ mile of the river (units 301, 372 and 373). These three units all burned at high severity, and no live trees are remaining. These units have been given a high emphasis for retention of snags and residual standing dead trees could provide perches for bald eagles adjacent to the river corridor. Because of the emphasis on snag retention and the small amount of salvage within the corridor, availability of perch trees should not be a limiting factor.

These units could be harvested during any season. If harvested during the summer, non-breeding eagles could be displaced into other reaches of the river (there are no nest territories in this reach).

Alternative 2 (Proposed Action)

Wedge Canyon Fire

Direct and Indirect Effects

Design criteria

- Timber sale contracts include a provision that prohibits the hunting or transportation of big game animals by the purchaser in closed areas and for protection of habitat for endangered species
- If wolves are detected and it is determined that denning is occurring, no logging activities would be allowed within a one-mile radius of the den and/or rendezvous sites during March 15 to July 1 (Forest Plan, p. II-44).
- To address downed wood and snags, refer to the Deadwood Habitat Prescription Matrix found in Appendix F
- A buffer would be retained within 100' on both sides of all avalanche chutes. The standing dead would provide some visual screening, and the downed logs would provide bedding cover adjacent to an important foraging habitat.
- There will be no motorized activities(except helicopter use) in security core habitat during the non-denning period.

- Roads 10335, 907, and 9827 have been identified as accessing high spring value grizzly habitat (BMP Biological Assessment, 2004). Activities off of these road systems will be restricted between April 1 to July 1.
- This proposal includes about 2,200 acres of planting. About 685 acres of this would be whitebark pine. Over the long-term, these trees could provide additional fall foraging habitat. There is also some planting of spruce in one unit that could result in a quicker return to forested riparian habitats. These actions would generally benefit grizzly bears over the long-term; effects analysis will focus on the human activity associated with the planting.

Assumptions

- Some of the units could feasibly be winter logged but there is no timing requirement now (except for a small area around Tepee Lake that would be winter logged due to wetland concerns). It is assumed for this analysis that units will be logged during the non-denning period.
- The assumption is made that currently restricted roads and new temporary roads would be gated to restrict use by the public
- Scarification is generally considered a detrimental post-logging treatment for huckleberry regeneration, as it results in almost total destruction of the remaining root system (Martin 1979, Zager 1980). However, a small-scale treatment will evaluate effects of scarification. The location of this project has not been identified yet, but it will be less than 40 acres and in a proposed salvage unit. Site-specific locations will be determined in the summer of 2004 and evaluated in the FEIS.
- It is assumed that disturbance associated with logging could delay the regeneration of huckleberry shrubs for a year or two, as activities may trample new sprouts/seedlings. However, over the long-term, based on studies on huckleberry regeneration, there would be no measurable effect.
- • The timber contract would have a three year term, but salvage activities would be expected to be completed in the first 18 months

Grizzly bear

Several factors contribute to effects to grizzly bears. These include long-term access management, disturbance during activities associated with the proposal, activities within security core habitat during the non-denning period, use of restricted roads during project activities, and effects from other ongoing activities (mushroom harvest, BMP work etc).

Chapter 2 identified a significant issue related to grizzly bear habitat; the amount of road restrictions and decommissioning proposed and the effects on security for grizzly bears. In addition, effects indicators used to focus the grizzly bear analysis and disclose relevant environmental effects include 1) whether Forest Plan management direction would be met; and 2) the potential loss of habitat values associated with removal of dead trees.

A review of literature on dead trees, including the Grizzly Bear Compendium (Interagency Grizzly Bear Committee 1987), did not yield any information on dead-standing trees and grizzly habitat potential. It can be concluded that the removal of standing dead trees on 13% of the fire on NFS lands (or 5% of the total fire area) would not have a significant effect on grizzly bear habitat. Additionally, riparian areas would not be harvested, and units have snag retention guidelines. Additional analyses of removal of dead trees will focus on cover values.

Planting would generally shorten the time period for the early succession grass/forb period, which is important for spring grizzly forage. However, only 2,200 acres are proposed for planting, out of a total of 15,268 acres of grass/forb within the project area and spring foraging habitat is not likely to be limiting.

BMA Analyses

Forest Plan guidelines used to address direct and indirect affects are the presence of security areas and activity timing. The security area guideline addresses access to an adjacent 5,000 acre area with an open road density of less than 1 mi/mi².

This proposal would remove standing dead trees from about 3,090 acres (with use of snag retention guidelines) through a combination of tractor, cable and helicopter logging systems. The Proposed Action would not affect how the areas are meeting Forest Plan guidelines for hiding cover. Salvaging burned dead standing trees would reduce the residual levels of screening cover on the salvages units but would not remove “hiding cover”. The main effect of this is that bears are more visible to humans and are more vulnerable to being illegally killed or mistaken for a black bear during black bear hunting seasons. Table 87 shows the acreage of moderate and high vegetation severity burns within 500 meters of open roads, where grizzlies could be more vulnerable, especially during the hunting season.

Table 87. Fire Severity Levels of Buffer Along Open Roads within Wedge Canyon Fire BMA’s

BMA	Total Acres in BMA	Acres in buffer along open roads	Acres in moderate or high vegetation severity within buffer	% of open road system where grizzlies would be more vulnerable
Lower Trail - existing	8,538	3,574	1,135	32%
Lower Trail – post-project		3,574	1,135	32%
Tepee - existing	5,708	1,014	439	43%
Tepee - post-project		99	99	100%
Mid Whale - existing	9,016	2,291	426	18%
Mid Whale - post-project		2,196	337	15%
Whale Buttes - existing	9,722	5,404	2,088	39%
Whale Buttes - post-project		5,402	2,088	39%
Tepee Lake	6,173	3,869	2,556	66%

- existing				
Tepee Lake - post- project		3,425	2,245	65%

High = complete consumption of duff/understory vegetation; 80-100% mortality of overstory canopy

Moderate = significant reduction of duff/understory vegetation; 30-80% immediate mortality of overstory

Low = low to moderate duff reduction and large patches unburned or lightly burned vegetation; immediate mortality of overstory is less than 30%

*** = Increase in vulnerability as a result of lack of cover on remaining open roads**

The revised Biological Opinion on the Forest Plan (1989) recommended a “3&7” rule for Management Situation 1, that would guide activity scheduling by BMA. The “3&7” rule refers to human activities within BMA’s that last longer than 30 days. These activities should only occur for a maximum of three consecutive non-denning periods and then rest for seven. In theory, this assures that only one litter of cubs out of a 10-year period will not get familiar with the mothers home range because of displacement. This rule is to be used until security core areas per Amendment 19 are identified and effective on a site-specific basis.

Lower Trail

About 15% of this BMA burned at a high fire severity. Only one unit (123) is in this BMA. This unit is proposed for tractor harvest, could be winter logged and would use an existing road system for access. It is expected that it would take 4 days to harvest this units. This would be considered a minor activity and would not influence the “3&7” rule.

There is a large security area in this BMA (security core for Ketchikan subunit), as well as in Mid Trail BMA to the west (security core for Upper Trail subunit).

Tepee

About 46% of this BMA burned at a high fire severity. There are six units (101 to 106) in this BMA. These could not be winter logged due to length of road that would have to be kept open and safety concerns due to steep slopes in the units and avalanche chutes along the road. These units would be helicopter logged during the non-denning period and would take about 14 days to harvest. This would be considered a minor activity and would not influence the “3&7” rule.

There is a security area in the Mid Trail and Lower Trail BMA’s to the north.

Areas identified as having a high spring value for grizzly bears are maintained through a spring restriction on road 907.

There are several proposed salvage units within 2,000 meters of modeled denning habitat (101-105). These units would be harvested during the non-denning period. Salvage of dead trees would not affect this areas physical potential for denning habitat. However, disturbance associated with salvage could cause displacement if harvest occurred late in the season when bears would be using the area around their den sites.

Road management changes would reduce the total acres of moderate and high vegetation severity within the buffer along open roads (340 acres) and would reduce the vulnerability of grizzlies to human-caused mortality.

Several units are located between avalanche chutes along Wedge Canyon. Harvesting of these units during the non-denning period could displace grizzly bears foraging in the avalanche chutes. However, a spring restriction on road 907 would allow use of the avalanche chutes prior to July 1. Buffers have been incorporated along the edges of avalanche chutes to provide a visual screening (while still standing), as well as a source of downed logs that will provide bedding cover adjacent to foraging areas.

Mid Whale

Only about 4% of this BMA burned at a high fire severity. There are seven proposed salvage units in this BMA (173 to 179). These are all proposed for harvest by helicopter, would require use of an existing, unmapped road, and could not be winter logged. It is estimated that it would take 21 days to harvest these units. This would be considered a minor activity and would not influence the “3&7” rule.

There is a security area in this BMA that would be unaffected by harvest activities, south of road 1672.

Road management changes would reduce the total acres of moderate and high vegetation severity within the buffer along open roads (89 acres) and would somewhat reduce the vulnerability of grizzlies to human-caused mortality.

There are several proposed salvage units within 2,000 meters of modeled denning habitat (174-179). These units would be harvested during the non-denning period. Salvage of dead trees would not affect this areas physical potential for denning habitat. However, disturbance associated with salvage could cause displacement if harvest occurred late in the season when bears would be hanging around their den sites. Road 10335, which access the units, has a spring restriction on it, so disturbance upon emergence from the den is not an issue.

Whale Buttes

About 23% of this BMA burned at a high fire severity. Activities in this BMA would take longer than 30 days. Major activities began in the late summer of 2003 with fire suppression. In 2004, BMP’s, roadside salvage, and mushroom harvesting are expected to occur. At the earliest, this proposal could begin in the fall/winter of 2004 and would be expected to occur for up to three years (although probably much shorter). This would not meet the “3&7” rule. Displacement of bears would be expected. This area lacks adjacent security areas for displaced bears.

No road management activities are proposed in this BMA and the risk of mortality due to changes in access would not be affected (see Table 72).

Tepee Lake

About 48% of this BMA burned at a high fire severity. Activities in this BMA would take longer than 30 days. Major activities began in the late summer of 2003 with fire suppression. In 2004, BMP’s, roadside salvage, and mushroom harvesting are expected to occur. At the earliest, this proposal could begin in the fall/winter of 2004 and would expected to occur for up to three years (although probably much shorter). This would not meet the “3&7” rule. There are adjacent security areas in Lower Trail to the north.

Road management changes would reduce the total acres of moderate and high vegetation severity within the buffer along open roads (311 acres) and would reduce the vulnerability of grizzlies to human-caused mortality.

Subunit Analyses

Four of the five subunits meet all of the A19 objectives. The Lower Whale subunit does not meet the objectives for OMAD or security core.

Table 88. Existing and proposed (including previous Decisions)

Subunit	Open motorized access density		Total motorized access density		Security core	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Amendment 19 objectives- 10 yrs		19		19		68
Ketchikan	19	19	3	3	68	68
Lower Whale	44 (43)	37	25 (16)	16	24 (45)	47
Upper Trail	17	14	5	4	85	88
Upper Whale Shorty	12	12	11 (10)	10	82 (85)	86

Ketchikan

There is only one proposed salvage unit (123) in this subunit. This is a tractor unit that could feasibly be winter logged and is estimated to take about 4 days.

During project activities Open Motorized Access Density would remain at 19%, Total Motorized Access Density would remain at 3%, and effective security core would decrease to 67% (from 68% existing).

Lower Whale

The majority of the salvage would be from this subunit. Of the 2,732 acres proposed for harvest, about 2,120 acres (or 78%) are in this subunit. If skyline and tractor harvests occurred concurrently, it would take a minimum of 186 days. Helicopter harvest would take another 26 days for a minimum of 212 days to harvest and haul all units in this subunit.

Road 9827 has been identified as accessing high spring value grizzly habitat (BMP Biological Assessment, 2004). Activities off of this road system will be restricted between April 1 to July 1.

Many of these units (31) are also in security core (about 780 acres). This core area has only been in place for about three years and had considerable disturbance associated with fire suppression in 2003. Vegetation management may occur within security core areas so long as the objectives for security core continue to be met. Access use levels must be met during the non-denning period, and requires that all motorized activities occur during the denning period. Tractor units in security core that are feasible to winter log have been identified as winter logging units.

It is estimated it would take 71 days to harvest all of these units in security core if none of the harvest was done concurrently. If skyline and tractor harvest occurred concurrently, total time could be shortened to 55 days. Because many of these units could not be winter logged (denning period), and logging and road use would occur in the non-denning period, re-consultation with FWS is required. Wedge Canyon Road 907 would have to be reopened for about three months.

Units proposed in security core have been modified so that all units using ground-based harvest systems would be harvested during the denning period. Units proposed for harvest by helicopter would be harvested during the non-denning period, due to the length of road that would need to be kept open and associated safety concerns with steep slopes and avalanche chutes along the road.

Security core habitat would be affected by disturbance from chainsaw tree felling, machinery with tractor systems and helicopter yarding operations, as well as associated road traffic. Helicopter logging isn't considered a disturbance for security core calculations. Helicopter yarding would occur during the summer, and log hauling would occur during the denning period. There is one helicopter landing in security core at the bottom of unit 115 on road 1669. During operations, roads that are in security core and are currently restricted would be reopened (but closed to public use). These include Wedge Canyon Rd 907, and 1669. In addition, a few road systems would be used for winter logging (9899, 362209C, H and G). There are a couple of temporary roads that would be used for hauling in the winter as well.

During project activities Open Motorized Access Density would increase to 54%, Total Motorized Access Density would increase to 37%, and effective security core would decrease to 11% (from 24% existing).

As shown in Table 88, the Lower Whale subunit would meet standards for TMAD, and would move closer to, but would not meet standards for OMAD and security core upon completion of the project. Road management changes include about 1.2 miles of currently open road to closed yearlong with berm (9805 and 907), about 2 miles of a gated closure to a berm closure (5399) and changes to a state road (closed with sign to closed with gate).

Upper Trail

There are five units totally in this subunit (101-105) and part of unit 106. These are helicopter units that **could be not feasibly logged during the winter**, because of safety concerns associated with avalanche chutes along the road and the distance of road that would need to be kept open. This would require using the Wedge Canyon road 907 that is currently closed yearlong by earthen berm. It is estimated that it would take about 14 days to harvest these units.

Roads 907 has been identified as accessing high spring value grizzly habitat (BMP Biological Assessment, 2004). Activities off of this road system will be restricted between April 1 to July 1.

Unit 101 is in security core habitat. There is one helicopter landing at the edge of the unit and core boundary, on road 907. An upper helicopter landing (further up in core) was dropped. Units and hauling routes in Wedge Canyon will be further refined between the draft and final analysis, but currently haul would occur on road 907 between July 2 until winter conditions restrict operations.

During project activities Open Motorized Access Density would increase to 18%, Total Motorized Access Density would move to 5%, and effective security core would decrease to 81% (from 85% existing).

Upper Whale Shorty

There are seven units in this subunit (173-179). These are helicopter units that **could be not feasibly logged during the winter**, because of safety concerns associated with avalanche chutes along the road and the distance of road that would need to be kept open. One section of existing, unmapped road would be needed to access these units but most access is by existing, open roads (roads 318, 9805). It is estimated that it would take 21 days to harvest these units.

Road 10335 has been identified as accessing high spring value grizzly habitat (BMP Biological Assessment, 2004). Activities off of this road system will be restricted between April 1 to July 1.

During project activities Open Motorized Access Density would increase to 14%, Total Motorized Access Density would remain at 11%, and effective security core would remain at 82%.

Summary

The risk of grizzly bear mortality is rated as **low** for these projects. Most activities will include machinery and considerable activity by humans. Bears would be expected to be displaced during most of the activities and chances for encounters between bears and humans are considered low. In addition, many activities will take place within the first couple of years after the fire, and some displacement could naturally occur due to lack of forage (especially during the first year). Restrictions in high value spring habitat are incorporated (see subunit analysis) and chances for displacement and increased mortality during the spring black bear hunting season would be reduced.

Gray wolf

Management activities associated with salvage logging that may affect ungulate availability could indirectly affect wolves (see ungulate section). The allowance of winter logging would not add much stress to wintering ungulates, as winter range is limited in the vicinity of the project. Reduction of residual screening cover that dead trees provide, especially along the major open roads, may result in an increased hunter harvest of ungulates, reducing the prey base available to wolves.

This proposal would improve habitat security for wolves over the long-term. Assuming that grizzly bear security core habitat also provides functional security habitat for wolves, there would be an increase of 2% core in the Lower Whale subunit. By installing berm closures on the 5399 road system (currently closed with a gate), there will be an increase in security at lower elevations. While the area is less than 2500 acres and does not meet the security core definition, there will be an increase in secure habitat. This is important as the lower elevation, flatter terrain is used disproportionately. In addition, it is closer to ungulate winter ranges and also closer to the current home range area of the Kintla pack, which largely uses Glacier National Park.

The following table shows the acreage of moderate and high vegetation severity burns within 500 meters of open roads, where wolves could be more vulnerable, especially during the hunting season. Vulnerability would not be expected to increase during project activities, as any newly opened roads would not be open to the public. After implementation of all the actions (this Proposed Action as well as previous Decisions), the total acres lacking cover within the open road buffer would decline in the Lower Whale and Upper Trail subunits. This is most pronounced in the Upper Trail subunit, where only 1% of the open road system would

lack cover as a result of the fire. Lower Whale, where vulnerability may be the highest, had a decline of about 400 acres. Overall, implementation of this alternative would reduce the risk of mortality to wolves in this fire area.

Table 89. Acreage within the open road buffer lacking cover as a result of fire

Subunit	Total acres in subunit	Acres in buffer along open roads	Acres in moderate or high vegetation severity within buffer	% of open road system where wolves would be more vulnerable
Ketchikan - current	24,147	9,984	1,569	16%
Ketchikan - after		9,984	1,569	16%
Lower Whale - current	19,036	9,526	4,849	51%
Lower Whale - after		9,088	4,431	49%
Upper Trail - current	25,874	3,948	277	7%
Upper Trail - after		3,142	42	1%

Canada Lynx

Salvage harvest that leaves coarse woody debris and snags at or above Forest Plan standard levels would be adequate to retain woody material to supply denning habitat features for lynx over the long-term. These sites would still provide potential travel and summer foraging habitat over the shorter term, once understory vegetation becomes re-established. However, in the fuels reduction zones (around Tepee Lake), the sites would be maintained as relatively open forest and would not provide winter foraging habitat over the long-term. Winter track surveys detected lynx at the lower elevations on Tepee and Whale Creek drainages. The units located in these areas have a high snag emphasis.

The proposed salvage units are largely in moderate and high severity burned areas. These areas are already currently unsuitable for lynx due to the loss of overstory and understory vegetation. About 2,650 acres of salvage are proposed, out of 18,483 acres of currently unsuitable habitat created by the wildfire, or about 14%. Because of the low acreage proposed for treatment in low severity burn areas (76 acres) there will be no significant changes to conditions portrayed in Table 80.

Indirect effects from winter logging as a result of compacted snow roads are possible. These compacted roads may provide a path for other predators that were previously excluded by deep snows, to reach lynx prey species. Snow track surveys along the North Fork (outside of either project area) found that over two winters, about 90% of the transects along the North Fork road had coyote tracks. Wolves, red fox and bobcats were found on less than 10% of the transects. In comparison, surveys on roads on the Forest over the same two year period, found 84% of the transects had coyote tracks, 16% had bobcat tracks, and wolves and red fox were found on less than 3% of the transects. These results have no statistical significance and do

not account for differences based on snow compaction, but do suggest what competitor species might be present.

Salvage at the higher elevations would not occur during the winter and increased access to competitors is not an issue. However, at lower elevations, where winter logging operations are more likely to occur, roads could provide more access to competitors. However, because these areas burned at mostly high and moderate severity, there is little cover or forage left for snowshoe hares, and lynx would be expected to shift use into unburned or lightly burned areas where more prey would be available.

This proposal includes 2,211 acres of planting (larch, whitebark pine, Douglas-fir, spruce, and shrubs). This would speed recovery of lynx foraging habitat as the seed source in some areas is limited due to the fire severity. Planting is expected to speed recovery by five or more years, thereby enhancing production of cover, travel and foraging habitat.

Bald Eagle

Since the closest nest territory is 7 miles from the project area, there will be no vegetation management or disturbance effects on any pairs home ranges (up to 2 ½ miles in MBEWG 1986). Effects analysis will be based on the amount of habitat alteration within the habitat zone along the North Fork.

There are about 3 miles of river corridor on the east side of the project area. There is one proposed tractor harvest unit (126) and one proposed planting unit between the river and the North Fork road. Unit 126 burned at a moderate severity and has a high emphasis for snag retention. Residual standing dead trees could provide perches for bald eagles adjacent to the river corridor. Because of the emphasis on snag retention and the small amount of salvage within the corridor, availability of perch trees should not be a limiting factor.

This unit could be harvested during any season. If harvested during the summer, non-breeding eagles could be displaced into other reaches of the river (there are no nest territories in this reach). Tree planting would occur in spring or fall and temporary displacement from perching/foraging sites could occur.

3.4.4 Cumulative Effects

This section will present a cumulative effects analysis for the threatened and endangered species for the Roberts and Wedge projects. The cumulative effects analysis area will be defined, the list of past, ongoing and reasonably foreseeable future actions will be disclosed, and the cumulative effects will be estimated.

Robert Fire Area-Past, Present and Reasonably Foreseeable Future Actions

Past

- Fire suppression activities in 2003
- Roadside Hazard Tree Salvage winter 2003-4 and summer of 2004
- Fire rehab projects 2003 and into 2004
- 1929 Wildfires south of Robert, Moose wildfire to the north in 2001
- Approximately 50% of the fire area on NFS lands has been harvested (light partial cuts to clearcuts). The most recent harvest activity occurred in 1993.

- Small amount of logging on private lands along the North Fork Road. Stoltz has logged portions of their land in the lower reaches of the McGinnis Creek drainage.

Present

- Groomed snowmobile trail in Canyon Creek (Robert fire)
- Cedar Spoon fuels project (900 acres) south of Roberts (Cedar-Teakettle subunit). Timing??

Ongoing activities

- Road and trail maintenance
- Noxious weed spraying at river access sites
- Personal use firewood, Christmas trees, post and poles and boughs
- Hunting, fishing, snowmobiling and dispersed recreation
- Fire suppression as needed
- Private land development
- Monitoring activities
- Heartrot study in Western Larch

Reasonably Foreseeable

- Commercial mushroom harvest (April through July 2004)
- Road BMP work – 75 miles of surveys in Robert (2004) and some implementation starting in 2004
- Trail maintenance/reconstruction, Great Northern Flats and trails
- Reforestation outside of salvage areas
- Cedar Spoons Fuels reduction project (winter 2004/05 at earliest)

Wedge Canyon Past, Present and Reasonably Foreseeable Future Actions

Past

- Fire suppression activities 2003
- Roadside Hazard Tree Salvage winter 2003-4 and summer 2004
- Fire rehab projects 2003 and into 2004
- Wildfires to north and south of Wedge Canyon in 1910
- About 32% of the area within the fire perimeter on NFS lands has been harvested sometime from 1951 to 2002. The most recent harvest activity was from the Hornet-Wedge Decision (12/1996) and harvest occurred from 1998 to 2002.
- Road reclamation, removal or decommissioning (Center Mountain Roads Reclamation DM, (8/1996).
- Wedge Canyon fire suppression and rehabilitation

- Extensive logging/clearing of private lands after Wedge Canyon fire, especially around Tepee Lake area

Present

- One road will be decommissioned summer 2004 (Center Mountain decision)
- Trail Creek road slump repair in 2004
- Roads 1672 and 5234 (Red Meadow Moose subunit) will be decommissioned summer 2004 (Hornet Wedge Decision)
- Road 1671 will be bermed in summer of 2004 (Hornet Wedge Decision)

Ongoing activities

- Road and trail maintenance
- Noxious weed spraying at river access sites
- Personal use firewood, Christmas trees, post and poles and boughs
- Hunting, fishing, snowmobiling and dispersed recreation
- Fire suppression as needed
- Private land development
- Monitoring activities
- DNRC is logging sec. 16
- Heartrot study in Western Larch
- Ford (May 20 to March 10), Hornet (yearround) and Ninko (Dec 1 to March 31) rental cabins

Reasonably Foreseeable

- Commercial mushroom harvest (April through July 2004)
- Road BMP work – 54 miles of surveys in Wedge to identify needs (2004) and begin implementation in 2004 and up to 2006
- Trail maintenance/reconstruction
- Reforestation outside of salvage areas

Summary of Cumulative Effects

Grizzly bear

Within the grizzly bear subunits that comprise the cumulative effects analysis area (two for Robert, four for Wedge Canyon), past management activities have altered habitat conditions. These activities include timber harvest, firewood cutting, gathering forest products, motorized and non-motorized recreation and hunting. Probably the most significant management activity that has influenced grizzly bear habitat has been the construction of roads. The grizzly bear study in the Swan Mountains of Montana (Mace and Waller 1997) demonstrated relationships between roads and grizzly bear habitat use patterns. Bears tend to avoid roads, especially those open to motorized traffic.

In addition to the regularly occurring activities, fire suppression efforts and post-fire burned area rehabilitation activities have probably had some level of disturbance and displacement.

However, because of the fire and lack of cover, the effects of displacement from management activities were probably low.

Mushroom harvest is another forest activity with the potential to displace grizzly bears, especially in the summer of 2004. Mushroom harvest following the Moose fire brought hundreds of people into the area. This may have caused displacement of bears, but no human-bear conflicts were reported. Mushroom harvest declines sharply after the first post-fire year.

Best Management Practices (BMP) work will be occurring and will likely take several years to complete. The work consists of improving road drainage, upsizing culverts, and removal of fish barriers.

Spring black bear hunting is expected to continue in the fire areas and given the current lack of cover, the risk of loss of grizzly bears may occur. Administrative use of closed roads for reforestation or road-related work may also affect grizzly use of the area.

Field work associated with a study of occurrence of heart rot in fire-killed western larch will occur during the summers of 2004 and 2005. This is a minor activity, will use existing roads and would fell no more than 300 snags over the two seasons.

Robert fire

Canyon-McGinnis subunit

Major activities in this subunit are displayed in Table 90. Only major activities in the last 10 years and out into the future are displayed. Minor, ongoing activities will continue to occur across the subunits. There has been no timber harvest in the last 10 years.

Table 90. Major activities occurring in Canyon-McGinnis subunit

Year	Activities
2003	Robert fire suppression
2003/2004	Roadside Hazard tree salvage, fire rehab
2004	Commercial mushroom harvest (April through July)
2004-2006	Road BMP work (71 miles total, 0.1 mile in core)
2004-2006	Salvage
2004-2009	Planting/Reforestation

Major activities began in 2003 and are expected to continue through 2009. Habitat availability and security would be improved over the long-term with implementation of additional road management actions.

Cedar Teakettle subunit

Major activities in this subunit are displayed in Table 91. Only major activities in the last 10 years and out into the future are displayed. Minor, ongoing activities will continue to occur across the subunits. Because only 3% of the subunit was affected by the Robert fire, activities associated with this salvage are not expected to....

Table 91. Major activities occurring in Cedar Teakettle subunit

Year	Activities
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2003	Robert fire suppression
2003/2004	Roadside Hazard tree salvage, fire rehabilitation
2004	Commercial mushroom harvest (April through July)
2004-2006	Road BMP Work (11.1 miles, none in core); Cedar Spoon Fuels Reduction Project

The Robert fire only affected 3% of this subunit and activities since 2003 are concentrated in a small area of the subunit. Salvage activities would take less than 30 days and are considered a minor activity.

Wedge Canyon fire

Ketchikan subunit

Major activities in this subunit are displayed in Table 92 Only major activities in the last 10 years and out into the future are displayed. Minor, ongoing activities will continue to occur across the subunits.

Table 92. Major activities occurring in Ketchikan subunit

Year	Activities
2003	Wedge Canyon fire suppression
2003/2004	Roadside Hazard tree salvage, fire rehabilitation
2004	Commercial mushroom harvest (April through July)
2004-2006	Road BMP Work (8.2 miles, none in core)

There is only one proposed unit in this subunit and harvest would take less than 30 days and is considered a minor activity.

Lower Whale subunit

Major activities in this subunit are displayed in Table 93. Only major activities in the last 10 years and out into the future are displayed. Three timber sales have occurred in the recent past, as a result of the Hornet Wedge Decision. Minor, ongoing activities will continue to occur across the subunits.

Table 93. Major activities occurring in Lower Whale subunit

Year	Activities
1998-1999	Doogan Dog timber sale (374 acres)
1999	Happy Trails timber sale (99 acres)
1999-2002	Help Me Rhonda timber sale (59 acres)
2002	Snap Crackle Pop timber sale (9 acres)
2003	Wedge Canyon fire suppression Center Mountain roads reclamation Extensive logging on private lands around Tepee Lake
2003/2004	Roadside Hazard tree salvage, fire rehabilitation

2003/2004	Salvage of 227 acres on state land
2004	Commercial mushroom harvest (April through July) Center Mountain road reclamation (1 road) Rd 1671 bermed (Hornet-Wedge)
2004-2006	Road BMP Work (30.9 miles total, 4.7 miles in core)
2004-2006	Salvage
2005-2009	Planting/reforestation

There have been major activities in this subunit, most years since 1998. Habitat availability and security would be improved over the long-term with implementation of proposed road management actions.

Upper Trail subunit

Major activities in this subunit are displayed in Table 94. Only major activities in the last 10 years and out into the future are displayed. Minor, ongoing activities will continue to occur across the subunits. Because less than 1% of the Lower Big subunit was affected by the Robert fire, only part of one unit (323) is in Lower Big, it is a helicopter unit and logs will be flown down into the Canyon-McGinnis subunit, no further analysis will be done for this subunit.

Table 94. Major activities occurring in Upper Trail subunit

Year	Activities
1998-1999	Doogan Dog timber sale
1999	Happy Trails timber sale
2003	Wedge Canyon fire suppression
2003/2004	Roadside Hazard tree salvage, fire rehabilitation
2004	Commercial mushroom harvest (April through July)
2004-2006	Road BMP Work

Upper Whale Shorty subunit

Major activities in this subunit are displayed in Table 95. Only major activities in the last 10 years and out into the future are displayed. Minor, ongoing activities will continue to occur across the subunits.

Table 95. Major activities occurring in Upper Whale Shorty subunit

Year	Activities
2003	Wedge Canyon fire suppression
2003/2004	Roadside Hazard tree salvage, fire rehabilitation
2004	Commercial mushroom harvest (April through July) Rd 1672 decommissioned (Hornet-Wedge)
2004-2006	Road BMP Work (9.6 miles total, .4 miles in core)

There are only 5 units proposed in this subunit, and would take less than 30 days to harvest and is considered a minor activity.

Summary

There have been many past forest management and recreational activities in the above subunits. Fire suppression and follow up best management practices activities have likely caused some level of displacement. Post-fire mushroom harvest in the spring and summer of 2004 may also contribute to some displacement. The proposed salvage may take as long as three years to complete. Considering the reductions in grizzly bear habitat and security as a result of roading, the ongoing human activities discussed above, and the existing levels of motorized access, the implementation of the Proposed Actions would have a determination of “may affect – likely to adversely affect” the grizzly bear and its habitat.

Gray wolf

The cumulative effects analysis area for wolves are the same subunits as described above for grizzly bear. Past road building and timber harvest may have had initial negative effects on ungulate populations because of increased access by hunters. However, the conversion of mature forest to early successional habitats has generally provided increased levels of forage and higher population potentials for ungulates. The increased emphasis on road closures over the last 15 years has probably had a generally positive effect on ungulate survivability during hunting seasons, leaving more prey available for wolves.

None of the reasonably foreseeable future actions are expected to affect ungulate populations or risk of mortality. These future actions include commercial mushroom harvest, road BMP work, road reclamation and decommissioning etc (see tables 75 to 80). Considering the past habitat modification, the existing relatively low ungulate carrying capacity, and reasonably foreseeable future actions, the determination is that implementation of the Proposed Action “may affect but is not likely to adversely affect” the gray wolf or its habitat.

Canada Lynx

The cumulative effects analysis areas for lynx are the affected LAU’s. Past activities have had varied effects on lynx habitat. Even-aged timber harvest methods temporarily removed both snowshoe hare and red squirrel habitat, reducing prey densities. Over time, these areas provided early-successional habitats required by snowshoe hares. Intermediate harvest methods opened the forest floor to sunlight, most likely stimulating shrub and conifer seedling growth that favored snowshoe hares, yet retained overstory mature, cone-producing trees needed by red squirrels.

Within the Robert fire, about 6% of the area has had regeneration harvest and another 7% has had some kind of intermediate harvest. Within the Wedge fire, about 8% of the area has had some regeneration harvest, and another 4% has had some kind of intermediate harvest. The effects of these past harvests have been incorporated into the existing habitat conditions.

It is expected that this past harvest may have decreased the amount of available denning habitat. However, lynx have been known to den under single tree stumps, rootwads and shrubs (Ruggerio et al 2000). The proposed action does not propose treatments in denning habitat and no effects are expected. Over the long-term, snag retention in the units will provide for recruitment of downed logs that could provide denning structure.

Human activities in the areas (cabins, trails, and roads) have probably only had minor direct effects on lynx habitat because lynx are tolerant of human presence (Ruediger *et al.* 2000). Indirect effects from winter recreation as a result of compacted snow trails are possible. These compacted trails may provide a path for other predators that were previously excluded by deep snows, to reach lynx prey species. Because winter logging would access areas that generally burned at a high or moderate severity, there would be little foraging habitat

provided for lynx and these projects should not contribute to effects from other winter activities. Implementation of the Proposed Action would result in a determination of “may affect – not likely to adversely affect” the lynx or its habitat.

Bald eagles

The North Fork river corridor in the Robert project area is mainly in public lands (Flathead National Forest and Glacier National Park). The Wedge project area includes private and state lands along the corridor. Because the North Fork is designated a Wild and Scenic River, management activities have been restricted, and limited human-caused habitat alteration has occurred within the corridor. If beetle outbreaks do occur, remaining live spruce and Douglas-fir trees could be attacked, weakened and eventually die. As long as these trees remained standing they could function as perches.

Other project activities outside of the corridor but in the project areas could cause some foraging displacement during the fall or winter when eagles may be foraging in the uplands. As discussed in the Affected Environment section, recreational use in the river corridor is ongoing and disturbance-related impacts may be occurring. This recreational use contributes to disturbance within nest home ranges but all nest sites are managed under approved Nest Management Plans. However, these proposals would have no cumulative impact with recreation impacts.

Reasonably foreseeable actions are proposed to occur in upland sites, and have little potential for impacting bald eagles. No effects are expected from activities such as mushroom harvest, trail maintenance, road BMP work or reforestation.

Implementation of the Proposed Action would result in a determination of “may affect – not likely to adversely affect” the bald eagle or its habitat.

3.4.5 Multi-Scale Assessment

Grizzly bear

Flathead National Forest lands comprise about 40% of the Northern Continental Divide Grizzly Bear Ecosystem (NCDE). There are 73 grizzly bear subunits on the Flathead, and Amendment 19 applies to 54 of those subunits. Of the 19 subunits where A19 does not apply, 16 are in the Bob Marshall Wilderness where road management is not an issue. The other three subunits are in the Stillwater drainage where NFS lands comprise less than 10% of the subunits.

A19 applies to 54 of the subunits on the Forest, and was developed to provide direction concerning levels of open roads, total roads and secure habitat that contribute to the recovery and conservation of grizzly bears. Fourteen of the subunits (including Cedar-Teakettle) have less than 75% NFS lands and have a “no net loss” objective. Forty of the subunits have more than NFS lands and 18 of them met the 19/19/68 standard in 1995 when A19 was signed. At the end of 2000, the same 18 meet A19, plus there are four additional ones that would meet the objectives once recent NEPA decisions were fully implemented (R1 Cohesive Strategy, Hillis *et al.* 2003).

Progress in closing and decommissioning roads has been made across the Forest since 1995. Available information indicates that between 1995 and 1999, total miles decreased by about 210 miles, open miles decreased about 145 miles, seasonally open miles decreased about 5 miles and restricted miles decreased from about 60 miles. Additional miles have been restricted or decommissioned since 1999, but updated numbers are not available at this time.

A19 included both five and ten year objectives for reaching standards. The 5-year objectives were not met and in 2000 the Flathead National Forest requested re-initiation of formal consultation and this process is still ongoing. The expected outcome is to revise the implementation schedule with the continuing goal that the open road density, total road density and security core standards will be met unless changed through individual subunit consultations (such as occurred in the Werner Creek subunit as a result of the Moose Post-fire project).

Other direction for grizzly bear habitat management includes the Food Storage Order, Cooperative Access Management, cooperation with MFWP and population monitoring. Population estimates from 1998 and 2000 indicate that populations in the study area are contributing significantly to the NCDE-wide population goal (USFS 2002, pg 3-133).

Of the seven subunits analyzed for these two proposals, five currently meet and would continue to meet all three of the A19 objectives. Two subunits (Canyon-McGinnis and Lower Whale) would move closer to, but would continue to not meet A19 objectives.

Wolf

The recovery goal for wolves in the Montana/Idaho/Wyoming area is 30 packs. That is goal was met in 2000 and in 2003 there were 51 breeding pairs across the Northern Rocky Mountains. While there were 17 breeding pairs in Montana in 2002, in 2003 this dropped to 10. Northwest Montana had 12 breeding pairs in 2002, but this dropped to four in 2003 (while numbers in Central Idaho more than doubled). At least 21 wolves from this population died in 2002; 14 in control actions, four by vehicles and two by illegal shooting (FWS *et al.* 2004).

This species has a high reproductive rate, is very mobile and has some habitat connectivity with wolves in Canada. Previous declines in numbers of breeding pairs were followed by increases and this would be expected to occur again. Wolf pack numbers at the Forest, Western Montana Recover Area and Northern Rockies area indicate that cumulative, broad-scale activities are consistent with recovery.

Table 96. Number of breeding pairs by recovery area, since 1995 (FWS *et al.*, 2004)

Recovery Area	1995	1996	1997	1998	1999	2000	2001	2002	2003
NW MT	6	7	5	5	6	6	7	12	4
Yellowstone	2	4	9	6	8	14	13	23	21
Central ID	0	3	6	10	10	10	14	14	26
Total	8	14	20	21	24	30	34	49	51

Lynx

Lynx are a disturbance-dependent species (Ruggerio *et al.* 2000). Stands 0 to 15 years old, while unsuitable to lynx in the short run, are needed to provide habitat for snowshoe hare and foraging habitat for lynx in the future.

The Regional One Canada Lynx Assessment (Hillis *et al.* 2002) was used to compare LAU-scale findings to several scales. Levels of unsuitable habitat are below the standard at all scales except the LAU. This would be expected at the LAU scale, where the effects of large, naturally occurring fires would be felt. While the denning and foraging habitat has not been field verified, it appears that foraging and denning is adequate at the LAU scales.

Table 97. Levels of lynx habitat across LAU, Forest, Planning Zone and Region One scales (Hillis et al, 2002)

Scale	Unsuitable	Foraging	Denning
Historic range of variability	9.5%	19%	10%
LCAS standard	30% max	NA	10% min
Canyon LAU	39%	60%	36%
South Trail Tepee LAU	62%	36%	11%
Lower Whale	29%	68%	33%
Flathead NF	9.7%	8.9%	*
Planning Zone (F, Lolo and Bttrt)	9.3%	4.0%	*
Region One	9.2%	5.4%	15.1%

While other factors outside of Forest Service control (non-target trapping mortality, high competing predator populations etc) may impede lynx recovery, the actions taken in these projects are fully compatible with recovering lynx to non-listed status and consistent with maintaining habitat for viable populations of lynx at the regional scale.

Bald Eagle

Bald eagles have been increasing across their range, and in Region One. They were down-listed from endangered to threatened in 1995. Recovery goals at that time were for 800 pairs in the 7-western state area. The recovery goal has been met and exceeded.

The Flathead National Forest has about 10 nesting pairs (USFS 2002). There were 138 active nests in western Montana and 297 active nests statewide in the 2001 nesting season. Proportionately, the Flathead National Forest and western Montana have many more nests than the rest of the State. Montana alone has more than a third of the nests needed to meet the 7-state recovery goal of 800 nests. Actions proposed are consistent with recovering bald eagles to non-listed species.

3.4.6 CONSISTENCY WITH FOREST PLAN

Grizzly bear

Objectives for MS 1 are to provide high-quality habitat for seasonal foraging needs, free-ranging movement and dispersal of resident grizzly bears, and low risk of mortality due to human bear conflicts.

The Wedge fire burned about 7,830 acres of MA11 (11%). Units initially proposed for harvest in MA11 were dropped due to resource concerns and public comments.

Amendment 19 (1995) provided road density and security core objectives. In BMU Subunits (>75% FS); 1) limit high density (>1 mi/mi²) open motorized access to no more than 19% of a BMU subunit within 5 years; 2) limit high density (>2 mi/mi²) total motorized access to no more than 24% of a BMU subunit in 5 years, and no more than 19% in 10 years; and provide security core areas that equal or exceed 60% of each BMU subunit in 5 years, and 68% in 10 years. Two subunits, Canyon-McGinnis and Lower Whale would not meet these objectives under the Proposed Action.

To be in full compliance with these objectives, additional road management would have to take place. Over 20 miles of open yearlong/seasonally open roads would have to be closed to

wheeled motorized vehicles; the Proposed Action closes about 5 miles. In addition, another 45 miles of roads would need to be decommissioned; the Proposed Action decommissions 16 miles of road. Because of the small size of the Lower Whale subunit, and miles of main open roads (North Fork and roads in Glacier National Park) it is impossible to meet the ORD objective without restricting access to private and state lands. The West Side Reservoir Post Fire Project DEIS concurrently is developing proposed alternatives that would identify project specific Forest Plan amendments for 3 subunits, in addition to an alternative proposed to meet the Forest Plan.

The revised 1989 Biological Opinion on the Forest Plan recommended a “3&7” rule for MS 1, that would guide activity scheduling by BMA. The “3&7” rule refers to human activities, especially timber sales, within BMA’s that last longer than 30 days can only occur for a maximum of three consecutive non-denning years and then rest for seven. This, in theory, assures that only one litter of cubs out of a 10-year period would not get familiar with the mothers home range because of displacement. This rule is to be used until security core areas as per Amendment 19 are identified and effective on a site-specific basis (Moose BA 2002). The post-fire environmental baseline does not meet A19 and some Forest Plan guidelines. The Flathead will formally consult with the FWS before any proposed action could be selected for implementation. The proposed actions 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.

Gray wolf

The project area lies in Management Zone 1 as designated in the Flathead Forest Plan and lies in the Northwest Montana Recovery Area. It contains habitat components necessary to support wolves. The Flathead Forest Plan provides management directions and standards to guide project planning. The Proposed Action 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.

Canada Lynx

The Flathead National Forest does not currently include direction specific to lynx, but they are included in a current process to amend Forest Plans to incorporate direction for management of lynx habitat. Indicators used for the lynx analysis were taken from the LCAS (Ruediger *et al.* 2000) which was used as a basis for amending Forest Plans. Effects indicators used to address direct and indirect effects are currently included in all action alternatives of the DEIS Northern Rockies Lynx Amendment (2004). The proposed action is also consistent with Forest Plan snag and coarse woody direction (denning habitat components).

Bald Eagle

The main Forest Plan standards for protection of bald eagle habitat include limiting disturbance around nests during the nesting season; consulting with FWS if activities would change vegetation within ¼ mile of active nest; retention of snags around large bodies of water; and adherence to the Montana Bald Eagle Management Plan.