Aquatic Biological Evaluation

Sensitive Aquatic Species Potentially Affected

There are three sensitive aquatic species that may potentially be affected by the Basin Creek Fuels Reduction project: westslope cutthroat trout (*Oncorhynchus clarki lewisi*), northern leopard frog (*Rana pipiens*), and boreal toad (*Bufo boreas boreas*). Bull trout (*Salvelinus confluentus*) reside in the Upper Clark Fork River basin approximately 25 to 30 miles west of the project area but none reside in or near the project area. Fluvial arctic grayling (*Thymallus arcticus*), though present in some areas on the Beaverhead-Deerlodge National Forest, are not native to the upper Clark Fork River and do not stand to be affected by this project. Neither bull trout nor arctic grayling stand to be potentially affected by this project so they were not analyzed in detail in this biological evaluation.

Sensitive Amphibians

Northern Leopard Frog

The northern leopard frog historically ranged from Newfoundland and northern Alberta in the north to the Great Lakes region, the desert Southwest and the Great Basin in the south (Maxell 2000). In Montana they have been documented across the eastern plains and in many of the mountain valleys on both sides of the Continental Divide at elevations up to 6,000 feet. Over the last few decades the leopard frog has undergone declines across much of the western portion of their range (Stebbins and Cohen 1995 as reported in Maxell 2000). Most northern leopard frogs in western Montana became extinct in the 1970s or early 1980s. The only 2 population centers known to exist in western Montana are near Kalispell and Eureka (Maxell 2000). The northern leopard frog is a sensitive species in all the Region 1 Forests.

Northern leopard frogs tend to use permanent slow-moving or standing water bodies with considerable vegetation, wet sedge-meadows, cattail meadows, springs, and beaver ponds in streams as habitat (Reichel and Flath 1995, Maxell 2000). They usually breed in ponds or lake edges with dense aquatic vegetation (Corkran and Thoms 1996). Adults are usually found in riparian habitats or on prairies near permanent waters (summarized by Maxell 2000). Adults feed on invertebrates, but may cannibalize smaller individuals. Northern leopard frogs overwinter burrowed into lake or pond bottoms, beneath substrate in streams, or in underground crevices that do not freeze (Maxell 2000).

Boreal Toad

The western toad (*Bufo boreas*), is currently recognized as two subspecies ranging from the Rocky Mountains to the Pacific Coast and from Baja Mexico to southeast Alaska and the Yukon Territory (Stebbins 1985 as reported in Maxell 2000). One subspecies, the boreal toad, is recognized in Montana.

Within the last 25 years, populations of boreal toads have undergone population crashes in Colorado, Utah, southeast Wyoming and New Mexico (Loeffler 1998). It is listed as endangered by

the state of Colorado and considered a candidate species which is "warranted, but precluded" for federal listing by the U.S. Fish and Wildlife Service in the southern Rocky Mountains (Colorado, southeast Wyoming and northern New Mexico) (Loeffler 1998).

In the northern Rocky Mountains boreal toads have also undergone declines. Surveys in the late 1990s revealed they were absent from a number of areas they historically occupied. While they remain widespread across the landscape, they appear to be occupying only 5 to 10 percent or less of the suitable habitat (Maxell 2000). Based on these findings the USFS listed the boreal toad as sensitive in all of Region 1's National Forests, and initiated a regional inventory in Montana. As a result, a systematic inventory of standing water bodies in 40 randomly chosen 6th level hydrologic unit code (HUC) watersheds was completed across western Montana during the summer of 2000. Results indicated they were widespread, but extremely rare.

Adult boreal toads reside in a wide range of habitats including wetlands, forests, woodlands, sagebrush, meadows, and floodplains (reviewed by Maxell 2000). Adults feed on a variety of ground dwelling invertebrates and are known to eat smaller individuals of their own species. Breeding typically occurs from May to July in shallow areas of large and small lakes, ponds, slow moving streams, backwater channels of rivers, and roadside ditches (Black 1970a and Metter 1961; as reported in Maxell 2000).

Tadpoles metamorphose in mass in 40 to 70 days and can be found in dense aggregations of hundreds of individuals adjacent to breeding grounds upon emergence during summer (Black and Black 1969, Maxell 2000). Young toads are limited in distribution and movement by available moist habitat but adults can move several miles to reach their habitats (Loeffler 1998). Adult and juvenile toads are freeze-intolerant. During winter they hibernate in subterranean chambers underlaid by flowing groundwater to prevent freezing (Campbell 1970) or in small mammal burrows below the frost line (Loeffler 1998, Maxell 2000).

Local Amphibian Surveys

Amphibian surveys were conducted on the Butte and Jefferson Ranger Districts in summer 2001 (Fernandes 2001). Northern leopard frogs were not found at any sites surveyed in 2001 (Fernandes 2001). Boreal toads were conclusively found at 4 out of 14 sites surveyed (Fernandes 2001). Surveys done by the University of Montana in the Basin Creek subwatershed in 2003 indicated boreal toads present at 3 out of 13 wet lentic habitats sampled (Bryce Maxell, personal communication 2004). If these were representative sampling efforts in these two years, then boreal toads may occupy approximately 23 to 28 percent of slow-water habitats on the Butte and Jefferson districts.

In 2001 boreal toads were found in Bear Gulch, tributary to Basin Creek, in the project area (Fernandes 2001). There is no proposed management activity near the Bear Gulch site.

Surveys were also conducted in summer 2002 and spring/summer 2003 in areas more specifically focused within this project area. No amphibians were seen in two small perennial, non-fish-bearing streams while spotted frogs (*Rana luteiventris*) were seen in a small pond area adjacent to Basin Creek between the two reservoirs. Spotted frogs were also seen in Basin Creek proper between

the two reservoirs. Suitable boreal toad habitat exists in unsurveyed areas in the project area, particularly in beaver ponds and stream reaches of China Gulch, Herman Gulch, and other unnamed perennial streams in the project area. One boreal toad and numerous spotted frogs were seen in an unnamed tributary to China Gulch in spring 2003 (Appendix B, Map 26). Boreal toad tadpoles were found at one site in China Gulch and in a small localized portion of upper Basin Creek Reservoir (Appendix B, Map 26). Boreal toads and spotted frogs were also found at one site in the headwaters of Basin Creek upstream of proposed fuels reduction activity. In each case (with the exception of upper Basin Creek Reservoir) the habitat where toads were found consisted of a series of beaver ponds constructed within stream channels. As the upper Basin Creek reservoir is on lands owned by Butte-Silver Bow, no activities are proposed near this site with this project.

Overall there are five sites in the Basin Creek subwatershed where boreal toads have been found. Reproduction has been confirmed at two of these five sites. Numbers of boreal toad tadpoles found at each reproductive site indicated small numbers of breeding adults using each site. No northern leopard frogs were found in the project area.

Additional unsurveyed amphibian habitat exists in the main stem and headwater areas of China Gulch, as well as in a portion of main stem Herman Gulch. One site, a pond in main stem Herman Gulch, was surveyed in 2003 but no sensitive species were found there.

Boreal toads likely reside in a number of additional unsurveyed sites in the Basin Creek subwatershed both on and off the Forest. There is additional potential habitat for boreal toads downstream of the Forest boundary on private lands, particularly associated with two ponded areas on Basin Creek proper just north of the Forest boundary, and in Basin Creek itself between and downstream of these ponds. There are approximately 5 miles of habitat in main stem Basin Creek off the Forest that are likely usable by toads although habitat conditions have likely been affected by livestock use, residential development, and some timber harvest. These areas have not been surveyed to determine presence of sensitive aquatic species.

In the Blacktail Creek subwatershed boreal toads have been found at one site in the headwaters. Breeding was confirmed at this site in 2003 and it does not stand to be affected by this project because it is approximately 1.5 miles upstream of any proposed activity. Only one other site in Blacktail Creek, at the north end of the subwatershed near the Forest boundary in Thompson Park, has been surveyed. No boreal toads have been found to date in this Thompson Park area. Habitat in main stem Basin Creek through the Thompson Park area has been altered by the presence of heavily traveled valley bottom roads (Highway 2 and Roosevelt Drive) along about 4.5 miles of the stream. These roads have introduced excessive amounts of fine sediment to the creek and may also serve as mechanisms of direct mortality to toads via crushing by vehicles. These roads also may be connectivity barriers to toads through the length of the riparian area they occupy. In spite of these impacts, this portion of the stream may still provide habitat for toads.

Given that only two sites have been surveyed in Blacktail Creek subwatershed, there is a large amount of potential habitat in Blacktail Creek proper (approximately 7 stream miles), particularly through Thompson Park and downstream, that has potential to support boreal toads. Other smaller streams in the headwaters on both private and National Forest lands may also support toads as well.

Westslope Cutthroat Trout

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*), inhabit streams on both sides of the Continental Divide. Its eastside distribution is largely in Montana, but includes some headwaters in Wyoming and southern Alberta (Behnke 1992). It occurs in the Missouri basin downstream to about 60 km below Great Falls and in headwaters of the Judith, Milk, and Marias rivers. On the west side the subspecies occurs in the upper Kootenai River, the Clark Fork River, the Spokane River above Spokane Falls, the Coeur d'Alene and the St. Joe watersheds, and the Clearwater and Salmon rivers.

Westslope cutthroat trout distribution and abundance are in decline (Liknes and Graham 1988, Behnke 1992). East of the Continental Divide, less than 5 percent of its historic range is occupied within the upper Missouri River watershed in Montana. Extinction risk for 144 known populations on federally managed lands was assessed using a 'customized' Bayesian viability assessment procedure (Shepard et al. 1997). Probability of persistence was estimated based on subjective evaluation of population survival and reproductive rates as influenced by environmental conditions (Lee and Rieman 1997). Results indicated 90 percent of the populations were at a high, to very high risk of extinction over the next 100 years (Shepard et al. 1997). These findings prompted completion of a statewide conservation strategy, which was completed in 1999.

Habitat abundance and quality is a significant concern for WCT because of increased risk of local and more extensive extirpation. Major factors in the decline of WCT include competition and hybridization with non-native salmonids, overfishing, and habitat loss, fragmentation and degradation (Liknes and Graham 1988, Rieman and Apperson 1989). In general, westslope cutthroat trout now reside primarily in small, headwater, mountain streams as the factors leading to their decline have most profoundly affected larger streams and rivers.

Genetically pure westslope cutthroat trout are present in approximately 1.5 miles of stream habitat in Basin Creek as discussed in detail in Chapter 3 of the FEIS. They are also found in Blacktail Creek although the genetic purity of these fish is less certain.

Potential Effects to Sensitive Aquatic Species

General Effects to All Sensitive Aquatic Species

Potential effects of this project on aquatic habitats and species are discussed in detail in Chapter 3 of the FEIS for this project. The No Action alternative (Alternative 1) would have a wide range of potential effects due to the assumption of a large-scale wildland fire taking place in the year 2028 in a non-geographically specific location in the planning area. The range of possible effects is discussed in detail in Chapter 3 of the FEIS.

Under the action alternatives, some erosion and sedimentation of aquatic habitats would likely be expected on a small-scale in localized areas associated with proposed activity. The most likely places this would occur are along stream or wetland crossings. There are four crossings proposed

in Alternative 2, three crossings proposed in Alternative 3, two crossings in Alternative 4, and two crossings in Alternative 5. No stream crossings are proposed on fish-bearing streams in any action alternatives. Stream or wetland crossing construction would entail localized alteration of aquatic habitat morphology that would likely occur along tens of feet of habitat at each crossing. Additional localized sediment inputs to Herman Gulch and China Gulch would be expected with the proposed reconstruction of their valley bottom roads. All proposed new roads would be temporary and would be decommissioned upon completion of the project. Of the three sensitive aquatic species, sediment-related effects would likely most affect boreal toads because they are likely to be the most widely distributed species in the project area. No northern leopard frogs have been found in the project area to date and westslope cutthroat trout are limited in their distribution within the project area, primarily to areas upstream of the majority of proposed activity.

There would be some risk associated with the potential for hazardous fuel spills into aquatic habitats in all action alternatives. As per mitigation measures described in the EIS there would be no refueling or fuel storage allowed within RHCAs thus limiting the risk of fuel spills accessing aquatic habitats.

Aquatic habitat morphology could potentially be changed by increased peak flows. The potential for increased peak flows is predicted to be minimal with all action alternatives because widespread lodgepole pine mortality due to the mountain pine beetle outbreak is likely to facilitate a natural increase in annual water yield of approximately 12.5 percent regardless of fuels reduction activity (see the Hydrology/Riparian section in Chapter 3 of the FEIS for more rationale behind estimated water yield increases). This increase in water yield reflects some unknown increase in magnitude or duration of peak flows. The greatest potential water yield increase for any of the five drainages analyzed for this project with any action alternative would be 15 percent in Herman Gulch with alternative 4 (the most impactive alternative). This increase is very similar to what would be expected under natural conditions brought about by the mountain pine beetle outbreak. A 14.25 percent water yield increase is predicted with Alternative 4 for China Gulch where stream channel morphology may be at greatest risk due to existing conditions. In main stem China Gulch there is a series of remnant beaver dams no longer being maintained by beavers because willow communities are currently inadequate to support beavers. The remnant beaver dams are likely going to eventually fail because there are no beavers present to maintain them. The ponds upstream of these remnant beaver dams are at risk of being dewatered in the near future even under natural conditions, especially with the advent of increased peak flows due to the mountain pine beetle outbreak.

Boreal Toads

Potential effects associated with sedimentation of breeding habitats, loss of shade, and loss of large wood recruitment would be minimized by the presence of no-treatment riparian buffers described in the DEIS.

One effect to boreal toads is the potential for toads to be killed by prescribed burning treatments in colonized parks in action alternatives. These treatments would have to occur during spring months when any boreal toads present in these parks would potentially be emerging from hibernation. Breeding individuals overwintering in colonized parks might vacate them en route to breeding habitats prior to prescribed burning activities. Individuals not moving toward breeding habitats

would likely be at greater risk of mortality due to prescribed fire activities. Table 3.53 in the FEIS displays prescribed burning acres by alternative where this effect might occur. Alternative 4 at approximately 362 acres creates the greatest risk to toads from this perspective, followed in order by Alternative 5 at 342 acres, Alternative 3 at 311 acres, and Alternative 2 at 181 acres.

Alternatives 3, 4, and 5 all propose activity in the vicinity of the two China Gulch boreal toad sites, one of which supported breeding in 2003. To reduce risk of altering these sites to the point of unsuitability for breeding, these sites would receive a 500-foot no-treatment buffer in all action alternatives. Bartelt (2000) found that 75 percent of all adult male boreal toad movements in his study were confined to an approximately 500-foot radius of breeding sites during the breeding season. To minimize risk of squashing or burning individual toads with management activities, fuels reduction activities within an approximately ¼-mile radius of the China Gulch sites would be limited to winter months while toads are hibernating.

Because boreal toads reside in upslope areas from autumn through spring, they may also be crushed by equipment and vehicles used during fuels reduction activities (Bryce Maxell, personal communication 2004, Loeffler 1998). This mortality could be associated with activity in treatment areas as well as on roads used for implementation. Tree and down wood removal, particularly from regeneration harvest units may create migration barriers that prevent toads from accessing upslope overwintering areas. Running over ground with equipment may also collapse small mammal burrows used for overwintering by boreal toads (Loeffler 1998). Loeffler (1998) documented that in one study in Rocky Mountain National Park, most male toads were usually found within 300 feet of water while females were more wide-ranging and were found as far away as 2.5 miles from their breeding habitats. Slash burning and broadcast burning of colonized parks may also cause direct mortality to boreal toads. Based on these potential effects, the relative risk of these impacts by action alternative would likely vary commensurately with the relative amounts of ground disturbing activities located adjacent to riparian habitats described in the Effects to Fisheries and Aquatic Resources section in Chapter 3 of the FEIS. From this perspective Alternative 3 poses the greatest risk to boreal toads followed in order by alternatives 4, 5, and 2. Alternative 1 (no action) poses the risks associated with a large-scale wildland fire occurring in 2028 described in Chapter 3 of the FEIS.

Northern Leopard Frogs

Northern leopard frogs have not been found in the project area and are not believed to be present. If they are present, potential effects associated with sedimentation of breeding habitats, loss of shade, and loss of large wood recruitment would be minimized by the presence of no-treatment riparian buffers described in the FEIS. Risk of hazardous fuel spills would be minimized by excluding refueling and fuel storage activities from RHCAs. If northern leopard frogs are present, relative risk of the action alternatives would be similar to that for boreal toad: Alternative 3 would pose the greatest risk, followed in order by alternatives 4, 5, and 2. Alternative 1 (no action) would pose the risks associated with a large-scale wildland fire in 2028 described in Chapter 3 of the FEIS.

Westslope Cutthroat Trout

Direct and indirect effects to westslope cutthroat trout would be minimized by the RHCA buffers with all action alternatives. There remains a relatively low risk that with all action alternatives that eroded sediment could be transported into main stem Basin Creek where westslope cutthroat trout reside. The most likely source of sediment to westslope cutthroat trout habitats would be indirect from the Herman Gulch and China Gulch areas where relatively large amounts of fuels reduction activity are proposed and where road reconstruction and timber haul would occur on valley bottom roads. Sediment accessing Herman and/or China Gulch could be transported to Basin Creek downstream of the lower reservoir where habitat conditions are already impaired (see existing conditions and cumulative effects sections in the FEIS) and where westslopes are believed to reside with non-native brook trout.

The portion of the planning area most heavily used by westslopes, Basin Creek upstream of the lower reservoir (Upper Basin drainage as described in the FEIS), has comparatively little activity proposed (151 to 1,765 acres in action alternatives) relative to other portions of the planning area such as in China and Herman gulches where westslopes do not reside. The approximately 1,765 acres of treatment proposed in Alternative 4 is located primarily on ridgetops and midslope areas away from riparian habitats. The majority of this proposed activity would be located at least 0.75 mile from the fish-bearing portion of Basin Creek. This area also has very little ongoing activity aside from this project to which this project would contribute to cumulative effects.
The risk of project-derived sediment accessing Blacktail Creek and affecting westslope cutthroat trout there is negligible. Proposed treatments are relatively small in scale in the Blacktail Creek watershed and all are located on or near ridgetops on relatively flat ground, at least 1 stream mile from where westslopes reside in this stream. Alternative 1 would pose the risks associated with a large-scale wildland fire in 2028 described in Chapter 3 of the FEIS.

Viability of Sensitive Aquatic Species

The National Forest Management Act of 1976 (NFMA) directs the Forest Service to manage fish and wildlife habitat to maintain viable populations of existing native and desired non-native species in the planning area. Rarely are viability analyses conducted for any species that conclusively determine whether viability is assured under a given habitat and population management strategy. The Beaverhead-Deerlodge National Forest's approach for sensitive amphibians was to map the appropriate habitats on a Forest-wide basis and evaluate the distribution of these habitats across the entire National Forest (the Planning Unit). Because separate Forest Plans are in effect for the formerly separate Beaverhead and Deerlodge National Forests, habitat viability for sensitive amphibian species was evaluated individually for each of these areas.

Northern Leopard Frog

Northern leopard frogs are found in, or near permanent water, but on rare occasions are found near temporary ponds several miles from permanent water. Preferred habitat is swampy cattail marshes on the plains, and beaver ponds in the foothills and montane zones. They have also

been found in low gradient streams with pools and beaver ponds. Suitable habitat exists within the analysis area for this species. Based on amphibian surveys in the Big Hole River watershed, we have considerable information on amphibian distribution on National Forest lands; and no leopard frogs have been found. Non Forest Service lands were not included in the surveys. No northern leopard frogs have been found in the Basin Creek Hazardous Fuels Reduction project area.

In January-March 2003 the Beaverhead-Deerlodge National Forest wildlife biologists made a National Forest-wide assessment of northern leopard frog habitat. A geographic information system (GIS) was used to evaluate potential northern leopard frog habitat, using information collected from satellite imagery or SILC. SILC predicts potential habitat types using life forms, slope, aspect and elevation. Habitat data for each Landscape Analysis Area on the Forest is available for review in the Forest Supervisor's Office in Dillon. For the GIS analysis, northern leopard frog habitat was defined as bog, swamp, wet meadow, lake/reservoir, and streamside riparian.

Based on current best available habitat information for the Beaverhead National Forest, it appears that habitat is well distributed across the landscape for northern leopard frog. However, the aquatic habitats used by northern leopard frogs are poorly represented on the Beaverhead NF (1.89 percent of landscape). (B-D NF Wildlife Habitat Viability Analysis, Query 3 – Bogs, Swamps, Wet Meadow, Lake/Reservoir, and Streamside Riparian).

Based on current best available habitat information for the Deerlodge National Forest, it appears that habitat is well distributed across the landscape for northern leopard frogs. However, the aquatic habitats used by northern leopard frogs are poorly represented on the Deerlodge NF (2.07 percent of landscape). (B-D NF Wildlife Habitat Viability Analysis, Query 3 – Bogs, Swamps, Wet Meadow, Lake/Reservoir, and Streamside Riparian).

Based on the wide distribution of habitat for northern leopard frogs on the Forest, the Basin Creek Hazardous Fuels Reduction project is not expected to increase risk to viability of this species. At the project level scale, all potential breeding habitats for northern leopard frog would receive 150 to 300 foot no-treatment buffers. These buffers are expected to minimize any potential effects to these habitats.

Boreal Toad

This species frequents a wide variety of habitats from grasslands, forests, and subalpine areas in mountains. It breeds in ponds and other calm water bodies. The boreal toad prefers very shallow water (usually less than 6 inches) in exposed areas with no emergent vegetation. This species does occur in the Forest-wide analysis area, but is not well distributed. The proposed alternatives for the Basin Creek Hazardous Fuels Reduction project do contain suitable habitat and boreal toads have been found in the Basin Creek Hazardous Fuels Reduction project area.

In January-March 2003 the Beaverhead-Deerlodge National Forest Wildlife Biologists made a National Forest-wide assessment of boreal toad habitat. A geographic information system (GIS) was used to evaluate potential boreal toad habitat, using information collected from satellite imagery or SILC. SILC predicts potential habitat types using life forms, slope, aspect and elevation. Habitat data for each Landscape Analysis Area on the Forest is available for review in

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Based on the wide distribution of habitat for boreal toad on the Forest, the Basin Creek Hazardous Fuels Reduction project is not expected to increase risk to viability of this species. At the project level scale, all potential breeding habitats for boreal toad would receive 150 to 300 foot no-treatment buffers. Two known boreal toad sites would receive 500-foot no-cut buffers and winter logging within an approximately ¼-mile radius of each site to minimize risk of crushing individual toads. The buffers are expected to minimize any potential effects to these habitats.

Westslope Cutthroat Trout

To assess viability of westslope cutthroat trout populations, it is not adequate to merely examine the amount and distribution of suitable habitat available to them. Even suitable habitat can be impeded or prevented from use by westslopes due to such variables as hybridization, competition with non-native species, or lack of connectivity with other habitats or populations. It is necessary to examine the threats to westslope cutthroat trout in the context of their available habitat. Viability of westslope cutthroat trout was examined at multiple scales including the Beaverhead-Deerlodge National Forest, Silver Bow Creek Watershed, and Basin and Blacktail Creek scales.

General Types of Risk to Population Viability

Rieman et al. (1993) discuss a number of mechanisms whereby fish populations can become locally extirpated or extinct. Deterministic processes are those associated with cumulative loss or permanent change of a critical component in a species environment. An example would be introduction of eastern brook trout that eventually outcompete westslopes and displace them from their historic habitats. Stochastic processes are those associated with chance events. There are generally two types of stochastic events: demographic stochastic events which are associated with population changes being caused by a series of individually unpredictable births and deaths; and environmental stochastic events which apply to periodic environmental variations that cause population fluctuations. In Basin Creek an example of environmental stochasticity may be population changes that may be brought about by a high intensity, high severity large-scale wildland fire taking place in a key area relative to the westslope population.

Beaverhead-Deerlodge National Forest Scale

The area considered for Forest scale analysis includes streams in the Rock Creek drainage and the upper portion of the Clark Fork river drainage west of the continental divide. East of the divide it includes the Boulder, Jefferson, Madison, Ruby, Beaverhead, Red Rock, and Big Hole Drainages and the Madison River drainage below Quake Lake. Data used for this analysis originated from a Forest adaptation of the GIS information provided with the assessment of Shepard et al. (2002) and is located in the project file.

Historic Distribution

Historically westslope cutthroat trout (WCT) probably occupied approximately 33,000 miles in Montana, representing about 59 percent of the total range-wide distribution (Shepard et al. 2002). Around 9,300 of those miles (28 percent of the state-wide total) are within the Beaverhead-Deerlodge National Forest Scale area (hereafter referred to as the B-D area). It was broadly distributed across the drainages (4th field HUCs) listed above. Our best information suggests only 10 of 433 sub-watersheds (6th field HUCs) historically lacked WCT.

Historic cutthroat distribution in the B-D area was relatively balanced between public and private lands. An estimated 48 percent of the stream miles were on Federal lands. Thirty-nine percent (3630 miles) are assumed to have been on the Beaverhead-Deerlodge NF. Streams on private lands probably constituted around 46 percent (4250 miles) of the total. State lands made up the remaining 6 percent (600 miles) of WCT occupied streams.

Current Distribution

Describing current WCT distribution is complicated by an abundance of populations with varied levels of genetic purity. The question that invariably surfaces is: At what point has a hybridized individual/population become sufficiently altered so that it no longer has value from a WCT conservation standpoint? Shepard et al. (2002) used specific criteria to designate Conservation Populations. Basically they were genetically unaltered; or those which are hybridized or the genetic status is unknown, but have ecological, genetic and behavioral attributes of significance. Populations that occupy habitat likely to become part of a WCT conservation focus were also included. This same concept of conservation populations will be used for WCT in this biological evaluation.

Currently about 301 WCT populations exist within the B-D area. Fifty-seven percent, or 173 of these are conservation populations. Table 2 displays their distribution across the river drainages. Conservation populations occupy about 1280 stream miles, representing approximately 14 percent of the historically occupied stream miles within the B-D area.

Table1. Distribution of conservation populations and non-conservation populations by River Drainage.

River Drainage[1]	Number of Conservation Populations	Approximate number of Non-Conservation populations[2]
Beaverhead	18	7
Big Hole	48	27
Boulder	6	1
Jefferson	7	2
Madison	9	20
Red Rock	40	22
Rock Creek	8	5
Ruby	16	19
Upper Clark Fork	21	25
TOTAL	173	128

1- Equal to 4th level HUC

2 - Unlike conservation populations, beginning and end points of individual non-conservation populations were not defined in this analysis. Thus, an approximate number of populations could only be determined by counting stream segments WCT currently occupy. This method is probably fairly accurate east of the continental divide, but a little less so west of the divide.

Total stream miles occupied by conservation populations are nearly balanced east versus west of the continental divide, however fewer populations are found on the west side. Twenty-nine populations occupy 646 stream miles west of the divide, while 144 populations east of the divide persist in 635 miles. These data point to notable geographic differences between populations. The average length of stream occupied by populations on the west side is 22.3 miles, while it is only 4.4 miles for those on the east side.

Influences from non-native trout and other factors have resulted in WCT distribution patterns east of the divide that are more severely disjointed. While WCT conservation populations still occur in a reasonable number of sub-watersheds/6th HUCs (Table 2), they have been eliminated from most mid-sized and larger streams and rivers. This has left harsh, less productive headwater streams as their most common refuge. Small, isolated stream segments in the uppermost headwaters of east side stream systems are commonly the only places where habitat conditions or barriers prevent non-native trout from mixing with them. When cutthroats move downstream out of the headwaters, they are exposed to unnatural competition and hybridization risks. Consequently, when individuals east of the divide migrate, they are commonly lost from the population.

While, non-native trout have significantly influenced populations on both sides of the continental divide, the magnitude of effects vary. The percentage of 6th field HUCs that contain Conservation Populations in Rock Creek and the Upper Clark Fork are notably higher than the percentages for

east side river drainages (Table 2). Further, Conservation populations persist in 36 percent of the historically occupied stream miles west of the divide. They persist in only 8 percent of the historic habitats east of the divide.

Table 2. Comparison of the number of 6th field HUCs that contain WCT conservation populations to total number of 6th field HUCs, by individual River Drainages.

River Drainage[1]	Total Number 6th field HUCs	Number of 6th field HUCs containing 1 or more Conservation Populations	Proportion of 6th field HUCs containing 1 or more Conservation Population
Beaverhead	39	13	33%
Big Hole	94	35	37%
Boulder	24	8	33%
Jefferson	31	4	13%
Madison	51	7	14%
Red Rock	82	32	39%
Rock Creek	49	40	82%
Ruby	29	13	45%
Upper Clark Fork	34	19	56%
TOTAL	433	172	39%

1- equal to 4th field HUC

Current WCT distribution in the B-D area shows a shift, relative to land ownership. Approximately 66 percent of the cutthroat conservation populations occur on Federal lands versus 48 percent historically. Beaverhead-Deerlodge NF lands contain 760 (90 percent) of the 841 stream miles on Federal lands. Thirty percent of the stream miles are now on private land (46 percent historically). State lands currently contain about 4.5 percent of the WCT conservation population stream miles (6 percent historically). The shift in distribution away from private lands is largely a reflection of populations being restricted to headwater streams. These are typically found on National Forest in the B-D area.

Connectivity

The persistence of populations depends on individuals being able to move necessary distances to meet their nutritional, reproductive, and survival related needs. Persistence is also dependent on the ability of individuals to move between populations and breed. The transfer of genetic information tends to maintain genetic diversity within populations and enhance long-term survivability. If the ability to move is restricted, risks to the population increase. One other major component of connectivity is that habitats need to be connected so that if fish in one stream suffer local extirpation due to a chance event (such as a major flood or severe wildland fire), individuals from other streams can access that stream to re-colonize it after the event. Populations isolated from other populations face higher risks of extirpation through stochastic effects (Rieman et al. 1993).

Risks to Cutthroat Conservation Populations relative to their ability to move is reflected in two components of our data: 1) Whether populations migrate; or 2) The length of stream available to

individual populations - referred to as connected habitats. Populations that do not migrate are called "resident". Most of our WCT populations are now resident, but probably had some form of migratory tendency in the past. In most locations, we attribute losing the migratory component in populations to non-native competition and hybridization impacts. As described above, populations isolated in headwater streams, commonly lose individuals that migrate downstream. Over time, only non-migratory individuals survive to comprise the population. Without migrating individuals the natural opportunity for genetic exchange between populations is lost. For this reason genetic risks to small resident populations are higher.

At the Forest Scale, resident life histories are present in 1223 miles of the streams occupied by WCT conservation populations. Migratory life histories are present in 413 miles stream. Notable differences in migratory tendencies exist between the east and west sides of the continental divide. Migrating individuals are found in 382 miles of streams on the west side, but only in 31 miles of east-side streams.

The length of stream available for individual populations is an important consideration. The greater amount of stream available, the greater the chance that all biological requirements can be consistently met over time. In general, as available stream length increases, so does the potential for populations to interact.

At the Forest Scale, 5 percent of conservation populations have 15 or more miles of connected stream habitats available to them. Sixty-nine percent have less than 6 miles of connected habitats available. Seventy-eight percent of the populations with 15 or more miles are west of the divide. Ninety-three percent of the populations with less than 6 miles are east of the divide. The isolated nature of populations east of the divide and the short lengths of stream they occupy, suggest they are at higher risk. However, risks to individual populations will vary with the quality of their habitat conditions.

Hybridization with Non-Native Species

Hybridization with non-native species, particularly Yellowstone cutthroat trout (*Oncorhynchus clarki bouveri*) and rainbow trout (*Oncorhynchus mykiss*), is one major threat to westslope cutthroat trout viability (Liknes and Graham 1988, Shepard et al. 1997, Shepard et al. 2002).

Cutthroat populations that have been tested and found to be genetically pure exist in 569 (44 percent) of the 1281 stream miles containing conservation populations. An additional 342 miles of stream are occupied by populations suspected to be pure, but which have not been tested.

The genetic integrity continues to be at risk in certain populations. Hybridizing species are present with conservation populations in 104 miles of stream. In an additional 319 miles of stream, hybridizing species occur within 7 miles with no known barrier separating them. Together these represent 33 percent of the total miles occupied by conservation populations.

Competition with Non-Native Species

Competition with non-native species has been identified as one threat to viability of westslope cutthroat trout (Griffith 1988, Liknes and Graham 1988, Shepard et al. 2002). Eastern brook trout is the most influential non-native competitor with WCT in the B-D area. While the nature of brook trout's competitive advantage is not fully understood, the magnitude of the effects on WCT distribution is well known. Fish biologists are documenting that it continues to invade new areas and displace cutthroat many decades after its original introduction into B-D area waters.

East of the continental divide 57 percent of WCT Conservation Populations have competing brook trout (Table 3). Because there is a mix of resident and migratory populations in a number of the same streams west of the divide, the numbers are a little less clear. However, in 49 of 66 west-side sub-watersheds (6th field HUCs), cutthroat populations live with competing brook trout. It is not fully understood, why there has been a greater retention of the migratory life history in Rock Creek and Upper Clark Fork populations.

Table 3. Comparison of the number of WCT conservation populations that have competing brook trout in River Drainages East of the Divide, relative to the total number of conservation populations.

River Drainage[1]	Total Number of Conservation Populations	Number of Conservation Populations with competing Brook trout	Proportion of Conservation Populations with Competing Brook Trout
Beaverhead	18	9	50%
Big Hole	48	36	75%
Boulder	6	5	83%
Jefferson	7	3	43%
Madison	9	1	11%
Red Rock	40	19	48%
Rock Creek	--	--	--
Ruby	16	9	56%
Upper Clark Fork	--	--	--
TOTAL	144	82	57%

1- equal to 4th field HUC

Habitat Conditions

Changes in WCT distribution from historic conditions have not been driven as much from habitat conditions as from non-native trout influences. However, conditions in various streams across the B-D area are limited by grazing, mining, roads, irrigation diversion and/or timber harvest. Where conservation populations occur, streams range from properly functioning condition to non-functioning. Where populations are limited to very short stream segments, habitat conditions become even more critical, since opportunities to move and find suitable conditions for biological and survival needs are restricted.

Silver Bow Creek Watershed Scale

Historic Distribution

At the 5th field Hydrologic Unit Code (HUC) scale, Basin Creek lies within the Silver Bow Creek watershed. This watershed, along with the Browns Gulch watershed, occupies approximately 278,558 acres in the headwaters of the Upper Clark Fork River Basin. In their recent status assessment of westslope cutthroat trout, Shepard et al. (2002) mapped the historic distribution of westslopes in Silver Bow Creek, indicating that westslopes were once widely distributed throughout approximately 352 stream miles of habitat in main stem Silver Bow Creek and most of its tributaries including Willow Creek, Sand Creek, German Gulch, Browns Gulch, Basin Creek, and Blacktail Creek. Most of these historic populations were likely well connected and could move from one subwatershed to another as there are no major natural barriers to fish movement in the lower portions of these subwatersheds. Natural barriers to upstream fish movement existed in the steeper headwater portions of some of these subwatersheds, as they still exist today.

Current Distribution

Shepard et al. (2002) estimated that there are currently about 106 miles of stream in the Silver Bow Creek watershed that support westslope cutthroat trout, compared to 352 miles in the estimated historic distribution. These stream miles are located in the Browns Gulch, German Gulch, Basin Creek, and Blacktail Creek subwatersheds. Main stem Silver Bow Creek does not currently support westslope cutthroat trout due primarily to historic contaminant impacts from mining (Natural Resource Damage Program 2002).

Approximately 82,305 acres (about 30 percent) of the Silver Bow Creek watershed (including Browns Gulch) are located on National Forest lands. There are an estimated 67 miles of fish-bearing stream on or encircled by National Forest lands in the Silver Bow Creek watershed (La Marr 2003). These fish-bearing stream miles are located in the German Gulch, Browns Gulch, Blacktail Creek, and Basin Creek subwatersheds.

Connectivity

In the case of Silver Bow Creek, connectivity between westslope populations has been largely eliminated by the long-term contamination of the main stem of Silver Bow Creek downstream of Butte. Main stem Silver Bow Creek is uninhabitable to salmonids due largely to long-term pollution from historic mining, mineral processing, and wood treating activities (Natural Resource Damage Program 1995). This means that westslope populations within Silver Bow Creek subwatersheds are isolated from each other such that if extirpation occurs in one stream or subwatershed, there is little chance that fish from a nearby stream or subwatershed could recolonize the affected stream. Other activities such as stream dewatering and placement of artificial barriers in streams also serve to sever connectivity between streams or even stream reaches within the same stream. These impacts exist to varying degrees within streams that support westslopes in the Silver Bow Creek watershed.

Shepard et al. (2002) identified conservation populations as those where westslopes exist in a genetically unaltered condition (genetic analysis indicating greater than 99 percent purity) and/or

populations having unique ecological, genetic and behavioral attributes of significance that may be genetically introgressed. Shepard et al. (2002) characterized conservation populations as being one of two types. Groups of small subpopulations that are connected and can interbreed within a few generations (3-15 years) were considered meta-populations. Populations that occupy isolated habitat fragments independently from connected groups of subpopulations were referred to as isolated populations or isolates (Shepard et al. 2002).

Shepard et al. (2002) identified three conservation populations in the Silver Bow Creek watershed: German Gulch, Blacktail Creek, and Basin Creek. While westslope cutthroat trout are known to exist in the Browns Gulch subwatershed, their genetic status is unknown and these fish are believed to be present in very low abundance based on available fish sampling information. Of the three Silver Bow Creek conservation populations, German Gulch was identified as a meta-population because there are a number of connected tributaries within the German Gulch subwatershed that support westslopes. Blacktail Creek and Basin Creek were identified as isolates (Shepard et al. 2002) because there are no other populations with which fish in these two streams are connected.

Hybridization with Non-Native Species

Hybridization with non-native species, particularly Yellowstone cutthroat trout (*Oncorhynchus clarki bouveri*) and rainbow trout (*Oncorhynchus mykiss*), is one threat to westslope cutthroat trout viability (Liknes and Graham 1988, Shepard et al. 1997, Shepard et al. 2002). Rainbow trout were historically stocked in a number of tributaries to Silver Bow Creek. Recently, some hybridization between rainbow trout and westslopes was detected in the German Gulch subwatershed. Westslope cutthroat trout were found to be greater than 99 percent pure so they still met criteria of Shepard et al. (2002) to qualify as a conservation population. It is believed that genetically pure westslopes still occupy portions of the German Gulch subwatershed. The genetic status of westslopes in the Browns Gulch watershed is unknown but historic stocking of rainbow trout has occurred in this subwatershed as well. Blacktail Creek westslopes are believed to be genetically pure based on a relatively small sample size of fish analyzed (5 fish). Rainbow trout have historically been stocked here as well. Basin Creek fish upstream of the lower reservoir are known to be genetically pure westslopes. Genetic status of any westslopes below the lower reservoir is unknown.

Competition with Non-Native Species

Competition with non-native species has been identified as one threat to viability of westslope cutthroat trout (Griffith 1988, Liknes and Graham 1988, Shepard et al. 2002). Eastern brook trout, a non-native species, have previously been widely stocked and are now widely distributed throughout streams in the Silver Bow Creek watershed. Stream miles where westslope cutthroat trout reside without competition from brook trout represent localities where local population viability is more ensured than in stream reaches where westslopes reside with brook trout. Of the 67 fish-bearing stream miles on or surrounded by National Forest lands in the Silver Bow Creek watershed, it is estimated that brook trout occupy about 62.4 miles (93 percent) along with westslope cutthroat trout and that westslopes occupy only 5.6 stream miles (7 percent) in the absence of brook trout (La Marr 2003). Brook trout dominate fish communities in many of the tributaries where they co-exist with westslopes. Although brook trout do not hybridize with

westslopes, they can outcompete them and may eliminate them from their habitat. The existing situation with brook trout in a number of streams in the Silver Bow Creek watershed (including portions of German Gulch, Browns Gulch, Blacktail Creek, and possibly lower Basin Creek) is likely impacting the population size, demographic, isolation, and temporal variability factors assessed by Shepard et al. (2002) for westslopes. A number of local westslope populations in Silver Bow Creek appear to be at an increasing risk of extirpation due to competition with brook trout.

Habitat Conditions

Habitat conditions for westslope cutthroat trout have changed markedly in the Silver Bow Creek watershed since the advent of western Euro-American dominated human habitation. Silver Bow Creek proper is no longer capable of supporting westslopes due to chronic water quality issues associated with historic mining, mineral processing, and wood treating activities. Historic placer mining has impacted many stream reaches in the watershed although some of these are still currently inhabited by westslopes (such as in Blacktail and Basin creeks). Agricultural water withdrawals currently serve to reduce instream flows during summer low flow periods thus reducing the amount of habitat available and probably altering temperature regimes. Irrigation structures and stream crossing culverts serve as migration barriers to fish in some places. Cattle grazing has impacted and continues to impact streams watershed-wide. In some cases the impacts are minimal while in others riparian vegetation has been altered and streambank trampling due to cattle grazing has destabilized streambanks, introduced sediment to streams, and caused widening and shallowing of streams. Rural development has altered riparian vegetation and flow regimes. Road construction and timber harvest have caused increased sedimentation in some streams. Riparian timber harvest has also caused a reduction of natural wood inputs to streams. In some cases valley bottom roads have disrupted riparian vegetation, stream channel morphology, wood recruitment, and floodplain function. Noxious weeds have been introduced to many riparian areas with a tendency to replace native vegetation with non-native noxious weeds. Reservoir construction in Basin Creek and Moulton Reservoir north of Butte has converted stream habitats to reservoirs, altered flow regimes, and created barriers to aquatic faunal movement. Many of these activities have degraded aquatic habitat conditions overall and increased risk of extirpation of westslope cutthroat trout from the Silver Bow Creek watershed.

Overall, viability of westslope cutthroat trout at the scale of the Silver Bow Creek watershed appears to be at extreme risk due to severely reduced fish distribution, lack of connectivity and associated isolation risks, severely degraded habitat conditions (particularly in Silver Bow Creek proper), genetic risks, and competition with non-native species.

Basin Creek

In most cases there is a disparity between the scale of a local management action and the scale at which species viability applies (Ruggiero et al. 1994). For example the Basin Creek Hazardous Fuels Reduction project may have effects to westslope cutthroat trout at the scale of Basin Creek, but the concept of viability of westslope cutthroat trout as a species applies to several western states including Oregon, Washington, Montana, and Idaho. One way to reconcile this mismatching of scales is to focus viability analysis at the population scale (Ruggiero et al. 1994).

Shepard et al. (2002) used six criteria to assess risk to conservation populations for long-term persistence. These criteria and how the Basin Creek population rated out included:

Isolation Risk. This factor deals with whether migratory life forms are present and whether migration corridors are available to connect populations. The Basin Creek population rated out in the highest risk category used by Shepard et al. (2002) meaning that the "Population is isolated from any other population segment, usually due to barrier, but may be related to lack of movement or distance to nearest population." In the case of Basin Creek, the lower Basin Creek reservoir dam serves as a connectivity barrier with any fish populations downstream. Basin Creek westslopes upstream of the lower reservoir do not have a natural source of colonists if the population were to be extirpated. This isolation makes these fish more susceptible to permanent extirpation.

On the other hand, the presence of the lower Basin Creek reservoir dam has prevented non-native fish species such as brook trout from expanding their distribution upstream to where westslopes currently reside in the absence of non-native species upstream of the lower reservoir. Westslopes upstream of the lower Basin Creek reservoir are not currently threatened by competition with non-native species. No non-native species have been found in Basin Creek upstream of the lower Basin Creek reservoir. So from a local population standpoint, the upper Basin Creek westslopes are not currently at risk due to non-native species competition. Downstream of the lower Basin Creek reservoir, brook trout are believed to be present in Basin Creek to some unknown extent so westslopes downstream of the lower reservoir are believed to be subject to the threat from non-native species competition.

Population Size Risk. This variable focuses on the number of breeding adults in a population. The Basin Creek westslope population was characterized as having "50-500 adults" (Shepard et al. 2002). This is the second highest risk category out of four categories used by Shepard et al. (2002) and suggests a relatively small population of breeding adults.

Population Demographic Risk. This characteristic pertains to population trends and stability relative to their potential. Shepard et al. (2002) characterized Basin Creek as "Population has been reduced and is declining (year-class failures are periodic; competition may be reducing survival; habitat limiting population)." Downstream of the lower reservoir, competition with non-native brook trout is likely impacting the westslope population.

Temporal Variability Risk. This pertains to the amount and distribution of habitat available to the population in the context of providing areas within the overall amount of available habitat for fish to survive environmentally stochastic events (large-scale natural environmental disturbances such as wildland fires, floods, large landslides) that may affect their habitat. Shepard et al. (2002) rated the Basin Creek population as having "10-25 km of connected habitat." As with population size, this was the second highest risk category out of four categories. However, if we consider the lower reservoir dam as a connectivity barrier, Basin Creek westslope cutthroat trout would have less than 10 km of connected habitat (approximately 2.4 km of habitat upstream of the dam). It appears that Shepard et al. (2002) should have rated temporal variability for Basin Creek in their highest risk category of "< 10 km of connected habitat."

Disease Risk. This pertains to the extent to which aquatic-borne diseases may impact a population. Shepard et al. (2002) identified that "Significant diseases and/or pathogens have been introduced and/or identified in stream and/or drainage > 10 km from the population, but not in same stream segment as westslope cutthroat trout, or within 10 km where existing barriers exist, but may be at risk of failure" for the Basin Creek population. This is the second lowest risk category out of four categories and likely represents known disease locations elsewhere in the Silver Bow Creek watershed. Basin Creek westslopes upstream of the lower reservoir dam are likely at very low risk of having aquatic-borne diseases introduced to the population. Those downstream of the dam are likely more susceptible.

Genetics Risk. This variable pertains to whether a population is hybridized or has the potential for hybridization to occur. Shepard et al. (2002) characterized the Basin Creek population as "Hybridizing species cannot interact with existing [westslope cutthroat trout] population. Barrier provides complete blockage to upstream fish movement." This is the lowest risk category for genetics used by Shepard et al. (2002) and it certainly applies to westslopes upstream of the lower reservoir dam. Fish downstream of the reservoir would likely be more susceptible to hybridization in the event that hybridizing species accessed lower Basin Creek. The primary hybridizing species of concern are rainbow trout and Yellowstone cutthroat trout.

Habitat. Habitat conditions for westslopes in Basin Creek upstream of the lower reservoir are generally good. Two relatively short reaches (several hundred feet apiece) within the fish distribution have undergone localized bank instability likely due to flow augmentation from the Fish Creek diversion but most of the habitat is relatively complex with good pool quantities and depths and fair channel stability. The flow augmentation from the Fish Creek diversion appears to have locally destabilized streambanks in some areas but also ensures a good supply of cool, high quality water through summer months that likely benefits westslopes.

Downstream of the lower reservoir habitat conditions are markedly compromised. Immediately below the reservoir Basin Creek is subject to extremely low flows in late summer months as very little water is released from the reservoir. The creek flows through private lands where agricultural practices have created more widespread bank instability and more habitat impacts associated with erosion and sedimentation. Several ponds on private lands have altered aquatic habitat markedly from its historic condition and may also create connectivity barriers.

Overall, the Basin Creek westslope cutthroat trout population upstream of the lower reservoir dam appears to be most susceptible to extirpation due to its isolation from other populations, its relatively small population size, and the relatively small amount of habitat it occupies. The population upstream of the dam appears to be least susceptible to extirpation associated with hybridization, habitat conditions, and disease risks. Overall this segment of the population appears to be at a moderate to high risk of extirpation.

The portion of the population downstream of the dam appears to be extremely susceptible to extirpation due to competition with non-native species, disease risks, poor habitat conditions, and isolation from other westslope populations. This segment of the population appears to be at a high risk of extirpation.

Blacktail Creek

Shepard et al. (2002) identified Blacktail Creek as supporting a conservation population of westslope cutthroat trout. They rated the risks to this population as follows.

Isolation Risk. Shepard et al. (2002) rated Blacktail Creek as "Population is isolated from any other population segment, usually due to barrier, but may be related to lack of movement or distance to nearest population." This was their highest risk category for this variable. The Blacktail Creek population is isolated from other populations by the toxic conditions in Silver Bow Creek. Ongoing efforts to clean up Silver Bow Creek may eventually lead to increased connectivity with the westslope population in Blacktail Creek.

Population Size Risk. Shepard et al. (2002) rated Blacktail Creek as having "50-500 adults." This is their second highest risk category for this variable and suggests a relatively small population of breeding adults.

Population Demographic Risk. Shepard et al. (2002) rated Blacktail Creek as "Population has been reduced and is declining (year-class failures are periodic; competition may be reducing survival; habitat limiting population)." This was their second highest risk category for this variable. This rating is likely related to compromised habitat conditions in Blacktail Creek associated with rural development, valley bottom roads impacting riparian and floodplain function, and sediment inputs entering the stream particularly via the valley bottom road system.

Temporal Variability Risk. Shepard et al. (2002) rated Blacktail Creek as having "< 10 km of connected habitats." This was their highest risk category for this variable. Because there is such a limited amount of habitat occupied by westslopes in Blacktail Creek, there is a relatively high risk that one large-scale disturbance could render the majority of available habitat uninhabitable for westslopes and that there is a relatively low chance that some portion of the habitat within Blacktail Creek could serve as a refuge in the event of such a disturbance.

Disease Risk. Shepard et al. (2002) rated Blacktail Creek as "Significant diseases and the pathogens that cause these diseases have very limited opportunity to interact with existing westslope population. Significant disease and pathogens are not known to exist in stream or watershed associated with westslope population." This was their lowest risk category for disease risk. There are no known disease concerns in Blacktail Creek.

Genetic Risk. Shepard et al. (2002) rated Blacktail Creek as "Hybridizing species are in same stream and/or drainage within 10 km of westslope population and no barrier exists; however, hybridizing species not yet found in same stream segment as westslope population." This was their second highest risk category for this variable. The best available information suggests that the westslope population in Blacktail Creek is genetically pure. However, this is based on a small sample size (5 fish) for genetic analysis taken from the headwaters. Blacktail Creek has been historically stocked with rainbow trout so more information is needed based on a larger sample size (25 fish) to clarify the genetic status of the population.

Habitat. Blacktail Creek has undergone considerable habitat degradation. Valley bottom roads have altered floodplain function, reduced wood recruitment to the stream, and caused excessive

sedimentation in reaches of the stream flowing through approximately 4.5 miles of the fish distribution. Private land uses, namely agricultural uses for livestock and rural residential development, have altered channel morphology, riparian vegetation, and likely sediment regimes in the lower several miles of the fish distribution.

Overall it appears that the Blacktail Creek westslope population is at relatively high risk of extirpation due to its isolation, small population size, questionable population stability, poor habitat conditions, and relatively small amount of habitat occupied. This population appears to be at relatively low risk due to disease and genetic concerns.

Context of Basin Creek Hazardous Fuels Reduction Project to Westslope Cutthroat Trout Viability

The Basin Creek Hazardous Fuels Reduction project would not likely add substantial risk to viability of westslope cutthroat trout at any scale. The majority of proposed activity is located in drainages (Herman Gulch, China Gulch) in the Basin Creek subwatershed that do not directly affect westslope cutthroat trout populations. A small amount of activity (80 to 231 acres) is proposed in upslope areas in the Blacktail Creek subwatershed approximately 1 mile from the fish-bearing portion of the creek. Because the project area is in the Upper Columbia Basin, INFISH standards and guidelines apply so streams and wetlands would receive no-treatment buffers (300 feet on fish-bearing streams, 150 feet on perennial non-fish-bearing streams and wetlands larger than 1 acre, 50 feet on intermittent streams and wetlands smaller than 1 acre). These buffers should mitigate most direct and indirect effects to westslope cutthroat trout based on documentation in the FEIS. The contribution of this project to cumulative watershed effects is expected to be minimal based on WEPP model runs that predicted a low potential for erosion and sedimentation effects, and assessment of effects to stream flows and stream channel condition documented in the FEIS.

The portion of the planning area most heavily used by westslopes, Basin Creek upstream of the lower reservoir (Upper Basin drainage as described in the FEIS), has comparatively little activity proposed (151 to 1,765 acres in action alternatives) relative to other portions of the planning area such as in China and Herman gulches where westslopes do not reside. The approximately 1,765 acres of treatment proposed in Alternative 4 is located primarily on ridgetops and midslope areas away from riparian habitats. The majority of this proposed activity would be located at least 0.75 mile from the fish-bearing portion of Basin Creek. This area also has very little ongoing activity aside from this project to which this project would contribute to cumulative effects.

The risk of project-derived sediment accessing Blacktail Creek and affecting westslope cutthroat trout there is negligible. Proposed treatments are relatively small in scale in the Blacktail Creek watershed and all are located on or near ridgetops on relatively flat ground, at least 1 stream mile from where westslopes reside in this stream.

Effects Determinations

Based on the effects described above and in the EIS for this project, all alternatives for the Basin Creek Hazardous Fuels Reduction project **"may impact individuals but would not contribute to a trend toward federal listing or loss of viability to the population or species"** for westslope cutthroat trout, boreal toad, and northern leopard frog. Alternative 1 (No Action) warrants this determination due to the assumption of a large-scale wildland fire in 2028 in the planning area. These effects determinations assume that aquatic mitigation measures as described below and in Chapter 2 of the EIS, and Soil and Water Conservation Practices as described in Appendix D of the EIS would be implemented in action alternatives.

Determination Information

	Westslope Cutthroat	Northern Leopard Frog	Boreal Toad
Date	February 2004	February 2004	February 2004
Habitat in Analysis Area?	Yes	Yes	Yes
Species in Analysis Area?	Yes	Unlikely	Yes
Species Down Stream?	Yes	Unlikely	Likely
Point of Effect	Basin Creek, Blacktail Creek 1.5 stream miles downstream from any proposed activity	None Known	China Gulch and tributary, Bear Gulch, Upper Basin Creek, Upper Basin Creek Reservoir

Determination Summary

	Westslope Cutthroat	Northern Leopard Frog	Boreal Toad
DETERMINATION	MIIH	MIIH	MIIH

Sensitive Species Determinations

NI = NO IMPACT

MIIH = MAY IMPACT INDIVIDUALS OR HABITAT, BUT WILL NOT LIKELY CONTRIBUTE TO A TRENDS TOWARDS FEDERAL LISTING OR LOSS OF VIABILITY TO THE POPULATION OR SPECIES.

WIFV = WILL IMPACT INDIVIDUALS OR HABITAT WITH A CONSEQUENCE THAT THE ACTION MAY CONTRIBUTE TO A TREND TOWARDS FEDERAL LISTING OR CAUSE A LOSS OF VIABILITY TO THE POPULATION OR SPECIES.

BI = BENEFICIAL IMPACT.

Criteria For Reaching A Determination of "No Impact"

Criterion	Westslope Cutthroat Trout	Northern Leopard Frog	Boreal Toad
1. Does the activity likely involve the 'direct taking' of cutthroat trout, leopard frog, or boreal toad (including the capture, collection, harassment, or harm to individuals)?	No	Yes	Yes

2. Is the activity likely to involve the introduction of significant amounts of sediment (or other materials) into a perennial stream, pond, lake, or wetland?	Possibly	Yes, locally	Yes, locally
3. Is the activity likely to significantly change the natural process of Large Woody Debris (LWD) input into a perennial stream, pond, lake, or wetland?	No	No	No
4. Is the activity likely to measurably increase water temperatures during critical low flow periods, or decrease winter water temperatures?	No	No	No
5. Is the activity likely to substantially disturb stream, lake, pond, or marsh banks or morphology within areas suitable for any of these species?	No	No	No
6. Is the activity likely to significantly change riparian vegetation along a perennial stream or riparian area?	No	No	No
7. Is the activity likely to significantly change water quantity through diversion, withdrawal, or a change in water yield or groundwater?	No	No	No
8. Does the activity involve significant amounts of toxic or hazardous materials which could possibly be introduced into a streamcourse, pond, lake, or wetland?	Yes	Yes	Yes
9. Does the activity involve activity on landtypes with the potential for mass movement and does the activity have the potential to change the natural rate and volume of mass movement?	No	No	No
10. Does the activity involve heavy vehicle traffic near habitat for the amphibian species?	N/A	Yes	Yes
11. Is the activity likely to alter or damage amphibian burrows (i.e. small mammal burrows) or woody refugia?	N/A	Yes	Yes
12. Is there significant question or controversy regarding the potential effect of this activity on westslope cutthroat trout, northern leopard frog, boreal toad, or downstream habitat?	Yes	Yes	Yes
13. Would the decision document required to permit/allow this activity likely require an EIS?	Yes	Yes	Yes
All of the responses to the criteria #1 thru #13 above are 'NO'. The determination of effects of this activity is NO IMPACT.	N/A	N/A	N/A
If one or more of the responses to the above criteria (#1 thru #13) is 'yes', then the determination of effects of this activity is MAY AFFECT. A narrative Biological Evaluation is needed to assess the extent of impact.	MIIH	MIIH	MIIH

Signature

Prepared by: Timothy J. La Marr Date: February 26, 2004

Title: Zone Fisheries Biologist

Signature: /s/ *Timothy J. La Marr*

Comments/Rationale: The above effects determinations are based on the assumption that the following mitigation measures be applied.

Riparian areas would be buffered from fuels reduction treatments following INFISH standards and guidelines throughout the project area.

No fuel storage or equipment refueling activities would occur in RHCAs as described in INFISH.

The two known boreal toad sites located adjacent to proposed fuels reduction activities in alternatives 3 – 5 would receive a 500-foot no treatment buffer. In addition, fuels reduction activities within an approximately ¼- mile radius of these sites would occur during winter (December 1 through March 15) when toads are hibernating. To prevent boreal toad mortality, slash burning activities in winter logged units would occur during the period of November 1 through November 30 or possibly in October if sufficient snowfall has occurred to drive boreal toads into hibernation. Burning in October would be subject to negotiation with the aquatic biologist. Units to which this mitigation would apply are mapped in the project file.

Stream crossings would be designed to accommodate 100-year flood conditions as per INFISH standards and guidelines. Stream crossings would be removed upon completion of the project.

Temporary roads would be decommissioned upon completion of the project and there would be no public use of these road locations after completion of the project.

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File Code: 2710 **Date:** April 24, 2002

Subject: Basin Creek Hazardous Fuels Reduction

To: Von Helmuth

BIOLOGICAL EVALUATION FOR PLANTS

I. INTRODUCTION

Forest Service policy is to protect the habitat of federally listed sensitive species from adverse modification or destruction, as well as to protect individual organisms from hard or harassment as appropriate (FSM 2670.3). All Forest Service projects, programs, and activities are to be reviewed for possible effects on threatened, endangered, and sensitive species.

The purpose of this biological evaluation is to review the possible effects of the following proposed action on threatened, endangered, and sensitive plant species and their habitats in order to determine whether or not the proposed action may adversely affect any of these species.

II. PROJECT DESCRIPTION

Mountain pine beetle (*Dendrotonus ponderosae*) is killing large numbers of lodgepole pine (*Pinus contorta*) in the Thompson Park/Blacktail Creek and Basin Creek drainages south of Butte. One concern is the increased risk of wildfire within the urban interface because of increased fuels resulting from elevated mortality. Since Basin Creek watershed is one of Butte's water sources, potential for wildfire has local officials concerned. This proposal attempts to minimize risks of negative water quality should a wildfire of major proportions occur in the Basin Creek watershed. In addition, this proposal would remove dead trees, thin near private lands, and fire proof stands to lower the risk of stank replacing wildfire.

III. PRE-FIELD REVIEW

A review of the Nature Conservancy Element Occurrence Database indicates no known element occurrences of threatened or endangered plant species in the project area. The lands proposed for treatment have been virtually undisturbed for nearly a century. One sensitive plant species, Lemhi penstemon (*Penstemon lemhiensis*) is known from the very upper reaches of Basin Creek. Other sensitive plants are known from Moose Creek and the Highland Mountains.

III. PROJECT AREA ANALYSIS

These lands were surveyed by contract botanists, Montana Natural Heritage Program botanists, and Forest Service personnel, and checked against the Northern Region sensitive species database. No sensitive species were found in the lower elevation sites presently under attack by mountain pine beetle, either on the ground or reported in the data base. The Lemhi penstemon site is far removed from the present lower elevation beetle epidemic. That site will not be impacted by loss of trees which would improve the habitat for the penstemon.

IV. CONFLICT DETERMINATION

It has been determined after pre-field and field reconnaissance that this project will not conflict with threatened, endangered, or known sensitive plant species or their habitats.

V. EVALUATION: STATUS OF THREATENED, ENDANGERED, AND SENSITIVE PLANT SPECIES IN THE PROJECT AREA

There are no known federally listed plant species in the area to be affected by the proposed action. Federal listing refers to threatened and endangered species on record by the U.S. Fish and Wildlife Service. Additionally, there are no known species in the project area that appear on the Beaverhead-Deerlodge National Forest Sensitive Species List.

VI. DETERMINATION OF IMPACTS AND CUMULATIVE EFFECTS

The evaluation consisted of: (1) a pre-field review; (2) a field review of the project area; (3) arrival at conclusions on the probable overall impacts of the project.

VII. DETERMINATION OF "MAY IMPACT" OR "NO IMPACT"

Implementation of this project would have no known impact on the viability of any sensitive plant populations.

VIII. RECCOMENDATIONS FOR MITIGATING ADVERSE IMPACTS

If sensitive plant species are found within the project area they will be protected and mitigation measures instituted to protect them.

John W. Joy
Forest Ecologist

APPENDIX F: Biological Evaluation, Environmental Impact Statement, Basin Creek Hazardous Fuels Reduction Project, Beaverhead-Deerlodge National Forest

I. INTRODUCTION

Forest Service policy (FSM 2672.4) requires review of all FS planned, funded, executed, or permitted programs and activities for possible effects on federally *proposed, threatened, endangered*, and FS identified *sensitive* species (hereafter, PTES species). A "biological evaluation" (BE) is the means of conducting the review and of documenting the findings. The BE may be used or modified to satisfy consultation requirements for a "biological assessment" of construction projects requiring an environmental impact statement under 50 CFR Part 402 and Forest Service Policy. For this proposal, a separate biological assessment was completed for the proposed action that addressed PTE species.

This BE discloses the effects of the proposed Basin Creek Hazardous Fuels Reduction Project on those species designated in the Forest Service's Northern Region as *sensitive*. Effects of direct, indirect, and cumulative effects to Sensitive Species were assessed across National Forest lands located in the Basin-Butte and Blacktail 6th field hydrologic unit codes (HUC 170102010201 and 170102010202), two adjacent sub watersheds that will be affected by implementing the proposed action and alternatives; hereafter the analysis area. The analysis area, encompasses the 14,319-acre project area wherein fuels treatments are proposed. The HUCs comprise 55,946 total acres including: 28,154 acres of Forest Service land concentrated in forested areas in the southern portion of the HUCS; 716 acres of state land adjacent to the Forest Boundary northwest of the lower Basin Reservoir; and 27,077 acres of private lands the majority of which encompasses the city of Butte and Butte Valley in the northern portion of the HUCs as well as the Roosevelt Drive Subdivision east of the Basin Reservoirs.

II. SUMMARY OF FINDINGS

Table 1 is summary of determinations for each alternative for sensitive species analyzed in this biological evaluation for the analysis area.

Table 1. Northern Region sensitive species summary conclusion of effects for species known or suspected of occurring in the analysis area (refer to Table 2 for complete list of sensitive species on the Forest).

SENSITIVE SPECIES COMMON NAME/SCIENTIFIC NAME	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
Flammulated owl	NI	BI	BI	BI	BI
Northern goshawk	MIIH	MIIH	MIIH	MIIH	MIIH
Peregrine falcon	NI	NI	NI	NI	NI
Black-backed woodpecker	BI	MIIH/BI	MIIH	MIIH	MIIH
Sage grouse	NI	NI	NI	NI	NI
Common loon	NI	NI	NI	NI	NI

SENSITIVE SPECIES COMMON NAME/SCIENTIFIC NAME	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5
Wolverine	NI	NI	NI	MIIH	MIIH
Fisher	BI	MIIH/BI	MIIH	MIIH	MIIH
Northern bog lemming	NI	NI	NI	NI	NI
Townsend's(Western) big-eared bat	NI	NI	NI	NI	NI
Pygmy rabbit	Ni	Ni	Ni	Ni	NI

NI = No Impact
MIIH = May Impact Individuals or Habitat, but Will Not Likely Result in a Trend in Federal Listing or Reduced Viability for the Population or Species
WIFV = Will Impact Individuals or Habitat with a Consequence that the Action may Contribute To Federal Listing or Result in Reduced Viability for the Population or Species
BI = Beneficial Impact

III. PROPOSED ACTION AND ALTERNATIVES SUMMARY

Action alternatives for the proposed project focus on reducing hazardous fuels along the wildland/urban interface and in the Basin Creek drainage. Grassland/shrub communities that have been colonized by conifers would be treated by removing most of the conifers and then prescribed burned. Mature Douglas-fir and Douglas-fir pole-sized stands would be thinned from below to achieve a basal area of 40 to 80 sq. ft./acre (approximately 40% canopy closure) comprised of the largest diameter and oldest trees available. Mature lodgepole pine with MPB-related mortality would be treated by removing most of the larger diameter lodgepole (through clear cutting) and retaining variable patches of smaller diameter lodgepole and all Douglas-fir wherever it occurs as reserves. Lodgepole pine pole-sized stands would be thinned to a basal area of 80 to 120 sq. ft./acre (a density of 300 to 425 trees per acres) to achieve a more open stand condition comprised of larger diameter trees, with small scattered openings (< 2 acres in size).

A ground-based logging system, with construction of temporary roads to facilitate log hauling from cleared landing sites, is planned for all action alternatives, with additional winter helicopter logging planned for proposed treatments in the inventoried roadless area under Alternative 4, and in several units located southwest of Roosevelt Drive under Alternatives 2, 3, 4, and 5 (refer to Alternative maps 2 through 5; FEIS Appendix B; and FEIS Appendix C, list of treatment units by alternative). The amount of treatment-related disturbance, including miles of temporary road constructed for log hauling, varies by alternative with the smallest area affected in Alternative 2, followed by 3, 5, and 4, with the largest area affected. Direct and indirect effects of treatment related disturbances includes the use of helicopters. No treatments would occur in the research natural area, riparian INFISH buffers, old growth, or in a 40-acre buffer surrounding two stands located in territories recently occupied by northern goshawks. In addition, five standing snags per acre in accordance with Forest Plan Standards (left in wet areas, or near the edges of harvest units to limit blowdown, where available) and 10 to 15 tons of downed woody debris (> 3 inches in diameter) per acre would be left in treated areas (that would provide nesting, denning, and foraging opportunities for snag- and cavity-dependent wildlife consistent with Forest Plan standards).

Treatments are designed to protect aspen clones and to promote aspen regeneration in upland settings (i.e. conifers will be cleared around aspen up to 100 feet around clones to increase light availability); to protect larger-diameter Douglas-fir wherever it occurs and promote diameter growth; as well as increase the quantity and quality of grassland/shrub parks.

For ground-based treatment units, trees would be whole tree yarded to landing sites, and all landings would have 100% slash disposal. Post-treatment, all landings and temporary roads would be recontoured and reseeded to pre-treatment conditions and monitored and treated as needed for any noxious weed infestations.

Alternative 1: No Action

Abiotic and biotic processes, such as succession, decay, insect pathology, and weather would continue to cause structural changes in forested, riparian, and grassland environments causing a shift in wildlife species distribution over time. For example, in the absence of disturbance, grassland parks and upland aspen will continue to decline in quality eventually disappearing altogether from conifer colonization. Douglas-fir would continue to increase in tree density and canopy layering.

In lodgepole pine, ff mountain pine beetle (MPB) persists at existing epidemic levels, unabated by weather, the number of dead and dying trees would continue to increase habitat suitability for snag dependent birds and mammals for decades. The amount and extent of MPB-related mortality in mature and old growth lodgepole pine would vary (from 40 to 70%) across 10,332 acres. As beetle-killed trees lose their needles and the trees fall to the ground at varying rates, canopy gaps are created; and conifers, shrubs, grasses, and forbs regenerate from the increased space and available light. The amount of snag habitat, large downed woody debris, and subsequent regeneration of under story plants would vary spatially and temporally and depend on the rate at which trees fall down, the size of openings created, the condition of the soil seedbed, and weather. Species dependent on structurally diverse areas (i.e. snowshoe hare, lynx, fisher) would experience a 40 to 70% increase in foraging and denning potential, whereas others dependent on more closed canopy conditions (i.e. northern goshawk) would experience a 30 to 60% loss of mature forest for nesting, foraging and cover. In the absence of fire, MBP-killed stands would succeed to Douglas-, lodgepole, spruce-, or subalpine-fir depending on elevation, aspect, and soil type and favor wildlife specific to each cover type.

A large-scale, high intensity crown fire would convert late successional forest to early successional forest resulting in a reduction in cover and habitat suitability for species dependent on late seral forest; and an increase in habitat suitability for species dependent on snags and early seral forest.

Alternative 2

Proposed treatment under Alternative 2 would result in a 4% change (1,102 acres/28,154 acres) in existing wildlife habitat values in the analysis area, leaving 96% untreated. Construction of 8.14 of temporary road would occur to facilitate log hauling from 1,102 acres located along the wild land/urban interface, a 1/8- to ¼-mile buffer adjacent to the Forest/private boundary north and east of the Basin Reservoir. Treatments include 273 acres of mature (larger diameter) Douglas-fir, 288 acres of mature lodgepole pine, 246 acres of pole-sized Douglas-fir, 114 acres of pole-sized lodgepole pine, and 181 acres of grassland/shrub. Untreated areas, comprising 96% of the analysis area would continue to undergo structural changes through forest succession and insect pathology as described under Alternative 1.

Alternative 3: Preferred Alternative

Proposed treatments under Alternative 3 would result in a 9% change (2,541/28,154 acres) in existing wildlife habitat values in the analysis area, leaving 91% untreated. Construction of 17.43 miles of temporary road would occur to facilitate log hauling from 2,541 acres, including the 1,102-acre buffer located along the wild land/urban interface (Alternative 2) and an additional 1,439 acres located directly down-slope from (northwest of) the Roosevelt Drive Subdivision. Treatments would occur in 709 acres of mature Douglas-fir, 1,123 acres of mature lodgepole pine, 284 acres of pole-sized Douglas-fir, 114 acres of pole-sized lodgepole pine, and 311 acres of grassland/shrub. Untreated areas comprising 91% of the analysis area would continue to undergo structural changes through forest succession and insect pathology as described under Alternative 1.

Alternative 4

Alternative 4 would treat the 1,102-acre buffer in Alternative 2 and include 3,170 acres that comprise units placed on upper slopes and ridgelines located in the area down slope from the Roosevelt Drive Subdivision and upslope from (southeast and southwest of) the lower Basin Reservoir. Proposed treatments would result in a 15% change (4,272/28,154 acres) in existing wildlife habitat values, leaving 85% untreated, including 786 acres of mature Douglas-fir, 1,918 acres of mature lodgepole pine, 359 acres of pole-sized Douglas-fir, 848 acres of pole-sized lodgepole pine, and 361 acres of grassland/shrub.

In the inventoried roadless area, 1,259 acres would be treated using a helicopter logging system and allowing some heavy equipment and vehicles to enter the inventoried roadless area via the 5-mile Bear Gulch ATV trail. In mature lodgepole pine, after larger diameter trees are removed, slash and remaining smaller-diameter trees would be piled using excavators and then burned on site. In Douglas-fir and lodgepole pine thinning units, after larger trees are removed, the remaining trees will be piled using a combination of machine and hand piling, then burned on site.

Outside the inventoried roadless area, treatments would occur through whole yarding (as in Alternatives 2 and 3) requiring 17.06 miles of temporary road construction to facilitate log hauling.

Untreated areas comprising 85% of the analysis area would continue to undergo structural changes through forest succession and insect pathology as described under Alternative 1.

Alternative 5

Alternative 5 would treat the project area the same as in Alternative 4, excluding all helicopter treatment units in the inventoried roadless area and excluding use of the Bear Gulch ATV trail. Alternative 5 would treat 3,013 acres, resulting in an 11% change in exisitng wildlife habitat value, leaving 89%. Treatments include 777 acres of mature Douglas-fir, 1,135 acres of mature lodgepole pine, 341 acres of pole-sized Douglas-fir, 418 acres of pole-sized lodgepole pine, and 342 acres of grassland/shrub. Untreated areas would continue to undergo structural changes through forest succession and insect pathology as described under Alternative 1.

Forest Plan Compliance

The Proposed Action and its alternatives for this project are consistent with the Deerlodge National Forest Plan, as required by 36 CFR 219.10(e).

IV. FOREST SERVICE SENSITIVE SPECIES

Pre-field Analysis

There are currently 55 plant (39) and animal (12) species (excluding fishes and amphibeans) that are known or suspected of occurring on the Beaverhead National Forest. Eight animal species (Table 1 above), have the potential of occurring within or near the analysis area. Two other sensitve species, the boreal toad and leopard frog are addressed in the fisheries portion of the EIS. Table 2 lists terrestrial species known or suspected of occuring on the Beaverhead-Deerlodge National Forest.

Table 2: Sensitive species known or suspected of occurring on the Beaverhead-Deerlodge National Forest.

COMMON NAME	SCIENTIFIC NAME	OCCURRENCE WITHIN BEAVERHEAD-DEERLODGE NATIONAL FOREST
Flammulated owl	Otus flammeolus	X
Northern goshawk	Accipiter gentilis	X
Peregrine falcon	Falco pereginus anatum	X
Black-backed woodpecker	Picoides arcticus	X
Sage grouse	Centrocercus urophasianus	X
Common loon	Gavia immer	X
Trumpeter Swan	Cygnus buccinator	Occurs in Red Rocks Lake on the Beaverhead portion of the Forest. Species not addressed.
Wolverine	Gulo gulo	X
Fisher	Martes pennati	X
Northern bog lemming	Synaptomys borealis	X
Western big-eared bat	Corynorhinus townsendii	X
Pygmy rabbit	Brachylagus idahoensis	X

Field Reviews in conjunction with this proposed project were conducted throughout the 2001 and 2002 summer field seasons (project file).

A. Birds - Biological Information and Existing Environmental Baseline

Flammulated Owl

Flammulated owls are small, migratory insectivores that inhabit montane forests of western North America. In the Rocky Mountains, this owl is typically found in the dry pine belt, foraging primarily in late successional stands of ponderosa pine that are pure or mixed with oak, pinyon pine, true fir, Douglas fir, or aspen (Reynolds and Linkhart 1987, Reynolds et al. 1989). Flammulated owls nest in natural cavities or in cavities excavated by both small and large woodpeckers. Trees, both live and dead, used for nesting are ponderosa pine, quaking aspen, and Douglas fir. The affinity of flammulated owls for old ponderosa pine forests stems from the abundance of nest cavities, the structure of the trees and stands, and the arthropods found in these forests. They are almost exclusively insectivorous, preying on small to medium sized moths, beetles, caterpillars, and crickets. Flammulated owls are nocturnal foragers and hunt by gleaning among tree branches, hawking or capturing of flying insects, and pouncing on ground prey from a perch (Spahr et al. 1991). There are more moth species, many of which are active on cold nights in spring and early summer, associated with ponderosa pine and Douglas fir than with other western conifers. The specific hawking and gleaning tactics used during foraging, most of which occur within tree crowns and occasionally in the space between trees, requires the maneuvering room provided by the open crowns and park-like spacing of trees in these old growth stands (Reynolds et al. 1989).

Holt, et al. (1987) report the first state record of the flammulated owl in Montana in 1962 near Glacier Park but it was not until July 15, 1986 that the first nest in Montana was documented in Missoula County.

Ponderosa pine forest is limited on the Beaverhead-Deerlodge due to high elevations, and has probably decreased in abundance this century from early harvests and fire suppression. The greatest amount of ponderosa pine on the Deerlodge NF occurs approximately 25 miles northwest of the analysis area.

On the Forest, fammulated owls have been detected in Douglas-fir in the West Pioneers and in ponderosa pine in the northern Sapphires and Flints. The analysis area currently provides sub optimum nesting and foraging habitat for the owl, as the area is located above elevations where preferred habitat, ponderosa pine, occurs and the old-growth Douglas-fir component was reduced from the elimination of large-diameter trees in conjunction with the mining era around 1900. Currently, the analysis area provides the owl with 307 acres of old growth Douglas-fir scattered in patches among the approximately 4,147 acres of mature Douglas-fir (> 9 inches DBH) and 3,744 acres of pole sized trees (< 3.0 to 8.9 inches DBH).

Northern Goshawk

The northern goshawk is the largest of the North American accipiters. Northern goshawks nest in a variety of forested cover types distributed throughout the North American continent (Reynolds et al. 1992). The goshawk is a forest habitat generalist, occurring in all major forest types. Preferred nesting habitat comprises older, tall forests with tree densities low enough to allow goshawks to maneuver in and below the canopy while foraging, traveling to and from the nest, and where they can find large trees in which to nest (Hayward and Escano 1989, Reynolds 1989, Whitford 1991,

Squires and Ruggiero 1996). In the northern Rocky Mountains, goshawks frequently nest in mature Douglas-fir and lodgepole pine (Whitford 1991, Squires and Ruggiero 1996, Clough 2000). Primary prey in this part of the goshawk's range include, in order of frequency, snowshoe hare, red squirrel, Columbian ground squirrel, and grouse sp., suggesting the species need for a variety of forest cover types and successional stages that will support prey populations (Clough 2000).

Management recommendations for goshawks were developed for the Southwest Region (R3) of the Forest Service (Reynolds 1983, Reynolds et al. 1992). Since many of the forested habitat types in the Southwest (primarily ponderosa pine) differ from those in the northern Rocky Mountains, Region 1 of the Forest Service has not formally adopted the R3 management recommendations. Some interpretations may be made which are loosely based on some of the Southwestern management criteria. Such as, a goshawk's nesting home range may be up to 6,000 acres, and Reynolds et al. (1992) identified three main components needed within this home range for southwestern forests. The nest area (analogous to the nest stand) is 25 acres or more in size, and may include more than one nest. Nest areas contain one or more stands of large, old trees with a dense canopy cover. Most goshawks have alternate nest areas within their home range that may be used in different years.

Reynolds et al. 1992 and Kennedy et al. 1994 describe an area of concentrated use or a 170-ha (420 acre) post fledging-family area (PFA) around the nest used by the goshawk family during a 30- to 50- day fledgling-dependency period; roughly mid-July to mid-August or later. Because of its size, the PFA typically includes a variety of forest types and conditions. Limited studies indicate that the proportion of non-forested (grassland or clearcut areas) and forested cover types (including size class distribution) measured within a 170-ha area around nests varies widely among managed and unmanaged landscapes in the western-United State (i.e. Reynolds et al. 1992, Patla 1997, Clough 2000).

Reynolds et al. 1992 defined the foraging area as approximately 5,400 acres in size. Hunting goshawks use available habitats opportunistically. This suggests that the choice of foraging habitat may be as closely tied to prey availability as to habitat structure and composition. Goshawks hunt from tree perches by scanning lower portions of the forest for prey (on the ground and in the lower canopy). Because of visual limitations in dense forest environments, an open understory enhances detection and capture of prey. Also, because of their size, goshawks prey on the larger mammals such as snowshoe hare, ground squirrels, red squirrels and forest birds such as woodpeckers, jays, and grouse. The majority of these prey species reside mainly on the ground and in lower portions of the tree canopy.

In high elevations and montane areas, some goshawks descend to lower elevation into woodlands, riparian areas, and scrublands during winter. Recent radio telemetry studies by researchers at the Forest Sciences Laboratory (FSL) in Laramie, Wyoming also indicate that goshawks on the Medicine Bow National Forest (MBNF) also migrate off National Forest summer breeding areas southward into Colorado and westward to lower elevation non-forested areas (John Squires, Research Wildlife Biologist, Forest Sciences Laboratory, Laramie, personal communication). An ongoing radio telemetry study on the southern portion of the Beaverhead-Deerlodge, has found a similar movement of goshawks from their nesting territories to lower elevation more open habitats to over winter. In some cases the birds move > 20 miles between breeding and wintering areas,

but are still in the study area. Also over the 6-7 years of the study, some birds have shown a strong fidelity to wintering areas, returning there for multiple years. Other goshawks seem to migrate out of the study area and then return sometime in March (Kirkley 1998, 1999, 2000, 2001)

A scientific team, appointed by the U.S. Fish and Wildlife Service, conducted a recent assessment of the goshawk's status based on a review of published and unpublished literature and data collected on nesting habitat and nest locations located west of the 100th meridian in 17 states comprising 222 million acres, 55% of which is Forest Service lands. The review team determined that less habitat is probably available for goshawks today compared with presettlement conditions, but concluded that insufficient data exists to show a trend of continuing decline in goshawk habitat. The team's analysis indicated that the goshawk population is well distributed and stable at the broadest scale. Based on available data, the team concluded that although literature indicated goshawks preferred nesting and foraging in mature forests, they could be found nesting in young forests, tall willows, and riparian cottonwood stands and will forage in open and edge habitats, open steppes, dense forests, and sagebrush (citation).

Goshawks on the Beaverhead-Deerlodge National Forest

On the Beaverhead-Deerlodge NF, over 75 nest sites have been documented on the Forest over the past 15 years, with around half monitored for occupancy and nest success on a yearly basis since 1995 (Kirkley, UM-WMC monitoring reports available in project file; also refer to cumulative effects section below for summary of nest success). Reproductive rates for territories on the Beaverhead portion of the Forest average 1.75 fledglings per nest, and nesting success averages 67% (Kirkley 2002). Reproductive rates for known territories in intensively managed lands on the Deerlodge portion of the Forest averaged 2.6 fledglings per nest, and nesting success was about 68%, well within the ranges reported for studies done in unmanaged and managed landscapes throughout the western United States (summarized in Clough 2000).

In the Deerlodge portion of the Forest goshawks selected nest sites in mature and old growth Douglas-fir (preferred) or lodgepole pine, in stands that on average were 40 acres in size (19 ha.) located on north slopes below 7,000 feet in elevation, on average, within 4 kilometers from the grassland/forest interface (Clough 2000).

Three known goshawk territories occur in the analysis area, one southeast of Thompson Park outside of the proposed project area and two located north of the municipal watershed inside of the project area. The Thompson Park nest was discovered in 1997 and checked for occupancy in conjunction with this project in 2001 and again in 2003 but was not occupied during those years.

In 2001, systematic surveys were conducted across the analysis area in accordance with well-established protocol (Kennedy and Stahlecker 1993 as modified by Joy et al. 1994 and applied by Squires and Ruggiero 1997 and Clough 2000). All lands below 7,000 feet in elevation were surveyed by three field technicians who collectively walked 60 transect lines (1,950 m long laid side by side across the landscape 260 m part). Each transect line contained 7 broadcast calling stations for a total of 420 stations in the analysis area. Maps of transects and calling stations in project file.

Two nesting territories located inside the project area (China Gulch, and Basin Creek West) were discovered during the 2001 surveys (maps in project file). Each of two nests fledged 2 young. In 2002, a wildlife biologist visited the China Gulch and Basin Creek West nests during the early nestling period to determine occupancy. The China Gulch nest was not occupied, and in fact, the nest tree had broken in half, rendering it no longer suitable. Goshawk alarm call playbacks conducted in a one-mile radius around the China Gulch nest did not result in a response, and nest searches did not result in the discovery of an alternate nest.

The Basin Creek West nest was checked for occupancy in 2002 and 2003 with 2 young seen in the nest both years. The entire nest stand and surrounding area is now 80% dead with little canopy cover left from needle cast after a Mountain Pine Beetle infestation (project file).

The analysis area provides goshawks with 890 acres of potential nesting habitat, 700 acres (79%) of which is comprised of lodgepole pine that is considered at risk of 40 to 70% mortality from mountain pine beetle infestation and 190 acres of Douglas-fir (maps in project file). (Potential nesting habitat in the analysis area was modeled and mapped in GIS using field verified stand exam and photo interpretation data. Nesting habitat was defined as forested patches (> 25 acres in size) of mature Douglas-fir or lodgepole pine (> 9 inches diameter at breast height (dbh), located on northerly aspects below 7,000 feet in elevation, within 4 k. of the grassland/forest interface) based on habitat parameters found in Squires and Ruggiero 1996 and Clough 2000.

The goshawk analysis assesses habitat within National Forest boundaries in the Basin-Butte and Blacktail HUCs (maps and habitat data in project file). Habitats located on private lands adjacent to the Forest boundary on the north would provide some nesting and foraging opportunites; however, lands quickly transcend into private grasslands and the urban sprawl associated with the city of Butte and is considered nonhabitat and therefore not important for this analysis.

Peregrine Falcon

Peregrine falcons occur in low densities across the Forest as breeding individuals and seasonal migrants. A 1996 Forest-wide assessment of suitable cliff nesting habitat revealed that the analysis area and adjacent HUCs do not provide suitable cliff nesting habitat, and would provide migrant or transitory birds with marginal riparian foraging habitat (USDA-FS 1996). Sheepshead Mountain, located 20 miles north of the analysis area, contains the nearest known suitable nesting eyrie, but it has not been occupied since attempts at reintroducing falcons in the mid-1990s were unsuccessful.

No cliff nesting habitat is available in or near the analysis area; riparian foraging habitat for seasonal migrants would not be affected by the action alternatives; therefore, the species was not analyzed in detail. The action alternatives would have no effect on peregrine falcon.

Black-backed Woodpecker

The black-backed woodpecker is a year-round resident in boreal forests across Canada, extending south through the Pacific states and also into Idaho and Montana. Though rare in Montana, there

are breeding records from the western part of the state (Montana Bird Distribution Committee 1996). The black-backed woodpecker is a primary cavity nester that appears in large, irruptive concentrations in a diversity of forested types that have been recently disturbed (i.e. fire, insects) resulting in an abundance of bark beetle and/or wood boring insect prey (Hutto 1995, Goggan et al. 1989, Marshall 1992, also summarized in Dixon and Saab 2000). Numbers of individuals are nearly undetectable in undisturbed forests (i.e. Bock and Lynch 1970, Apfelbaum and Haney 1981, Harris 1982). Black-backed woodpeckers have shown a selection for mature and over-mature forest stands used for nesting (in cavities), foraging and roosting (Goggan et al. 1989). Lodgepole pine, ponderosa pine, larch, Douglas-fir and to a lesser extent spruce are used in Region 1 as primary feeding and nesting habitat (Maj and Hillis 1995).

The black-backed woodpecker feeds primarily on the larvae of wood-boring beetles in the Cerambycidae (long-horned beetles) and Buprestridae (metallic wood-boring beetles) families. Insects are retrieved from dead or live trees by scaling which is the flaking of tree bark from the bole (Bull et al. 1986). Pecking and gleaning strategies may also be used to forage insects from trees.

A review of ten years of landbird monitoring data that was collected in unburned forests on the Beaverhead-Deerlodge did not result in a single observation (Hutto and Young 1993-2002, data in project file). Yet, black-backed woodpeckers were observed on the Forest in 2002 in two areas, one on the south end of the Forest and one on the north end, which had burned during the fires of 2000 (T. Komberec and S. LaMarr, pers. comm.).

The black-backed woodpecker has not been documented in the analysis area, although the area supports forests and structures similar to those where the species occurs. Forest Service lands in the analysis area contain approximately 24,252 acres (86% of the analysis area) of forested cover that provides the woodpecker with potential snag habitat including: 14,875 acres of lodgepole pine (10,332 of which is considered at high risk of infestation by mountain pine beetle), 8,867 acres of Douglas-fir, and 446 acres of spruce/subalpine fir.

Based on Forest Inventory and Monitoring (FIA) Data the estimated number of snags per acre in the Upper Clark Fork landscape that encompasses the analysis area is 2.19 snags/acres with upper and lower 90% confidence limits that range from 0.00 to 7.25 snags per acre (Bush and Leach 2003; Czaplewski 2003). However, the FIA data grossly underestimates actual snag densities in the analysis area as snags created from mountain pine beetle related mortality occur in densities that range in size from pockets of 5 to 10 trees to patches that are 10 to 15 acres in size with 100s of snags per acre. If tree mortality continues at its current epidemic rate, 40 to 70% of the mature lodgepole pine (10,332 of 11,169 acres classified as mature and old growth lodgepole pine) is predicted to provide black-backed woodpeckers with high quality snag nesting and foraging habitat for several decades.

Common Loon

The common loon breeds on or near freshwater lakes, ponds, and occasionally riverbanks in either open or wooded habitat (DeGraaf et al. 1991). Loons prefer to nest on islands, whether a large island resembling a chunk of the mainland, or small peat hummock in a marsh (Dolan 1994). In Montana, small peat islands are the most common site chosen. The common loon has not been

documented in the analysis area and suitable habitat is not present, therefore the species was not analyzed in detail. The action alternatives would have no effect on common loon.

Sage Grouse

The sage grouse is primarily associated with sagebrush habitat throughout northwestern United States and southern Canada. Sage grouse have undergone a documented decrease throughout their historic range in western United States (Drut 1994, Gregg et al. 1994). The analysis area is dominated by Forested habitats intermixed with small sage/grass parks that are not considered suitable habitat for sage grouse. Therefore the species was not analyzed in detail. The actions alternatives would have no effect on sage grouse.

B. Mammals - Biological Information and Existing Environmental Baseline

Fisher

Fishers historically occurred in closed coniferous and mixed forests across southern Canada and the northern United States south through the mountains of the Pacific, Rocky Mountain, and New England states. Optimal habitat appears to be large, suitable areas of 245 acres or more interconnected with other large areas of suitable habitat. They are considered true "wilderness species." Because fishers select wet deciduous-coniferous forests with large overstory trees and closed overhead canopies, quality of fisher habitat may be affected by disturbances such as logging or fire. They usually avoid open areas such as meadows, grasslands, and clearcuts, and may be limited by snow depth. Fishers also require suitable maternal den sites which are typically located in high cavities of large trees, and sometimes in downfall or rock crevices (several citations in Finch 1992). A dense understory of young conifer, shrubs, and herbaceous cover is also important during summer.

Heinemyer (1993) and Jones et al.(1994) summarize that in the west, fishers are generally found in conifer-dominated forests containing a diversity of habitat types and successional stages. Fishers are closely associated with forested riparian areas which are used extensively for foraging, resting, and as travel corridors. Although fishers have been found to prefer mature and old-growth coniferous forest stands in most western studies, they also utilize a variety of earlier successional stages. Most studies have reported that fishers prefer forests with continuous cover, though some use of shrubby clearings can occur during certain seasons. A broader range of habitats may be used for hunting than for resting. Potential barriers to dispersal include large rivers, mountain divides above timberline, and open-canopied habitats.

Banci (1989) concluded that generally, habitats used by fisher have a high degree of diversity and interspersion. One of the features of having relatively large home ranges is the availability of diverse habitats. Because of the diversity of the fisher's diet, optimal habitat most likely includes a mixture of forest habitats (Ruggiero et al. 1994).

Fishers appear opportunistic in their use of resting sites, with hollow logs, tree cavities and canopies, snags, rocks, ground burrows, and brush piles frequently used (Heinemeyer 1993 and

Jones et al. 1994). "Witch's brooms" - dense clumps of stems and foilage typically caused by misteltoe - in the canopy of large diameter trees are commonly used by fishers (Jones 1991).

Natal dens are most often in cavities of live or dead trees (Heinemeyer 1993 and Jones et al. 1994). The absence of hardwoods in western habitats may limit the availability of suitable tree cavities for natal dens (suitable cavities being more prevalent in hardwoods). Consequently, in the absence of hardwoods, hollow logs may be more important as natal den sites in western North America than in central or eastern North America where hardwood species are more common.

Fishers are more habitat selective for resting than for foraging (Buskirk and Powell 1994). Fishers use lower elevations than marten (and are restricted to areas of lower snow accumulation than are marten) and are better adapted to earlier successional stages of forests than marten (Banci 1989).

Home ranges in Idaho are reported at 30 sq. mi. for males and 12 sq. mi. for females (Jones 1991) and in Montana: 32 sq. mi. for males and 7 sq. mi. for females (Heinemeyer 1993).

The fisher has always been uncommon to rare in western Montana, even in the last century, and may have been extirpated from the State by 1930-40 (Hoffmann and Pattie 1968). Some sources have indicated that the fisher never ranged into southwest Montana (Strickland et al. 1982, Powell 1982), whereas others indicated that they had (Strickland and Douglas 1981, Deems and Pursley 1983). Distribution maps in Ruggiero et al (1994) show that fishers do not occur or are extremely rare in southwest Montana, including the Analysis Area. A local, long-time trapper in the Big Hole Valley had only observed or heard of other trappers taking an occasional fisher along the Continental Divide. Trapping records from 1977 to 1994 document no fishers having been trapped in Region Three (Montana Fish, Wildlife and Parks, letter dated 2/95). However, fisher tracks have been detected in Bryant Creek in the Pioneer Mountains, during winter surveys from 1993 through 1996 by Montana Dept of Fish, Wildlife and Parks personnel. A fisher was observed in Bear Trap Gulch in the Anaconda-Pintler Range in 1995 (Montana Fish, Wildlife and Parks, letter dated June 5, 1997). And probable fisher tracks were found in Big Swamp Creek, in the West Bighole Range by a Forest Service Forest Carnivore survey crew in February 1999. The Rocky Mountain Research Station conducted surveys in Anaconda-Pintlers during winter 2000-2001 and no fisher tracks were detected during this effort (Ruggiero et al. 2001).

No fisher have been detected in the analysis area. Fisher do not tend to thrive or persist in mature, high elevation forests, like those found in the Basin Creek project area (C. Fager, pers. comm.). Fisher habitat in the analysis area is present at mid elevations along drainages. The analysis area provides over 19,000 acres (20 square miles) of mature, moist forested habitat types that includes 2,066 ac. of old growth lodgepole pine/spruce-fir, 114 ac. of aspen, and 1,153 acres of meadow/forest ecotones.

Wolverine

The wolverine has been characterized as one of North America's rarest mammals and least known large carnivores. Information on the habitat and population ecology of wolverines in the forests of western North America is mainly anecdotal or not available (Banci 1994). Within its geographic range, the wolverine occupies a variety of habitats. However, a general trait of areas occupied is their remoteness from humans and human developments. The wolverine is a management and

conservation enigma because the attributes of wilderness upon which it depends are not known. A pressing conservation issue is that we lack knowledge of what factors allow wolverines to persist at intermediate densities in western Canadian forests, while resource managers are being asked to provide for the needs of wolverines in the western conterminous United States, where population and habitat conditions are poorly known and likely more tenuous (Banci 1994).

Wolverines occur across the boreal and tundra zones of Eurasia, and in North America roughly north of the 38th parallel. In western conterminous United States, they occur in peninsular extensions of the more extensive Canadian habitats. Areas that supported reproduction during presettlement times are not known. Considering the extensive movements of this species, it is likely that individuals have been observed in areas that could not support home ranges or reproduction, such as an adult male trapped 18 miles north of Cheyenne, Wyoming in April of 1996 (Seidel et al. draft). Geographic isolation of wolverines may seem unlikely because of their extensive movements, however, whether animals moving long distances successfully complete dispersal and reproduce is not known (Banci 1994).

Wolverines have few natural predators but are occasionally attacked and killed by wolves and other large carnivores (several citations in Banci 1994). The importance of predation on wolverine kits has not been documented. Although this also is not documented, adult males may kill kits. Starvation may also be an important mortality factor for young and very old wolverines. Throughout most of its distribution, however, the primary mortality factor for wolverines is trapping and hunting.

Information on the use of natal dens in which the kits are born by wolverines in North America is biased to tundra regions where dens are more easily located and observed. All authors agree that the use of reproductive dens begins from early February to late March (Copeland 1993). These natal dens typically consist of snow tunnels up to 60 m in length (several citations in Banci 1994). Natal dens above treeline appear to require snow 1-3 m deep (Pulliainen 1968 cited in Banci 1994). Natal dens in Montana were most commonly associated with snow-covered tree roots, log jams, or rocks and boulders (Hash 1987 cited in Banci 1994). Little is known of the distribution of den sites in the landscape. The proximity of rocky areas, such as talus slopes or boulder fields, for use as dens or rendezvous sites may be important. Natal dens may be located near abundant food, such as cached carcasses or live prey. Limited information is available on dens in forested habitat, but they are often associated with old spruce/fir forest with desired physical structure (several citations in Banci 1994).

Wolverines are generally described as opportunistic omnivores in summer and primarily scavengers in winter. In general, diets during snow-free periods are more varied than in winter because of the greater availability and diversity of foods, such as berries, sciurids and other small mammals, and insect larvae. All studies have shown the paramount importance of large mammal carrion, and the availability of large mammals underlies the distribution, survival, and reproductive success of wolverines. Wolverines are too large to survive on only small prey. However, an abundance of large mammal carrion or a diverse prey base does not guarantee the presence of wolverines, especially if other life needs, such as denning habitat or travel corridors, are not met (several citations in Banci 1994). Although mostly scavengers, wolverines can prey on ungulates under some conditions, especially deep snow. Movement associated with daily hunting activity is typically 30-40 km (18-24 miles).

Broadly speaking, wolverines are restricted to boreal forests, tundra, and western mountains (Banci 1994). Wolverines are found in a variety of habitats and do not appear to shun open areas. Researchers have generally agreed that wolverine habitat is probably best defined in terms of adequate year-round food supplies in large, sparsely inhabited wilderness areas, rather than in terms of particular types of topography or plant associations (Kelsall 1981 cited in Banci 1994). Although this is generally true at the landscape scale, stand-level habitat use by wolverines in forests has not been adequately investigated.

At the stand level, preferences for some forest cover types, aspects, slopes, or elevations have been primarily attributed to a greater abundance of food (Gardner 1985 and Banci 1987 cited in Banci 1994), but also to avoidance of high temperatures and humans. In Montana, Hornocker and Hash (1981, cited in Banci 1994) believed that wolverines used higher ranges during the snow-free season because they were avoiding high temperatures and human recreational activity.

Home ranges of adult wolverines in North America range from 100 km^2 to over 900 km^2 (38-350+ mi^2) (several citations in Banci 1994). The variation of home range sizes among studies was at least in part related to differences in the abundance and distribution of food. Male home ranges are typically larger than those of females. The presence of young restricts movements and home range size of females. Home ranges of adult males and females overlap extensively, with the range of one male covering the ranges of 2 to 6 females. This is considered one reproductive unit. The number of reproductive units needed to ensure population maintenance and dispersal is not known. Home ranges of subadults, especially males, are transitory areas used before dispersal, which often is over long distances for males. Young females typically establish residency next to or within the natal home range (Magoun 1985 cited in Banci 1994). Because of the few data available, wolverine densities determined using home range size cannot be reliably extrapolated to the rest of an ecoprovince or used to compare ecoprovinces (Banci 1994). The long movements of wolverines suggest that recolonization of vacant habitats is not a concern. If dispersal is to be relied upon as a means of reestablishing populations, however, the productivity of the source population is important. Dispersal corridors that supply the requirements for young females are also important.

On a larger scale, the impacts of land-use activities on wolverine habitat are likely similar to those that have been described for grizzly bears (Banci 1994). Agriculture, domestic grazing, forestry, mineral and petroleum exploration and development, hydroelectric power development, human settlement, population growth, and recreation all have affected the productivity and integrity of habitat within the range of the wolverine. The presence of humans may conflict directly with wolverines. Hornocker and Hash (1981) suggested that human access on snowmobiles or ATV's in winter and early spring could cause behavioral disturbances. Despite their association with remote and generally wild habitats, information is insufficient to define what wilderness components wolverines require or to gauge when the impacts of a land-use activity have been excessive (Banci 1994). Until more information becomes available, habitat management prescriptions that successfully provide for the life needs of species such as the American marten, fisher, and lynx and their prey will also provide for the needs of wolverine at the stand level. However, it is not known whether this will provide for wolverine habitat needs at the landscape or larger scale (Banci 1994).

Habitat alterations have been limited in northern ecoprovinces but have been more extensive in the northwest United States, southern British Columbia and Alberta. The impacts of habitat loss and fragmentation have been large in these areas, except in those areas in the vicinity of large parks or other refugia.

Refugia are large areas that are not trapped and are free from land-use impacts. Refugia, representative of the ecoregions and vegetation zones that wolverine occupy and connected by adequate travel corridors, may be the best means of ensuring persistence of wolverine populations. Because wolverines are wide-ranging, refugia must be very large. Refugia have a dual purpose, also serving as a source of dispersing wolverine for other areas. Appropriate refuge sizes are unknown but will depend on habitat suitability. Because refugia for wolverines will no doubt be very large, the species will benefit by being part of a large carnivore conservation strategy in which connected refugia are established (Banci 1994).

Wolverines in the western conterminous United States exist in small populations largely in inaccessible areas. Populations in northwest Montana have the greatest likelihood of long-term persistence because they are contiguous with protected areas in British Columbia and Alberta and national park and wilderness area refugia within the state (Banci 1994). The persistence of populations in Idaho, Oregon and northwest Wyoming are less certain but can be enhanced if connected large refugia are established within the Shining Mountains (Alberta and British Columbia) and Northern Rocky Mountain ecoprovinces (Banci 1994). .

With the current level of land-use activity, it may not be possible to provide sufficiently large refugia for wolverines where populations are not contiguous with habitat from British Columbia and Alberta (Banci 1994). Even large national parks such as Yellowstone are considered by some scientists to be too small to maintain self-sustaining populations of certain bears and other upper level carnivores (Soulé 1980 and Salwasser et al. 1987 cited in Banci 1994). An evaluation of whether there is sufficient habitat to support self-sustaining populations and to provide for dispersal corridors in the Northern Rocky Mountain Forest ecoprovince (and others) should be done (Banci 1994). Such evaluations will likely show that the long-term persistence of these populations is dependent on recovery efforts.

Wolverines are documented in the Flint Creek, Anaconda-Pintler, Pioneer, West Bighole, and Boulder mountain ranges and are suspected of occurring in the analysis area. The Rocky Mountain Research Station conducted surveys in the Anaconda-Pintlers 20 miles northwest of the analysis area during winters 2000-2001 and 2001-2002 and detected wolverine presence during both survey efforts (Ruggerio et al. 2001, Ruggerio et al. 2002).

More than any other factors, wolverines are susceptible to mortality through hunting and trapping and human-caused disturbance near den sites (Hornocker and Hash 1981, Copeland 1998, Weaver et al. 1996). Some furbearer trapping occurs in the western half of the analysis area and is known to occur around the upper and lower Basin reservoirs (C. Fager, pers. comm.). Although other species (such as bobcat and mountain lion) have been trapped or taken in analysis area in recent years; no known wolverine trappings have been reported. The analysis area is highly accessible to trappers due to its close location to the local community of Butte, the network of roads and trailheads on the periphery of the project area, and the network of motorized trails that

bisect the Basin watershed on the west (in the inventoried roadless area) as well as on the east; all of which remain open to public use yearround.

The analysis area provides wolverine with 11,328 acres (32%) of unroaded, security habitat (96% comprises intermediate to mature forested cover) that could provide year round foraging opportunities and cover for travel for a portion of one female home range (Copeland 1998). Denning and rendezvous habitat similar to that described by Copeland (1998) occurs three miles south of the analysis area at the base of glacial cirque basins located near Red and Table Mountains. However, the Highland Road, which receives dispersed snowmobile use in winter (refer to recreation section), bisects forested habitat along the Continental Divide on the west side of the analysis area that would provide a forested linkage between ungulate winter range (located at lower elevations outside the analysis area) and potential denning habitat at higher elevations. The effect of an occasional snowmobile on wolverine movement in the analysis area is unstudied and unknown. A more suitable unroaded linkage between potential denning habitat and ungulate winter range occurs south of Red Mountain and extends eastward to the Jefferson River Valley (B-D NF Wildlife Habitat Viability Analysis, Query 5 –Wolverine Habitat Prediction; Banci 1994; Heinemeyer et al. 2001; maps in project file)

Townsend's (Western) Big-eared Bat

This bat ranges throughout the western half of North America and south into central Mexico (Clark and Stromberg 1987). Western big-eared bats have been found in a wide variety of habitats. Habitats used include deciduous forests, dry coniferous forests, pinyon-juniper woodland, desert shrubland, and mountain foothills. For the most part, the western big-eared bat is a cave dweller for both day roosts and hibernation sites. It is frequently found in abandoned mines. They also commonly use buildings, but only as night roosts. An exception occurs in the summer when these bats have been known to use tree cavities or hollow trees for daytime roosting (Torquemada and Cherry 1995).

These bats have not been documented in analysis area or anyone on the Beaverhead-Deerlodge National Forest. Management direction involves identifying and protecting caves and abandoned mines. Such structures serve as winter hibernation habitat and summer nursery colonies. In summer, male and nonreproductive females usually roost alone and will utilize snags to do so. Abandoned mine shafts located two miles south of the analysis area may provide suitable roosting, winter, and maternity colony habitat; however surveys done during the summers of 1996 and 2001 did not document the species presence. Riparian foraging habitat is available in analysis area in the lower reaches of Bear, Herman, and China Gulches as well as along Blacktail Creek; however such habitat is a long distance (at least four miles) away from cave habitat. The species has not been documented on the Forest; no activities are planned near abandoned mines, and as such, the Townsend's big-eared bat was not analyzed in detail.

Northern Bog Lemming

The northern bog lemming is a small grayish-brown vole which has a boreal distribution, occurring in the coterminous United States in Washington, Idaho, Montana, Minnesota and New England. The northern bog lemming is a habitat specialist. It occurs in disjunct populations. Its habitat is typically sphagnum bogs and fens, but it is also occasionally found in other habitats including

mossy forests, wet subalpine meadows, and alpine tundra (Reichel and Beckstrom 1993, Weckwerth and Hawley 1962).

Very little is known about the food habits of the northern bog lemming and at the time of their publication, Reichel and Beckstrom 1994, mentioned that their had been no study of their food habits.

Patch size of typical habitat where northern bog lemmings have been found in Montana range in size from 1-340 acres, with 7 of 13 being smaller than 10 acres (Reichel and Beckstrom 1994). No information is available that defines home range size, movements, or dispersal of this species.

As of 1993, the bog lemming was known to occur in about a dozen locations in Montana (Reichel and Beckstrom 1994) including populations in Missoula County, Ravalli Co., Beaverhead Co. and Lincoln Co. Bog lemmings are known to occur in the Pioneer Mountains on the south portion of the Forest, but limited surveys in other portions of the Forest have not documented the species presence.

The analysis area does not contain bog or fen habitat and is too low in elevation for alpine tundra. Wet sub-alpine meadow habitat occurs in spruce/fir riparian areas in the uppermost reach of main Basin Creek (on private land) and Blacktail Creek (on Forest Service lands where suitable wet meadow habitat is surrounded by old growth lodgepole pine). The analysis area does not contain bog/fen habitat; no activities are planned in or near potential spruce/fir riparian meadow habitat, and as such the species was not analyzed in detail. The action alternatives would have no effect on northern bog lemming.

Pygmy Rabbit

Pygmy rabbits are strikingly small. They are buff gray to slate gray, and their bellies are not white. Their tails are small and, unlike cottontails, inconspicuous because of the buff color underneath (Clark and Stromberg 1987). Pygmy rabbits are limited to areas where big sagebrush grows in dense, tall stands. These dense, tall thickets of sage where these rabbits live are laced with runways and burrows. Pygmy rabbits dig their own, multiple-entrance burrows. Burrow openings are often at the base of a large sage plant (Clark and Stromberg 1987). Suitable habitat does exist in or near the analysis area, therefore the species was not analyzed in detail. The action alternatives would have no effect on pygmy rabbit.

V. EFFECTS OF THE ALTERNATIVES

Effects of direct, indirect, and cumulative effects to Sensitive Species were assessed across National Forest lands located in the Basin-Butte and Blacktail 6th field hydrologic unit codes (HUC 170102010201 and 170102010202), two adjacent sub watersheds that will be affected by implementing the proposed action and alternatives; hereafter the analysis area. The analysis area, encompasses the 14,319-acre project area wherein fuels treatments are proposed. The HUCs comprise 55,946 total acres including: 28,154 acres of Forest Service land concentrated in forested areas in the southern portion of the HUCS; 716 acres of state land adjacent to the Forest Boundary northwest of the lower Basin Reservoir; and 27,077 acres of private lands the majority of

which encompasses the city of Butte and Butte Valley in the northern portion of the HUCs as well as the Roosevelt Drive Subdivision east of the Basin Reservoirs.

Five of the Forest Service sensitive species previously listed that are known to or potentially occur in or near the analysis area depend on forested ecosystems either entirely or for a large part of their life history needs. The avian species in this group reproduce in live trees or in cavities in live or dead trees. The mammalian forest carnivores in this group den on or below ground in association with dead and down woody material, tree stumps, and boulders. Removal of mature forest cover as proposed reduces the availability of preferred nesting and foraging habitat and reduces the abundance of prey species that require large trees, snags and downed logs. Five of the species included in this group are:

Flammulated Owl Black-backed woodpecker Northern Goshawk Fisher Wolverine

There will be no direct or indirect effects caused by the implementation of any of the alternatives on the peregrine falcon, common loon, sage grouse, Western big-eared bat, northern bog lemming, pygmy rabbit. Suitable habitat does not exist in or near any of the units proposed for treatment. Boreal toad and leopard frog are addressed in the aquatic BE.

Table 3. provides a summary of the change in quantity and quality of habitat (in acres and % change) from the current situation by alternative for the sensitive species associated with habitats in the analysis area.

Table 3. Sensitive species. Summary of change in acres (%) of habitat in the analysis area from existing by alternative and estimated change from past, present and reasonably foreseeable actions (cumulative change).

SENSITIVE SPECIES	ALT 1 ASSUMES NO CHANGE FROM EXISTING	ALT 2 CHANGE IN ACRES (%)[1]	ALT 3 CHANGE IN ACRES (%)[1]	ALT 4 CHANGE IN ACRES (%)[1]	ALT 5 CHANGE IN ACRES (%)[1]	ESTIMATE OF CUMULATIVE CHANGE IN ACRES (%)
Flammulated owl (*Otus flammeolus)*	4,454 mature and old growth Douglas-fir	No net change in old growth; 273 acre (6%) improvement in mature Douglas-fir through thinning [2]	No net change in old growth; 709 acre (17%) improvement in mature Douglas-fir through thinning [2]	No net change in old growth; 786 acre (18%) improvement in mature Douglas-fir through thinning [2]	No net change in old growth; 777 acre (17%) improvement in mature Douglas-fir through thinning [2]	No net change in old growth; 245 acre (6%) improvement in mature Douglas-fir through thinning
Northern goshawk (*Accipiter gentillis)*	890 mature and old growth Douglas-fir/lodgepole pine nesting habitat. Refer to text for foraging habitat.	No net change in old growth ;3% change in mature Douglas-fir and lodgepole pine (31 acres) [3]	No net change in old growth; 11% change in mature Douglas-fir and lodgepole pine (98 acres) [3]	No net change in old growth (11% change in mature Douglas-fir and lodgepole pine (98 acres) [4]	No net change in old growth (4%) change in mature Douglas-fir and lodgepole pine (39 acres) [5]	No net change.
Peregrine falcon (*Falco pereginus anatum)*	437 riparian foraging	No net change	No net change	No net change	No net change	No net change
Black-backed wood-pecker (*Picoides arcticus)*	7,225 high quality lodgepole pine snag nesting and beetle foraging habitat	288 (4%) [6]	1,123 (16%) [6]	1,918 (27%) [6]	1,135 (16%) [6]	717 (10%)
Wolverine	11,289	No net	No net	No net	No net	No net

SENSITIVE SPECIES	ALT 1 ASSUMES NO CHANGE FROM EXISTING	ALT 2 CHANGE IN ACRES (%)[1]	ALT 3 CHANGE IN ACRES (%)[1]	ALT 4 CHANGE IN ACRES (%)[1]	ALT 5 CHANGE IN ACRES (%)[1]	ESTIMATE OF CUMULATIVE CHANGE IN ACRES (%)
(*Gulo gulo)*	security	change	change	change	change	change
Fisher (*Martes pennati)*	19,587 wet mature and old growth forest	150 (<1%) [7]	659 (3%) [7]	1,001 (5%) [7]	680 (3%) [7]	866 (4%)
Northern bog lemming (*Synaptomys borealis)*	437 wet meadow	No net change	No net change	No net change	No net change	No net change
Townsend's big-eared bat (*Plecotus townsendii*)	437 riparain foraging	No net change	No net change	No net change	No net change	No net change

[1] Calculated by dividing the change in acres by Alternative 1 (existing acres) in the analysis area.

[2] Includes thinning treatments in mature Douglas-fir where 40% to 50% mature canopy closure would be maintained and larger diameter trees would be favored; no existing old growth would be treated.

[3] Includes clear-cut treatments in mature lodgepole pine at risk of 40 to 70% mortality from MPB. No old growth would be treated.

[4] Includes 72 ac. clear cut treatments in mature lodgepole, 24 ac. lodgepole pole thin, 10 ac. mature Douglas-fir thin. No old growth would be treated.

[5] Includes 27 ac. clear cut treatment in mature lodgepole, 2 ac. lodgepole thin, 10 ac. mature Douglas-fir thin. No old growth would be treated.

[6] Includes clear cut treatments in mature lodgepole (all habitat types included) at risk of 40 to 70% mortality from MPB. No old growth would be treated.

[7] Includes clear-cut treatments in mature lodgepole (wet habitat types) at risk of 40 to 70% mortality from MBP; no existing old growth would be treated, forest/riparian ecotones would be retained through no treatments in INFISH buffers.

DIRECT AND INDIRECT EFFECTS

Flammulated Owl

Alternative 1, No Action

Taking no action would not cause direct or indirect effects to the flammulated owl or its habitat. In the absence of fire, Douglas-fir stands will continue to undergo structural changes through forest succession and insect pathology. Pole-sized and mature Douglas-fir stands would continue to age, and would be expected to provide future nesting opportunities for owls in some areas. In other areas, a gradual decline in the quality of mature and old growth Douglas-fir habitats would be expected as stands increase in tree density and canopy layering. Unforeseen stand-replacing fires would decrease the amount and extent of existing mature and old growth Douglas-fir.

The no action alternative would have NO IMPACT on the flammulated owl.

Action Alternatives 2 through 5, Direct and Indirect Effects to Flammulated Owl

Direct effects to flammulated owl would not be expected from the treatments proposed in Alternatives 2 through 5. Given the existing lack of suitable nesting and foraging habitat and low probability that owls are present in the analysis area, the risk of disturbing even individual owls is low and therefore negligible. No old growth Douglas-fir would be treated therefore none would be affected. In adjacent stands comprised of pole-sized or mature (second growth) Douglas-fir, proposed treatments are designed to protect larger-diameter Douglas-fir, wherever it occurs, and to promote diameter growth. In addition, five snags per acres would be retained across all thinned acres to provide for potential nesting opportunities. In the long term, treatments would be expected to increase the quality of Douglas-fir which may increase the potential for future occupancy by the species. Beneficial effects would vary by area treated, with the largest area affected in Alternative 4, followed by 5, 3, and 2, with the smallest area affected. Untreated areas would continue to undergo changes as described under Alternative 1, no action.

Northern Goshawk

Alternative 1, No Action Direct, and Indirect Effects to Northern Goshawks

Taking no action would not cause immediate direct effects to the goshawk or goshawk habitat. In the absence of fire, nesting and foraging habitat will continue to undergo structural changes through forest succession and insect pathology. Over the next few years, the MPB epidemic is predicted to kill 40 to 70% of the lodgepole pine trees in 79% (700 of 890 acres) of the mapped, potential nesting habitat currently available in the analysis area. Areas that experience greater than 50% mortality likely would no longer provide suitable nesting habitat (Reynolds et al 1992, Squires and Ruggiero 1996). One of two recently occupied nest stands experienced 70% tree mortality in 2001, and the goshawk renested there in 2002. In similar MPB-killed nest stands in Oregon, goshawks returned to nest for two to three years until the needles fell from killed trees and the trees no longer provided sufficient canopy closure for nesting thermal cover (M. McGrath, pers. comm.). MPB-killed areas would continue to provide habitat for goshawk prey including snowshoe hare, red squirrel, and grouse species; however, once trees fall to the ground (28 years out), the

high density of fuels may actually impede the ability of goshawks to hunt and capture prey (refer to Biological Evaluation in the Appendix).

The remaining Douglas-fir, 21% (190 of 890 acres) of potential mapped nesting habitat, would continue to provide nesting habitat until tree densities in the under story increased, through succession, above levels considered suitable by goshawks for nesting (i.e. Squires and Ruggiero 1996).

Any unforeseen stand replacing fires would convert mature forest used for nesting and foraging to early seral forest that would gradually favor prey species such as snowshoe hare and grouse species, once trees, forbs and shrubs regenerate after fire.

Alternative 2 through 5

In the short term, Alternatives 2 through 5 would likely reduce the nesting and foraging potential for two of three known breeding pairs in the analysis area through the direct removal of mature trees and disturbance associated with treatment-related activities (including road construction and associated use). Disturbance around occupied nest sites would be minimized through the use of a 40-acre no harvest buffer. The 40 acre protected area represents the mean size of the nest stand comprised of mature forest (defined as a forested area dominated by trees > 9 " diameter at breast height) selected by goshawks in a heavily managed landscape on the B-D (Clough 2000). Of note, Reynolds et al. (1992, p. 13) defined the nest stand as a nest area 20 to 25 acres in size occupied by breeding goshawks from early March until late September, further stating that the nest area is the focus of all movements and activities associated with nesting. In addition, provisions to ensure adequate protection of nesting goshawks and their young from disturbance during the critical incubation, nestling and post fledgling periods were included in Chapter 2 of the Final Environmental Impact Statement (FEIS) for the project including the following. Mitigation added to FEIS which calls for no treatment or treatment related disturbance (i.e. road building) occurring from mid-April through late July within a 170-ha area (PFA) centered on the last known active nest. A goshawk nest protection clause will be added to the sale contract which states: if a new (previously unknown), active goshawk nest is discovered during marking or logging operations, a 40-acre no harvest buffer will be established around the nest to conserve the nest area, and no treatment related disturbance will occur within a 170-ha area from mid-April through late July. On August 1, treatment-related activity may commence within the 170-ha area. No treatment related activity would occur at any time within the 40-acre protected nest area.

Effects would vary by alternative, with the smallest area affected in Alternative 2, following by 3, 5, and 4 with the largest area affected. In stands considered suitable for nesting, removing more than 50% of the volume would likely reduce the stand to an unsuitable condition (Reynolds et al 1992, Squires and Ruggiero 1996).

In stands not currently considered suitable for nesting, proposed thinning treatments would maintain or enhance the foraging potential for goshawks. For example, more open-forested conditions would allow for unimpeded flight and increased prey availability for foraging goshawks. Moreover, as forbs, shrubs, and young conifers regenerate in thinned areas from the increased growing space and light, the potential for occupancy by snowshoe hare and grouse species prey would increase. In lodgepole pine and Douglas-fir pole-sized areas (now considered unsuitable as nesting habitat), Squires and Ruggiero (1996) suggested that thinning could create stands similar in structure to goshawk nest areas that would enhance future nesting opportunities.

Proposed treatments in grassland/shrub areas are designed to reduce conifer colonization and restore once more open parklands, resulting in improved conditions for goshawks, known to forage for ground squirrels and other prey items along forest/grassland ecotones. For example, in Idaho Patla (1997) found that nesting productivity and occupancy were positively related to the proportion of grassland/shrub cover in the Foraging Area, suggesting the importance of this cover type for goshawks.

Clear-cut areas and thinned areas may facilitate increased occupancy by open-forested raptor species resulting in increased competition for resources (such as with red-tailed hawks that forage on similar prey) or an increased risk of predation (such as by great-horned owls known to prey on goshawk nestlings and juveniles) (Crocker-Bedford 1990).

The remaining untreated acres in the analysis area would continue to undergo structural changes through forest succession and insect pathology as described under Alternative 1, no action above.

Peregrine Falcon

Alternatives 1 through 5

No suitable cliff-nesting habitat occurs in or near the analysis area and riparian foraging habitat for migrating individuals would not change under any of the alternatives. Furthermore, the risk of disturbing even migrating or transient individuals under the action alternatives is low. As such, direct, indirect, and cumulative effects would not be anticipated. Taking no action, Alternative 1, and/or implementation of action Alternatives 2 through 5 would have NO IMPACT on peregrine falcon (refer to Biological Evaluation in Appendix).

Black-backed Woodpecker

In the northern Rockies, only two studies quantify the population density of black-backed woodpeckers, both of which were concentrated in recently burned forests with none occurring in lodgepole pine forests recently killed by mountain pine beetle (MPB), such as that found in the analysis area. In western Montana, Harris (1982) found 15 individuals per 100 acres in burned forests two years after fire, compared with 0 per 100 in adjacent unburned forests; and in the northern Rockies, Hutto (1995) found, on average approximately 1 individual per 100 acres in 33 recently-burned forests (or 1 per 40 hectares). Hutto recently stated that large irruptions of black-backed woodpeckers in MPB-killed forests generally do not occur because insect densities at the landscape scale are not as high compared with recently burned landscapes. That is, MPB larvae are present in infected trees for one winter, then emerge the following summer as adults and move on to the next live host to lay eggs, thus moving through a landscape in a wave fashion affecting individual trees or groups of trees that are spread out over a large area. The infected area continues to grow in size with each passing year until the beetle runs out of host trees or a sustained cold snap kills them. In contrast, in large recent stand-replacement burns, wood boring insects are more concentrated and over a much larger area, and the larvae over winter for 2 to 3 years before emerging.

In MPB-killed lodgepole, Dixon and Saab (2002, p. 14) summarized two unpublished studies conducted in northeast Oregon, where on average 3.3 individual black-backed woodpeckers occurred for approximately every 100 acres of MPB-killed forest (or 0.033 pairs per acre) (Arnett et

al. 1997a and 1997b in Dixon and Saab 2002). For purposes of this analysis, the above population densities found in MPB-killed lodgepole forests were used to estimate the effects of the proposed alternatives on individuals, which give a more conservative estimate of effects, compared with burned forests in the northern Rockies.

Alternative 1, No Action

Taking no action in the analysis area would not cause immediate direct effects to the black-backed woodpecker or its habitat. The ongoing mountain pine beetle epidemic is projected to kill up to 70%, or 7,225 acres, of mature lodgepole pine that covers approximately 10,332 acres in the analysis area. As a result, the amount and distribution of concentrated, beetle foraging and snag nesting habitat would continue to increase significantly, providing potential habitat for up to 238 individuals (calculated as 7,225 acres x 0.033 individuals per acre).

Any unforeseen, stand replacing fire would have similar beneficial effects by creating standing dead snags followed by abundant insects.

Taking no action would not add adverse cumulative impacts to the past, present, and reasonably foreseeable actions described in Chapter II. Given the potential for a significant increase in the amount and distribution of beetle foraging and snag nesting habitat, the no action alternative (in the absence or presence of any unforeseen wildfires) may have a BENEFICIAL IMPACT on local black-backed woodpecker populations (refer to Biological Evaluation in Appendix).

Alternative 2 through 5

Potential adverse effects to black-backed woodpeckers from implementation of action Alternatives 2 through 5 could occur from the direct removal of potential snag nesting and beetle foraging habitat through proposed clear cutting in mature lodgepole pine (at risk of 40 to 70% MPB-related mortality). Harvest-related activities may occur from mid-April through late-July and increase the risk mortality to breeding adults and young during the incubation, young nestling, and early fledgling periods. Alternative 2 would remove 4% of the existing, potential snag-nesting and beetle-foraging habitat (see Table 3 above) and would reduce the existing potential for colonization by 9 individuals (from the 238 existing individuals calculated above to 229, and calculated as follows: [238 existing individuals – (0.033 individuals/acres x 288 clear cut acres) = 9 individuals]. Alternatives 3 and 5 would alter 16% and reduce the potential for colonization by 37 individuals, and Alternative 4 would alter 27%, and reduce the potential for colonization by 63 individuals. The remaining untreated acres of high-risk lodgepole pine would continue to provide high quality foraging and nesting habitat as MPB-related mortality continues as expected.

Wolverine

Alternative 1, No Action

Taking no action would result in no immediate changes in the size or vegetative structure of security habitat for wolverine (currently 32% of Forest Service lands in the analysis area provides security habitat dominated by coniferous forest cover). Forest structural changes through succession processes, mountain pine beetle-related mortality, or any unforeseen fire would not impact habitat security or cause a measurable change in the prey base for wolverine. No direct, indirect, or cumulative effects would therefore be expected. Taking no action would have NO IMPACT on the wolverine.

Alternative 2 through 5

Alternatives would not impact potential denning habitat or concentrated ungulate winter range (located outside of the analysis area) or reduce the available prey base of wolverine. The temporary increase in total and open road density and reduction in mature forested cover would heighten the potential for hunters to access more remote portions of the analysis area and encounter wolverines or other animals such as elk. An increase in access coupled with a potential increase in carrion from ungulates killed by hunters could attract wolverine to the area and increase the chance of wolverine mortality through wolverine/human interactions (Weaver et al. 1996, Copeland 1998, Trombulak and Frissell 1999, Forman et al. 2003, pp 113-138). Risks to wolverine would be highest in Alternative 4 with the largest area affected, followed by 5, 3, and 2 with the smallest area affected.

In the short term, under Alternatives 2, 3, and 5, the existing security values in the inventoried roadless area would be maintained throughout the 4-year implementation period (see Table 7y, p. 28). Alternatives 4 and 5 would increase access into the more remote areas of the Basin watershed, north of the lower reservoir. Conversely, Alternatives 2 and 3 would increase access in the lower elevation, more roaded portions of the analysis area.

The amount of security habitat would return to pre-treatment levels after temporary roads are recontoured and revegetated. In Douglas-fir and lodgepole areas treated with a thinning from below, mature forested cover would be maintained, and the quality as cover would gradually increase as diameter growth increased on the remaining trees and as new trees regenerated from the increased space and available light. Clearcut areas would be converted to young forest. Forest succession and insect pathology would continue in untreated stands.

Fisher

Alternative 1, No Action

Taking no action would not cause direct or indirect effects to fisher or fisher habitat. In the absence of a fire event, MPB-related mortality would gradually increase the quality of potential fisher habitat with the gradual increase in downed woody debris for denning and increase in under story vegetation for prey species.

The no action alternative would not add cumulatively to the past, present, and reasonably foreseeable actions listed in Chapter 2.

The projected increase in the quality of denning habitat and increase in the foraging potential for fisher may have a BENEFICIAL IMPACT on fisher and fisher habitat (refer to Biological Evaluation in Appendix).

Alternative 2 through 5

Given the low probability that fisher historically occupied or currently occupy the analysis area and surrounding Highland Mountains, the risk of direct effects (i.e. disturbance and displacement) to fisher from treatment-related activities would be low. Fisher do not tend to thrive or persist in mature, high elevation forests, like those found in the Basin Creek project area (C. Fager, pers. comm.). Witmer et al. (1998, p. 14) summarized that "fishers probably can tolerate small patch cuts or other small-scale disturbances, provided these occur in a larger matrix of relatively dense, closed canopy, late successional forest (internal citations omitted). Such openings might

even increase the value of habitat by providing a diversity of prey, which will support a diverse diet for fishers." In the analysis area, no treatments planned in old growth or riparian areas would aid in maintaining high quality denning and foraging habitat. Under Alternative 4, the maximum treatment alternative, 95% of potential fisher habitat would remain untreated. Mature forest cover, 5 snags per acres, and downed woody debris would be maintained in all Douglas-fir areas proposed for thinning. The conversion of mature lodgepole pine in suitable areas to young forest through clear cutting would render stands unsuitable for denning or for prey species (i.e. snowshoe hare and red squirrel), while adjacent untreated stands would continue to provide habitat. Effects would be greatest in Alternative 4 with the most area affected, followed by Alternative 5, 3, and 2 with the least area affected. Of note, the key environmental correlates for conserving fisher, identified in Witmer et al. 1998 (i.e. riparian corridors, > 20% mature forest, large areas of unroaded habitat) are accounted for in the analysis area.

Northern Bog Lemming

Alternatives 1 through 5

Treatment activities proposed in actions Alternatives 2 through 5 would not occur in or adjacent to bog lemming habitat; therefore, direct, indirect and cumulative effects would not be anticipated. Taking no action, Alternative 1, and implementation of action Alternatives 2 through 5 would have NO IMPACT on the bog lemming (refer to Biological Evaluation in Appendix).

Townsend's Big-eared Bat

Alternatives 1 through 5

Treatment activities proposed in actions Alternatives 2 through 5 would not occur in or adjacent to known caves or mine shafts that would provide the bat with roosting, winter, or maternity colony habitat. Treatment activities proposed in actions Alternatives 2 through 5 would not occur in or adjacent to riparian foraging habitat. Furthermore, treatment-related activities would occur during daylight hours, whereas bats forage at night.. Taking no action, Alternatives 1, and implementation of action Alternatives 2 through 5 would have NO IMPACT on the Townsend's big-eared bat.

CUMULATIVE EFFECTS

The existing condition in the analysis area represents the cumulative effects caused by natural and human-induced disturbances over time that in turn influence the successional stage, geographic extent, composition, and structural characteristics of vegetation communities, and consequently, the ability of those communities to meet the various seasonal needs of wildlife. The appearance of the existing landscape is the product of natural disturbance events such as fire, insects and disease, climatic events, and plant successional processes, as well as the effects of human-related activities such as past timber harvest, man-caused fire and fire suppression, grazing of domestic animals, recreational activities, road building, subdivision development and all related activities. The combined environmental effects of all human-related activities may be more substantial than those caused by an individual action.

Area of Analysis

Cumulative effects to sensitive species were assessed across all National Forest lands located in the Basin-Butte and Blacktail 6th field hydrologic unit codes (HUC 170102010201 and 170102010202) defined above. The FEIS for the project takes a broader look at sensitive species viability across the entire planning area.

Past, Present, And Reasonably Foreseeable Actions

The following list of past, present, and reasonably foreseeable actions were provided in Chapter 2 of the EIS for the project and each was reviewed for possible effects to individual sensitive species. Not every listed action is addressed for each and every species. That is only those actions that may contribute cumulative effects to a particular species were discussed for that species. In addition, a roads analysis was prepared in conjunction with this project and cumulative effects of ongoing motorized use of open roads and OHV trails were also considered (project file).

1. Forest Service Timber Harvest:
    a. Extensive timber harvest occurred during the late 1800s and early 1900s throughout the region, including parts of the Basin Creek watershed. Many stands are presently about 100 years old.
    b. The Wood Creek Helicopter Slash Burning project - In 1999, salvage of 48 acres of wind thrown lodgepole pine was completed. The majority of large, down woody material was preserved in the unit. Ground disturbance was minimal due to helicopter yarding, or harvest done near the main road.
    c. Thompson Park Hazard Tree Removal - In October 2002, approximately 2 acres were harvested within Thompson Park along the road and recreation sites on Forest Service land
    d. Thompson Park Hazard Tree Removal – In 2003, approximately 42 acres that posed a safety risk were harvested from recreation sites and roadways in Thompson Park. Most of the slash from the project was chipped instead of burned. Small piles of hand piled slash remain and will be burned in the fall of 2003.
    e. Lime Kiln Timber Sale - An Environmental Assessment, Decision Notice, and Finding of No Significant Impact for the Lime Kiln Timber Sale were completed in 1999. However, the decision was never implemented. The selected alternative would have harvested approximately 366 acres of sawtimber and roundwood (post and pole/tops); constructed 0.5 mile of temporary road; and closed 0.6 mile of existing dead-end spur roads in the Roosevelt Drive and Lime Kiln areas of the Highland Mountains. The project area is located immediately east of the Basin Creek project area. This action could be modified pending additional environmental analysis, and is a foreseeable future action.
    f. Basin Creek Fuels Reduction Project -
2. Non-Forest Service Timber Harvest:
    a. The Montana Department of Natural Resources intends to salvage log approximately 53 acres in the State lands in T2N, R8W, S36. They intend to implement salvage activities by the summer of 2004.

b. Private logging has occurred outside the analysis area, and it is anticipated that additional logging will continue to occur on private property in and outside the project analysis area. In the past, activity related slash has been piled and burned, and landowners must meet state slash disposal requirements.

3. Trail Construction/Reconstruction:

   a. Continental Divide National Scenic Trail – The proposed trail is located from FS Road 8492 (Lime Kiln Road) south and west to junction of FS road 84 and 8520, north on the divide to Climax Gulch, then west to Feely exit on I-90. Construction is scheduled for 2005 and 2008. The dates of this project could change depending on scoping, rights-of-ways, or other issues. The trail will be nonmotorized and is proposed to be closed during the winter due to lynx concerns. Length of the trail is approximately 16 miles. Tread width is 24 inches with clearing limits at 8 feet.

Construction of the trail would include reconstruction of a trailhead at the junction of Forest Service Roads 84 and 8520. Improvements would include a toilet, parking area, hitch racks, and tables/fire rings. The proposal is currently being analyzed and a fall 2003 decision is expected.

   b. Bear Gulch Trail #108 Reconstruction – The trailhead is in or near Basin Creek Municipal Park and terminates in Burton Park. This trail is open to motorized access year round. The trail length is approximately 5 miles. The existing trail does not meet current trail design standards and has numerous erosion concerns. The proposal will be to reroute the trail to minimize resource concerns.

   c. Herman Gulch Road - The eastern-most 0.8 miles of the Herman Gulch Road beyond the last recreational use cabin on the road is proposed for conversion to a non-motorized trail. The trail would have a 2-foot wide tread with a 5-foot wide horizontal clearing limit and a 10-foot high vertical clearing limit. This would entail maintaining the first 0.4-mile portion of the trail in the existing roadbed and relocating the eastern and southern-most 0.4-mile portion of the trail outside the valley bottom. The stream and valley bottom in this latter area where the current roadbed is located in and along the stream channel would be restored to improve riparian and aquatic function. Restoration of this valley bottom would include abandonment of the existing roadbed, placement of large woody material in the stream and valley bottom, and some localized physical reconfiguration of the stream channel in places where the current roadbed has encroached into the stream channel proper.

4. Livestock Grazing: The watershed contains the Twin Calf pasture of the Blacktail Allotment. The Blacktail Allotment was in nonuse status for 1999, 2000, and 2001. During 2002, the Twin Calf pasture was rested from livestock grazing. The Blacktail Allotment is permitted for 92 cow/calf pairs between June 16 and September 30. The Blacktail Allotment Management Plan is scheduled for revision. The Twin Calf pasture includes four small tributary streams which feed Basin Creek or directly into one of the reservoirs. The watershed map (Figure 1) shows the pasture boundary. The Butte-Silver Bow Water Utility District (BSBWUD) has maintenance responsibility for the pasture fence section above the reservoir and Basin Creek, which provides about a 1/8-mile buffer. Past use on the pasture showed light use on the tributaries, especially toward the lower fence. In addition, a small portion of the highland pasture of the Moose Camp allotment is within the Basin Creek watershed. This allotment plan is also

scheduled for revision. Livestock use in this area of the highland pasture has traditionally been light.

5. Rural homes: The potential for home development exists on private land parcels in the eastern portion of the watershed.

6. Butte-Silver Bow Water Utility District (BSBWUD):

    a. BSBWUD treats lower Basin Creek reservoir several times per summer with copper sulfate to reduce algal blooms in that could foul the domestic water supply. These treatments impair aquatic productivity in the lower reservoir.

    b. BSBWUD minimizes streamflow releases from the lower Basin Creek reservoir in late summer months such that aquatic habitat quantity in Basin Creek below the reservoir is relatively low.

7. Special Use Authorizations:

    a. Four recreation residences are located in Basin Creek and Herman Gulch. Each lot is approximately 1 to 1.5 acres in size. The permits require that the permittees take responsibility for reducing fire risks by removing hazardous fuels that pose a threat to the buildings. Permittees have been notified they are responsible for removing dead and dying trees from the recreation residence lots surrounding their cabins.

    b. Four private road use permits exist in the Roosevelt Drive area. These roads provide access to private land. Two additional road use permits are proposed in the area along Moose Creek that would provide access to private land. One road use permit will be issued above Basin Creek Reservoir to access private land in section 19.

    c. There is one outfitter and guide permit, which utilizes the Highland Road to access areas in the Highlands during the summer. Activities include fishing in streams above the watershed, hiking, and driving for pleasure. This permit has been issued as one-year temporary permit. It is likely to continue as an annual issuance.

    d. A "convenience exclosure" exists in the vicinity of Roosevelt Drive. This permit allows for the grazing of horses.

    e. A telephone/power line exists in Basin and Blacktail Creek watersheds. The power line clearance is approximately 40 feet.

8. Noxious Weeds: In the past, noxious weeds, mostly spotted knapweed, have been managed by herbicides. In the future spotted knapweed and common toadflax will be treated with herbicides and monitored on an annual basis. Estimated acreages of knapweed and toadflax are 30 and 10, respectively.

9. Thompson Park and Blacktail Creek Watershed Restoration Plan – This project is a grant proposal submitted to the Natural Resource Damage Program in March 2003. Thompson Park, a municipal recreation area of approximately 3,500 acres, is adjacent to the east boundary of the project area, within the Blacktail Creek watershed. The Park's west boundary extends to portions of the Herman Gulch Road, which is part of the project area. The proposal is for reconstruction of seven recreation sites along Montana Highway 2, rehabilitation of 33 miles of trail, and rehabilitation and/or obliteration of nine miles of roads.

10. Wright Mining Plan of Operations - A proposal was submitted in July 2003 to conduct exploration on two mining claims in China Gulch. Shallow pits will be dug by hand for potential quartz deposits. Five pits are proposed, however, if assay results are positive then there is a possibility that an amended plan of operations will be submitted. The work is proposed to occur during the summer/fall of 2003 with reclamation following the work. All pits will be hand dug and access to the site will be by foot.
11. Small Tracts Acquisition – There is a proposal for a small tracts acquisition of property located in Herman Gulch. Approximately 2 acres would be transferred from National Forest System lands to private land. This parcel of land currently has a nonsystem road that goes through the property, approximately 20 feet from a private residence.

Cumulative Effects to Flammulated Owl

Alternative 1

Given no direct and indirect effects are expected, no added cumulative effects would be expected.

Actions Alternatives 2 through 5

Extensive harvest in the analysis area at the turn of the century reduced the amount and extent of old-growth Douglas-fir and Douglas-fir snags and is therefore assumed to have reduced the nesting and foraging potential for flammulated owls from historic conditions. No historic population trend data exists for the species. Foreseeable treatments on Forest Service lands could include thinning up to an estimated 245 additional acres of mature Douglas-fir by removing patches of dense, smaller diameter trees from the subcanopy, and retaining snags consistent with Forest Plan standards. Treatments would be expected to leave the overstory relatively intact, promote diameter growth, thus increasing the potential for occupancy by the owl. The increase would represent a 6% added change from existing (245 acres/4454 existing mature and old growth, Table 3).

Combined with the foreseeable actions above, Alternative 2 would alter the structure in 12% of the available mature Douglas-fir; Alternative 3, 23%; Alternative 4, 24%; and Alternative 5, 23%.

When considered with past harvest, Alternatives 2 through 5 in addition to foreseeable thinning treatments in Douglas-fir would improve the quality of existing mature Douglas-fir habitats by reducing the conifer competition from smaller diameter trees currently found in the understory, promoting diameter growth in larger Douglas-fir, and thus may increase the potential for future occupancy by the species Given the above, implementation of Alternatives 2 through 5 may have a BENEFICIAL IMPACT on the flammulated owl.

Cumulative Effects to Northern Goshawk

Alternative 1, No Action

Given the potential for a reduction in nesting opportunities in lodgepole pine from MPB-related mortality over the next few years, taking no action would add cumulatively to the following past and reasonably foreseeable actions.

Extensive harvest around 1900 reduced the amount and extent of suitable mature and old growth Douglas-fir from what occurred in the analysis area during pre-settlement times and is assumed to have reduced the nesting and foraging potential for goshawks. No historic population data exists for the species.

Salvage harvest on 53 acres of MPB-killed forest on state land and foreseeable logging on private lands north of the Forest boundary, may disturb foraging individuals but would not occur in close proximity to suitable nesting habitat, therefore, nesting goshawks should not be affected.

When considered with all past, present, and reasonably foreseeable actions, taking no action MAY IMPACT INDIVIDUALS OR HABITAT but is not likely to contribute to a trend toward federal listing or loss of viability for the population of species.

Alternatives 2 through 5

Given the potential for a reduction in nesting and foraging opportunities through direct removal of mature forest and treatment related disturbance, implementation of action Alternatives 2 through 5 may add cumulative adverse impacts to two of three known breeding pairs in the analysis area. Only 3 to 11% of the available nesting habitat in the analysis area would be altered under the proposed action and alternatives (with added mitigation to protect occupied nesting habitat, p. 10).

Implementation of Alternatives 2, 3, 4, or 5 MAY IMPACT INDIVIDUALS OR HABITAT, but is not likely to contribute to a trend toward federal listing or loss of viability for the population or species. The following past and reasonably foreseeable actions were considered.

Foraging habitat is not considered a limiting factor for goshawks. Historic harvest and ongoing fire suppression has resulted in reduced structural and biological diversity compared to historic (or pre-mining) conditions. Lack of downed wood, reduced vigor in aspen and willow communities, loss of open grassland parks, and an overall lack of structural diversity in the understory of lodgepole pine and Douglas-fir forested areas is assumed to have reduced the potential of the area to support goshawk prey populations. The types of thinning proposed in Douglas-fir will leave the overstory relatively in tact, accelerate the development of larger diameter Douglas-fir, stimulate understory vegetation, and improve the vigor of grasses and shrubs, while leaving 10 to 15 tons of downed wood on the ground and 5 snags per acre, all important components for goshawk prey.

In some areas, past fire suppression has resulted in increased tree densities in grassland/shrub parklands and in mature and old growth Douglas-fir that has reduced the foraging and nesting potential for goshawks. The continuation of existing fire suppression activities may allow for the development of more structurally complex stands in thinned and some untreated areas that would benefit goshawks. In other untreated areas, a continued increase in tree densities in the sub canopy will continue to reduce the suitability of nesting habitat and prey availability (Squires and Ruggiero 1996, Graham et al. 1997).

Foreseeable harvest in the Limekiln area was anticipated to improve 266 acres of foraging habitat by reducing tree densities in the subcanopy; while protecting nesting habitat. Planned salvage of MPB- killed trees in the Thompson Park area may alter foraging habitat, but would not be anticipated to reduce nesting habitat. Foreseeable salvage harvest on 53 acres of MPB-killed forest on state land and foreseeable logging on private lands north of the Forest boundary (Items 2a and b, Ch. II), may disturb foraging individuals and alter foraging habitat, but would not occur in close proximity to suitable nesting habitat, therefore, nesting goshawks should not be affected.

Peregrine Falcon

Alternatives 1 through 5

Given no direct or indirect effects are expected, cumulative effects would not be expected. No suitable cliff-nesting habitat occurs in or near the analysis area and riparian foraging habitat for migrating individuals would not change under any of the alternatives. Taking no action, Alternative 1, and/or implementation of action Alternatives 2 through 5 would have NO IMPACT on peregrine falcon.

Black-backed Woodpecker

Alternative 1

Taking no action would not add adverse cumulative impacts to the past, present, and reasonably foreseeable actions described in Chapter II. Given the potential for a significant increase in the amount and distribution of beetle foraging and snag nesting habitat, the no action alternative (in the absence or presence of any unforeseen wildfires) may have a BENEFICIAL IMPACT on black-backed woodpecker.

Alternative 2 through 5

Treatments proposed in Alternatives 2 through 5 would add adverse cumulative impacts to the following past, present, and reasonably foreseeable actions described in Chapter 2. Actions with potential effects to snag nesting and beetle-foraging habitat for the black-backed woodpecker were considered.

Although historic population trend data does not exist for the species, extensive clear-cutting at the turn of the century (item 1a, Ch. 2) followed by active fire suppression and unregulated fire-wood cutting on Forest Service lands is assumed to have reduced the existing nesting and foraging potential from historic conditions. More recently, salvage of MPB-killed trees in developed recreation areas (Item 1c and d, Ch. 2) collectively effected 44 acres (0.6%) of potential snag habitat in 2002 and 2003; and foreseeable harvest in items 1e and 1f could affect an additional 673 acres (9%).

Currently, Thompson Park is closed to the public for firewood cutting; however, unregulated cutting is expected to continue to remove snags scattered throughout Forest Service lands that are located in close proximity to roads. Effects to the woodpecker would be localized to a few individual trees and difficult to predict or quantify.

Removal of MPB-killed trees on private lands in the Thompson Park area and near the Forest boundary on the north has occurred in the recent past and is expected to continue over the next few years.

Implementation of Alternative 4 (the maximum proposed treatment) could affect 27% of the estimated potential number of woodpecker individuals (63/238) in MPB-killed lodgepole pine; recent past and foreseeable actions could affect an additional 10% or (24/238), leaving high quality beetle foraging habitat for 189 individuals. Treatments would remove most of the standing dead, leaving clumps of live green trees and 5 standing snags per acre. Five snags per acre retained in treated areas are well above the snag density (0.6 per acre) recommended by Thomas (1979) to maintain 100% potential population of black-backed woodpeckers on units where snags will be removed. Five snag per acres are also well within the range of the 2.1-11 snags per acre (> 9 inches dbh) recommended by various researchers (Cunningham et al

1980, Raphael and White 1984, Schreiber and de Calesta 1992, Bull et al 1997, USFS 2000) to support the potential density of several woodpecker species and other cavity-nesting birds on a landscape. Refer to page 10 on existing FIA snag data. Natural snag recruitment would be allowed to continue on an additional 1,993 acres of Douglas-fir and lodgepole pine proposed for thinning (in addition to retaining 5 snags per acres), and on the 14,662 acres of forest that would remain untreated. Given the above, none of the reasonably foreseeable actions, in conjunction with the maximum proposed treatment in Alternative 4 would be expected to adversely impact the sustainability of local black-backed woodpecker populations. As such, action Alternatives 2, 3, 4, and 5 MAY IMPACT INDIVIDUALS OR HABITAT, but is not likely to contribute to a trend toward federal listing or loss of viability for the population or species.

However, given the long history of fire-suppression and post-fire and beetle-related salvage, researchers question the long-term population viability of black-backed woodpeckers and other cavity nesters. Throughout its geographical range, the black-backed woodpecker appears far more abundant in recently burned or MPB-killed forests than in undisturbed forests (Raphael et. al. 1987, Hutto 1995, Murphy and Lehnhausen 1998, and summarized extensively in Dixon and Saab 2000). Population densities of the black-backed woodpecker irrupt in forests where the larvae of wood-boring and bark beetle insects that the species feeds upon are abundant, typically in newly burned, beetle-killed, or partially cutover forest. Given the history of fire suppression and salvage logging following fires, the majority of research on the species focuses on burned forests, particularly in the northern Rockies (see above). Hutto (1995) theorized that "although it is possible that Black-backed Woodpecker populations are maintained by source refuges of low numbers in unburned forests, it is equally likely that their populations are maintained by a patchwork of recently burned forests. The relatively low numbers in unburned forests may be sink populations that are maintained by birds that emigrate from burns when conditions become less suitable 5-6 years after a fire." Taylor and Barmore (1980) found that northern three-toed and black-backed woodpeckers were present in burned forests the first three years following fire and absent or in undetectable densities thereafter.

Fire suppression and salvage logging will prolong periods of use in undisturbed forests by black-backed woodpeckers and likely cause them to decline (Murphy and Lehnhausen 1998). Saab and Dudley (1998) found that black-backed woodpeckers typically selected nest sites in unlogged burned stands, concluding that the species would respond positively to stand-replacement fires and negatively to fire suppression. Henderson (1997) studied the effects of fire on avian distribution in mid-elevation vegetation zones in southwest Montana, and concluded that the current fire management policies that emphasize fire suppression in forests and prescribed burning in grassland parks " is not adequate to maintain fire-associated or early-seral bird species."

In Region One, Hillis et. al. (2002) recently assessed the historical range of variability (HVA) of mixed-severity and stand replacing fires along with salvage logging to quantify and spatially display the amount of habitat available to the black-backed woodpecker over time. Hillis concluded that longer HVA fire intervals and historical salvage logging could negatively impact the species and he provided management recommendations, the first of which stated that "… Region One policy makers should recognize the need for retaining moderate and high severity fire on substantial acreages at normal intervals when land use and fire suppression decisions are made."

The current wildfire suppression policy will have a much greater impact on black-backed woodpecker population sustainability in the analysis area, and on the B-D NF, than the proposed project.

Wolverine

Alternative 1, No Action

Taking no action would result in no immediate changes in the size or vegetative structure of security habitat for wolverine (currently 32% of Forest Service lands in the analysis area provides security habitat dominated by coniferous forest cover). Forest structural changes through succession processes, mountain pine beetle-related mortality, or any unforeseen fire would not impact habitat security or cause a measurable change in the prey base for wolverine. No cumulative effects would be expected. Taking no action would have NO IMPACT on the wolverine.

Alternative 2 through 5

The short term increase in access and treatment-related disturbance coupled with a long term loss of mature forested cover would reduce habitat security for wolverine, and as a result, would add adverse cumulative impacts to the following past, present, and reasonably foreseeable actions described below (and listed above). On the east and southeast sides of the analysis area (outside the treatment area) past and ongoing disturbances associated with state highway development and use, coupled with developed and dispersed recreation in Thompson Parkand the Archery Range), dispersed snowmobiling (particularly on Highland Road #84), and ongoing disturbances associated with the Roosevelt Drive subdivision have reduced the quality and quantity of security habitat for wolverine. Urban development is expected to increase on private lands in the foreseeable future.

Urban development on the north, including the city of Butte, has altered the ability of ungulates to use the area as winter range, and therefore reduced the quality of winter foraging habitat for wolverine from historic conditions. In addition, dispersed recreation throughout the analysis area, including dispersed snowmobiling on the Highland road south of the analysis area coupled with winter use of the Bear Gulch Trail that bisects the inventoried roadless area has further reduced the ability of wolverine to move freely through the analysis area (see Recreation section for a detailed discussion of recreational use of the analysis area).

On the west side of the analysis area, the proposed Continental Divide National Scenic Trail project is projected to increase foot and horse travel in summer and fall and heighten the potential for dispersed winter recreation. The trail would be open to nonmotorized travel only. Although the risk (or probability) of an encounter between a wolverine and an individual or group of dispersed hikers, horse travelers, or skiers, would be low, cumulative effects to habitat security would result from the incremental increase in human use of the trail and surrounding area over time.

Foreseeable actions that may benefit wolverine include the Blacktail NRD restoration project that proposes to close 7.14 miles of road that is currently open to public vehicular travel year round on the east side of the analysis area. Total road density and human access on the east side of the analysis area would decline and reduce disturbance risks, however, total habitat security (or large blocks of unroaded land) would not increase.

Alternatives would not impact potential denning habitat or core ungulate winter range (located outside of the analysis area) or reduce the prey base of wolverine. The reduction in security habitat would occur in a portion of a home range that provides wolverine with foraging and cover habitat for travel. Implementation of Alternatives 2, 3, 4, and 5 MAY IMPACT INDIVIDUALS OR HABITAT, but is not likely to contribute to a trend toward federal listing or loss of viability for the northern Rocky Mountain wolverine population.

Fisher

Alternative 1, No Action

The no action alternative would not add cumulatively to the past, present, and reasonably foreseeable actions listed above.

The projected increase in the quality of denning habitat and increase in the foraging potential for fisher may have a BENEFICIAL IMPACT on fisher and fisher habitat.

Alternative 2 through 5

Cumulative impacts from the conversion of mature forest to young forest would have the potential to adversely affect habitat for fisher by reducing the amount of potential denning and foraging habitat.

Historic harvest around 1900 reduced the amount of available old growth and downed woody debris from historic conditions. Foreseeable harvest on 866 acres of Forest Service lands could alter mature forest on an additional 4% of potential fisher habitat available in the analysis area. Effects MAY IMPACT INDIVIDUALS OR HABITAT, but would not likely contribute to a trend towards federal listing or cause loss of viability to the northern Rocky Mountain fisher population or species.

Northern Bog Lemming

Alternatives 1 through 5

Treatment activities proposed in actions Alternatives 2 through 5 would not occur in or adjacent to bog lemming habitat; therefore cumulative effects would not be anticipated. Taking no action, Alternative 1, and implementation of action Alternatives 2 through 5 would have NO IMPACT on the bog lemming.

Townsend's Big-eared Bat

Alternatives 1 through 5

Treatment activities proposed in actions Alternatives 2 through 5 would not occur in or adjacent to known caves or mine shafts that would provide the bat with roosting, winter, or maternity colony habitat. Taking no action, Alternatives 1, and implementation of action Alternatives 2 through 5 would have NO IMPACT on the Townsend's big-eared bat.

VI. DETERMINATION

(A summary of the determinations is contained in Table 1.)

Common To All Alternatives

Implementation of the proposed action (preferred alternative 3) or any of the alternatives will have no impact on the peregrine falcon, common loon, sage grouse, Townsend's (Western) big-

eared bat, northern bog lemming, pygmy rabbit. Rationale: suitable habitat does not exist in or near any of the units proposed for treatment.

In addition, implementation of the proposed action (preferred alternative 3) or any of the alternatives (including taking no action) may impact individual northern goshawks or goshawk habitat but is not expected to result in a trend toward federal listing or reduced viability for the population or species. Rationale: 89 to 97% potential nesting will be maintained. No old growth will be affected. Structural components for prey species will improve in the long term. Added mitigation (40-acre no harvest buffer, no harvest within 170 ha. area during critical times of the year) ensure adequate protection of nesting goshawks.

Alternative 1 - No Action

Taking no action may impact individual northern goshawk or goshawk habitat (due to loss of nesting habitat from mountain-pine beetle related mortality) but is not expected to result in a trend toward federal listing or loss of viability for the population or species. Rationale: adequate nesting habitat will be maintained, habitat for prey will improve in the longterm.

Taking no action would have a beneficial impact on black-backed woodpecker and fisher. Rationale: improved nesting, denning, and foraging habitat from MPB epidemic.

Taking no action would have no impact on flammulated owl, peregrine falcon, common loon, sage grouse, Townsend's (Western) big-eared bat, northern bog lemming, pygmy rabbit, wolverine. Rationale: no change from baseline or suitable habitat is not present.

Alternative 2

Implementing Alternative 2, **may impact individual** northern goshawk, black-backed woodpecker, and fisher **or habitat, but is not expected to result in a trend toward federal listing or reduced viability for the population or species.** Rationale: Refer to common to all alternatives section for the goshawk. Sufficient snag densities will be maintained for the black-backed woodpecker. Fisher occupancy in the analysis area is unlikely, however, potential habitat will be maintained in sufficient amounts.

Implementing Alternative 2 may have a **beneficial impact** on the flammulated owl. Rationale: Thinning in Douglas-fir will enhance conditions for the owl.

Implementing Alternative 2 would have **no impact** on the peregrine falcon, common loon, sage grouse, Townsend's (Western) big-eared bat, northern bog lemming, pygmy rabbit. Rationale: suitable habitat would not be affected or does not exist near treatment units.

Alternative 3

Implementing Alternative 3, **may impact individual** northern goshawk, black-backed woodpecker, and fisher **or habitat, but is not expected to result in a trend toward federal listing or reduced viability for the population or species.** Rationale: same as alternative 2.

Implementing Alternative 3 may have a **beneficial impact** on flammulated owl. Rationale: same as alternative 2.

Implementing Alternative 3 will have **no impact** on peregrine falcon, common loon, sage grouse, wolverine, Townsend's (Western) big-eared bat, northern bog lemming, pygmy rabbit. Rationale: same as alternative 2.

Alternative 4

Implementing Alternative 4, **may impact individual** northern goshawk, black-backed woodpecker, wolverine, fisher **or habitat, but is not expected to result in a trend toward federal listing or reduced viability for the population or species.** Rationale: same as alternative 2. Habitat security will return to pretreatment conditions for wolverine once temporary roads are reclaimed.

Implementing Alternative 4, may have a **beneficial impact** on flammulated owl. Rationale: same as alternative 2.

Implementing Alternative 4 will have **no impact** on peregrine falcon, common loon, sage grouse, Townsend's (Western) big-eared bat, northern bog lemming, pygmy rabbit. Rationale: same as alternative 2.

Alternative 5

Implementing Alternative 5 may impact individual northern goshawk, black-backed woodpecker, wolverine, fisher or habitat, but is not expected to result in a trend toward federal listing or reduced viability for the population or species. Rationale: same as alternative 4.

Implementing Alternative 5 may have a beneficial impact on flammulated owl. Rationale: same as alternative 2.

Implementing Alternative 5 will have no impact, on peregrine falcon, common loon, sage grouse, Townsend's (Western) big-eared bat, northern bog lemming, pygmy rabbit. Rationale: same as alternative 2.

Recommendations To Remove Or Avoid Adverse Effects

Recommendations mitigating or reducing the risk of adverse effects to sensitive species or their habitat were made throughout the ID Team process and were incorporated into the development of the alternatives or listed as mitigation for other resource areas. The following summarizes mitigation or project design features that will aid in reducing effects to sensitive wildlife.

Summary of mitigation and or special project design standards that will minimize risks to terrestrial TES and MIS

1. Noxious weed prevention and control incorporating Best Management Practices to prevent undesirable herbicide effects (1986 Beaverhead Forest Environmental Assessment, Executive Order 2/3/99 on Invasive species).
2. Application of INFISH standards and guidelines within Riparian Habitat Conservation Areas (RHCAs), including no harvest buffers within 300 feet slope distance on each side of the active stream channel on fish-bearing streams; 150 feet on non-fish bearing streams, and 50 feet on intermittent streams and wetlands.
3. Road and landing locations in RHCAs would be minimized.
4. Fuel storage and refueling activities would not occur in RHCAs.
5. Dust abatement chemicals would not be applied in RHCAs.
6. Road use would be ceased during wet weather and runoff periods to minimize erosion.
7. Any new soil disturbances in treatment units would be restored or mitigated.
8. 10 to 15 tons/acre of woody debris would be left on site in treatment areas.
9. 5 snags per acres (concentrated at the edge of harvest units or near wet areas would be retained in all treatment units.
10. Trees would be retained in a clumpy or variable fashion.
11. All landing sites would be recontoured and revegetated.
12. All temporary roads constructed to facilitate log hauling would be recontoured and reseeded.
13. No treatments would occur in a single acre of designated old growth.
14. Treatments are designed to protect aspen clones and promote aspen regeneration.
15. Treatments are designed to restore grassland parks.
16. Treatments and treatment related disturbances would be concentrated in the lower elevation, more roaded portions of the analysis area.
17. No treatments would occur in the higher elevation, unroaded portions of the analysis area including the Inventoried Roadless Area and Research Natural Area.

18. Administrative use only would be allowed on temporary roads constructed to facilitate log hauling.
19. Contract clauses specify that the roads must be located in areas that require the least amount of cutting, and that the roads will remain open for the shortest amount of time possible.
20. Disturbance around occupied goshawk nest sites would be minimized through the use of a 40-acre no harvest buffer.
21. To ensure adequate protection of nesting goshawks and their young from disturbance during the critical incubation, nestling and post fledgling periods include the following: No treatment or treatment related disturbance (i.e. road building) will occur from mid-April through late July within a 170-ha area (PFA) centered on the last known active nest (map in project file). A goshawk nest protection clause will be added to the sale contract which states: if a new (previously unknown), active goshawk nest is discovered during marking or logging operations, a 40-acre no harvest buffer will be established around the nest to conserve the nest area, and no treatment related disturbance will occur within a 170-ha area from mid-April through late July. On August 1, treatment-related activity may commence within the 170-ha area. No treatment related activity would occur at any time within the 40-acre protected nest area.

Prepared by /s/ Lorraine Clough Date: 02/27/04
Wildlife Biologist

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Individuals Contacted

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Fager, C. Montana Department of Fish, Wildlife and Parks. Discussed Craig's research and expertise on mammalian carnivores (fisher, wolverine) as well as the trapping history in the analysis area.

BIOLOGICAL ASSESSMENT

FOR

TERRESTRIAL THREATENED AND ENDANGERED WILDLIFE SPECIES

BASIN CREEK HAZARDOUS FUELS REDUCTION PROJECT
ENVIRONMENTAL IMPACT STATEMENT

BUTTE RANGER DISTRICT
BEAVERHEAD-DEERLODGE NATIONAL FOREST

Prepared By:

*__/s/Lorraine Clough*_____ February 26, 2004
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SUMMARY

Determination of Effects

Implementation of the proposed Federal action IS NOT LIKELY TO ADVERSELY AFFECT the threatened Canada lynx; WILL HAVE NO EFFECT on the threatened bald eagle; and IS NOT LIKELY TO JEOPARDIZE THE CONTINUNED EXISTENCE OF experimental nonessential gray wolf populations.

Consultation Requirements

In accordance with the Endangered Species Act (ESA), its implementation regulations, and FSM 2671.4, the Beaverhead Deerlodge National Forest is required to request written concurrence from the United States Fish and Wildlife Service (FWS) with respect to determinations of potential effects on Canada lynx.

Need For Re-Assessment Based On Changed Conditions

The Biological Assessment findings are based on the best current data and scientific information available. A revised Biological Assessment must be prepared if: (1) new information reveals affects, which may impact threatened, endangered, and proposed species or their habitats in a manner or to an extent not considered in this assessment; (2) the proposed action is subsequently modified in a manner that causes an affect, which was not considered in this assessment; or (3) a new species is listed or habitat identified, which may be affected by the action.

INTRODUCTION

The purpose of this Biological Assessment is to review the possible effects of the proposed federal action on threatened, endangered, and proposed species and their habitats. Threatened, endangered, and proposed species are managed under the authority of the Federal Endangered Species Act (PL 93-205, as amended) and the National Forest Management Act (PL 94-588). Under provisions of the Endangered Species Act (ESA), Federal agencies shall use their authorities to carry out programs for the conservation of listed species, and shall insure any action authorized, funded, or implemented by the agency is not likely to: (1) adversely affect listed species or designated critical habitat; (2) jeopardize the continued existence of proposed species; or (3) adversely modify proposed critical habitat (16 USC 1536).

This Biological Assessment analyzes the potential effects of the proposed federal action on all threatened, endangered, and proposed species known or suspected to occur in the proposed action influence area (Table 1; the March 20, 2003 List of Threatened and Endangered Species by county for the Beaverhead-Deerlodge National Forest). Life history information on these species can be found in the reference document "The Distribution, Life History, and Recovery Objectives For Region One Threatened, Endangered, and Proposed Terrestrial Wildlife Species" (2002) and is incorporated by reference in this Biological Assessment.

Table 1. Threatened, endangered and proposed species known or suspected to occur on the Beaverhead-Deerlodge national forest. Occurrence column indicates species occurrence within the influence area (analogous to the Analysis Area) for the proposed action.

Species	Status	Occurrence
Gray Wolf *(Canis lupus)*	Nonessential Experimental	Suitable habitat and potential for occurrence as dispersing individuals or seasonal transients.
Canada Lynx (*Lynx canadensis*)	Threatened	Suitable habitat and potential for occurrence.
Bald Eagle (Haliaeetus leucocephalus)	Threatened	No suitable nesting habitat is present in the influence area; may occur as foraging migrants. Species addressed but not analyzed in detail.
Grizzly Bear (*Ursus arctos*)	Threatened	No suitable habitat. Species not considered present (as breeding or transients) in Silverbow County. Species not carried forward for analysis. The proposed action and alternatives would have no effect on grizzly bear.

PROPOSED PROJECT

The Butte Ranger District, Beaverhead Deerlodge National Forest proposes to treat approximately 2,544 acres of sage/grass, Douglas-fir, and lodgepole pine communities located in the Basin Creek drainage in the northern Highland Mountains, approximately 5 miles south of Butte, Montana. The purpose and need for this project is focused specifically on the objective of reducing hazardous fuels along the wildland/urban interface and in the Basin Creek drainage area in order to decrease the probability of crown fire, lower the spread and intensity of future surface fires, and increase the probability of safely defending life and property from fire (USFS 2003).

Table 2 describes the vegetation treatments.

Table 2. Summary of proposed project features (refer to Appendices 1 and 2).

VEGETATION TREATMENTS 2,544 acres (116 acres helicopter logging in winter; 2,428 acres ground based)	
Colonized Parks; thin and burn Colonized parks, consisting of sage/grass communities that have been encroached by conifers, will be treated by removing conifers and burning the sagebrush to decrease fire intensity and increase defensible space.	15 units; 334 acres (range 2 to 71 acres)
Mature Douglas-fir stands (dominated by trees > 9 inches diameter at breast height) at high risk to crown fire will be treated by removing most of the lodgepole and thinning the Douglas-fir. Trees will be retained in a clumpy distribution, but the main objective is to maintain space between tree crowns to reduce the spread of crown fire. The largest diameter and oldest trees will be retained. Mature Douglas-fir; thin from below	19 units; 708 acres (range 6 to 138 acres)
Mature lodgepole pine (dominated by trees > 9 inches diameter at breast height) at high risk to high intensity surface fire will be treated by removing most of the lodgepole, and retaining clumps of small diameter trees and snags in accordance with Forest Plan standards.	21 units; 1156 acres (range 1 to 167 acres)

Small diameter Douglas-fir (Douglas-fir pole dominated by trees < 9 inches diameter at breast height) at moderate risk to crown fire and will be treated by removing most of the lodgepole pine and thinning the Douglas-fir. Canopy conditions will become more open to reduce the potential for crown fire.	8 units; 283 acres (range 8 to 129 acres)
Small diameter lodgepole pine (Lodgepole pole dominated trees < 9 inches diameter at breast height) at moderate risk to both crown and surface fire will be thinned to create an open stand with larger diameter trees.	12 units; 117 acres (range 2 to 33 acres)

Approximately 17 miles of temporary road will be constructed, which will be recontoured after use, seeded, and covered with slash to discourage use. The proposed action (identified as preferred alternative 3 in the Final Environmental Impact Statement for the project), including treatment units, and approximate temporary road locations is displayed in Appendix 1.

Mitigation and or special project design standards that minimize risks to Threatened and Endangered species include (USFS 2003, pp. 2.4-2.7):

1. Noxious weed prevention and control incorporating Best Management Practices to prevent undesirable herbicide effects (1986 Beaverhead Forest Environmental Assessment, Executive Order 2/3/99 on Invasive species).
2. Application of INFISH standards and guidelines within Riparian Habitat Conservation Areas (RHCAs), including no harvest buffers within 300 feet slope distance on each side of the active stream channel on fish-bearing streams; 150 feet on non-fish bearing streams, and 50 feet on intermittent streams and wetlands.
3. Road and landing locations in RHCAs would be minimized.
4. Fuel storage and refueling activities would not occur in RHCAs.
5. Dust abatement chemicals would not be applied in RHCAs.
6. Road use would be ceased during wet weather and runoff periods to minimize erosion.
7. Any new soil disturbances in treatment units would be restored or mitigated.
8. 10 to 15 tons/acre of woody debris would be left on site in treatment areas.
9. 5 snags per acres (concentrated at the edge of harvest units or near wet areas would be retained in all treatment units.
10. Trees would be retained in a clumpy or variable fashion.
11. All landing sites would be recontoured and revegetated.
12. All temporary roads constructed to facilitate log hauling would be recontoured and reseeded.
13. No treatments would occur in a single acre of designated old growth.
14. Treatments are designed to protect aspen clones and promote aspen regeneration.
15. Treatments are designed to restore grassland parks.
16. Treatments and treatment related disturbances would be concentrated in the lower elevation, more roaded portions of the analysis area.
17. No treatments would occur in the higher elevation, unroaded portions of the analysis area including the Inventoried Roadless Area and Research Natural Area.
18. Administrative use only would be allowed on temporary roads constructed to facilitate log hauling.

19. Contract clauses specify that the roads must be located in areas that require the least amount of cutting, and that the roads will remain open for the shortest amount of time possible.

Past, Present, and Reasonably Foreseeable Actions on Non-Federal Lands (USFS 2003, pp. 2.8-2.11)

1. Non-Forest Service Timber Harvest:

    a. The Montana Department of Natural Resources intends to salvage log approximately 53 acres in the State lands in T2N, R8W, S36. They intend to implement salvage activities by the summer of 2004.
    b. Private logging has occurred outside the analysis area, and it is anticipated that additional logging will continue to occur on private property in and outside the project analysis area. In the past, activity related slash has been piled and burned, and landowners must meet state slash disposal requirements.

2. Rural homes: The potential for home development exists on private land parcels in the eastern portion of the watershed.

3. Butte-Silver Bow Water Utility District (BSBWUD):

    a. BSBWUD treats lower Basin Creek reservoir several times per summer with copper sulfate to reduce algal blooms that could foul the domestic water supply. These treatments impair aquatic productivity in the lower reservoir.
    b. BSBWUD minimizes streamflow releases from the lower Basin Creek reservoir in late summer months such that aquatic habitat quantity in Basin Creek below the reservoir is relatively low.

4. Special Use Authorizations:

    a. Four private road use permits exist in the Roosevelt Drive area. These roads provide access to private land. Two additional road use permits are proposed in the area along Moose Creek that would provide access to private land. One road use permit will be issued above Basin Creek Reservoir to access private land in section 19.
    b. A telephone/power line exists in Basin and Blacktail Creek watersheds. The power line clearance is approximately 40 feet.

SPECIES ASSESSMENT

Canada Lynx (*Lynx canadensis*)

Population and Habitat Status

The analysis area (affected area) for lynx encompasses the Basin-Butte (170102010201) and Blacktail (170102010202) Lynx Analysis Units (LAUs) that provide lynx with 19,587 acres of habitat that connect, via contiguous forest, to larger blocks of lynx habitat in adjacent LAUs on the south and west (Appendix 3. map). The analysis area is considered part of the southern, marginal extensions of boreal forest where occurrence records indicate a continuous presence of lynx since record keeping began in the 1950s (Ruggiero et al. 1999). From 1977 through 1996, Montana Fish, Wildlife and Parks reported two lynx occurrence records in the analysis area (MTFWP 1996). Recent sightings (2001 and 2002) of lynx occurred 2 to 5 miles south of the analysis area (C. Fager, Montana Department of Fish, Wildlife, and Parks, pers. comm.). Table 3 below reflects the existing and cumulative habitat conditions in the analysis area.

Table 3. Basin-Butte and Blacktail lynx analysis units (LAU). Table includes total acres in each LAU, acres of lynx habitat, foraging (%), denning (%), and the percentage of lynx habitat reduced to an unsuitable condition from vegetation management practices in the past 15 years .

LAU NUMBER/NAME	TOTAL ACRES IN LAU	ACRES LYNX HABITAT	ACRES FORAGING (%)	ACRES DENNING (%)	UNSUITABLE ACRES (15 YEAR PERIOD)
Basin-Butte 170102010201	31,331	10,132	67 (<1%)	7,151 (71%)	<1%
Blacktail 170102010202	24,616	9,453	43 (<1%)	5,674 (60%)	<1%

Although not studied in detail in the analysis area, the abundance and distribution of lynx throughout its range appears linked with snowshoe hares, their primary prey (Ruggiero et al. 1999). Structurally diverse areas (i.e. large downed wood, seedling/saplings and shrub development in the under story) that provide optimum foraging and denning habitat cover around 17 percent of the analysis area, concentrated primarily in large, contiguous blocks of mature and old growth lodgepole pine and spruce/subalpine fir (2,066 ac.), aspen cottonwood (114 ac.) and meadow/forest ecotones in the upper elevations (1,153 ac). Early seral forests that would also provide habitat for hares, and thus foraging habitat for lynx, is limited to less than 1 percent (111 acres) of the analysis area (i.e. Koehler et al. 1979, Koehler 1990, Koehler and Brittel 1990; Ruggiero et al. 1999).

Direct, Indirect, and Cumulative Effects Analysis

Direct and Indirect Effects. Alternative 3 would concentrate vegetation treatments, temporary road construction and associated disturbances for approximately a 4-year period in the wild land/urban interface adjacent to the Forest boundary located in the northern and eastern portion of the project area and in a block of Forest land located down slope from (northwest of) the Roosevelt Drive subdivision and (northeast of) the lower Basin Reservoir. Treatments would alter 11 percent

of mapped lynx habitat in the Basin-Butte LAU and <1 percent in the Blacktail LAU (Table 4). Treatments, 17 miles of temporary roads constructed to facilitate log hauling, helicopter logging in winter, and essentially all treatment-related disturbances associated with the project would be concentrated in the lower elevation, more roaded portions of the analysis area where mapped lynx habitat appears in discontinuous blocks on north slopes intermixed among drier Douglas-fir, lodgepole pine, and grassland/sage covertypes.

Larger, more suitable, untreated blocks of lynx habitat would remain available at higher elevations in the more remote, unroaded portions of the analysis area where large blocks of contiguous forest, including structurally diverse old growth lynx habitat exists.

Given the above, direct and indirect effects to lynx are expected to be minimal.

Table 4 below provides a summary of the change in mapped foraging, denning, and total lynx habitat in acres (and percent change) under the preferred alternative (3) in the affected LAUs. The cumulative effects column provides an estimated change in acres from recent past (10 years), present, and reasonably foreseeable actions. For purposes of this analyses, proposed treatments (including thinning and clear cutting) are assumed to reduce the suitability of lynx habitat for at least 10 years until trees, shrubs, grasses, and forbs regenerate sufficiently to provide forage and cover values for lynx and snow shoe hare prey (Ruediger et al. 2000, p. 2-3, 2-4).

Table 4. Lynx Analysis Unit (LAU) change in acres (%) of mapped lynx habitat from existing. Table separates habitat by foraging, denning, and total.

LAU NAME	EXISTING ACRES LYNX HABITAT (% OF TOTAL)	ALT 3 CHANGE IN ACRES (%) [1]	CUMULATIVE EFFECTS CHANGE IN ACRES (%)
Basin-Butte LAU			
Foraging	67 (< 1%) [2]	No net change	
Denning	7,151(71%)	480 (7%)	
Total	10,132 [3]	1,082 (11%) [4]	< 1% in past 10 years; 0 foreseeable
Blacktail LAU			
Foraging	43 (< 1%)	No net change	
Denning	5,674 (60%)	No net change	
Total	9,453	15 (< 1%)	< 1% in past 10 years; 250 (2%) foreseeable

[1] % = percent change to unsuitable over a 10-year period from proposed treatments, calculated by dividing the change in acres by existing acres column.

[2] Only includes young seral stands.

[3] 3,346 of 10,132 acres existing lynx habitat = mature and old growth lodgepole pine considered high quality denning and foraging habitat from Mountain Pine Beetle-related mortality.

[4] 659 of 1,082 acres proposed for clear cut treatment is comprised of lodgepole pine and considered high quality denning and foraging habitat from Mountain Pine Beetle-related mortality.

In the short term, minor increased risks to lynx productivity, survival, and movement from implementation of the proposed action would occur from the direct modification of lynx habitat; an increase in habitat fragmentation from roading and habitat alteration; and disturbance and displacement effects from harvest-related activities.

Proposing no treatment in the Research Natural Area, the inventoried roadless area, old growth lodgepole pine, mature and old growth spruce/fir, riparian areas and riparian/forest ecotones, will maintain existing areas comprised of high quality denning and foraging habitat. Treatments are designed to protect aspen clones and promote aspen regeneration throughout proposed units.

Following implementation the foraging potential for lynx would increase gradually across all acres of treated lynx habitat as grasses, forbs, shrubs, and young conifers release in the openings created by treatments and provide habitat for snowshoe hare (i.e. Bailey et al. 1986; Sullivan and Sullivan 1988; Koehler 1990 and 1991 in Ruediger et al. 2000, p. 1-3 and 1-4). In the remaining, untreated areas the quality and quantity of foraging habitat would also be expected to increase (refer to discussion below on mountain pine beetle-killed forests).

Cumulative Effects to Lynx

Minor increased risks to lynx productivity and survival from proposed treatments and treatment related disturbance (described above) would add minor adverse cumulative effects to the following past, present, and foreseeable actions.

Past harvest around the turn of the century on federal and private lands in the analysis area in conjunction with the Butte mines has contributed to the existing degraded quality of lynx habitat by reducing the amount of structurally diverse areas (compared to historic conditions) that would support abundant hares or provide high quality denning habitat (i.e. large downed woody material, multiple canopy layers; shrub, and forbs cover; young seral). In the late-1980s, a mountain pine beetle epidemic began advancing through mature lodgepole pine in the analysis area, with infestation rates varying temporally and spatially, branching out from 80 to 90 percent mortality in the lower portions of drainages (where beetles have been working for several seasons) to a few scattered trees in the upper portions of drainages (where beetles have advanced from below more recently). A sustained cold snap slowed, and in some cases stopped, the beetle activity for several years until 1999. After a series of mild winters, the beetle began advancing at a faster rate until reaching the epidemic proportions seen today (detailed and discussed in the EIS). Mountain pine beetle epidemics provide a large-scale natural disturbance process in lodgepole pine forests that over time increase the structural diversity in stands, thus improving habitat conditions for species such as snowshoe hare and lynx (Romme et al. 1986, Schmid and Mata 1996). Refer to footnotes 3 and 4 in Table 4 above for lynx habitat acres affected by mountain pine beetle mortality.

In the past 10 years, less than 1 percent of mapped lynx habitat has been altered in the Blacktail and Basin-Butte LAUs through vegetation treatments on Federal lands. The proposed action would convert 1,082 acres of lynx habitat (480 denning; 602 cover) to early seral forest in the Basin-Butte LAU and 15 acres (cover) in the Blacktail LAU. The remaining untreated acres will continue to provide denning and cover habitat.

Foreseeable treatments on Forest Service lands may occur in the Blacktail LAU that would alter up to 866 acres of forested areas, with an estimated 250 acres considered lynx habitat (or 2 percent)

(Table 4). Foreseeable treatments on state and private lands north of the project area are low in elevation; not considered suitable lynx habitat and would have no bearing on this project (Table 4 above).

Treatment-related disturbance under proposed Alternative 3 would be concentrated in the lower elevations in the analysis area, leaving more remote, higher elevation habitats located in the unroaded portions of the analysis area in tact. On Forest Service lands, construction of the proposed Continental Divide National Scenic trail that borders the analysis area on the south and east and reconstruction of approximately 5 miles of Bear Gulch Trail #108 that bisects the inventoried roadless area in the analysis area could facilitate long term, increased use into these more remote (untreated) portions of the analysis area, particularly in winter that could result in a slight increase in snow compacted trails in the Basin Butte and Blacktail LAUs. Although technically no net increase in "designated" over-the-snow routes would occur, some researchers theorize that human modifications (such as snow compacted trails) can facilitate access for competing predators to move into deeper snow environments used by lynx (Buskirk et al. *in* Ruggiero et al. 1999, pp. 83-95; and Ruediger et al. 2000, p. 5-2). However, how much this occurs and exactly what the effects on lynx productivity and survival are remain unstudied and unknown. The proposed project is not anticipated to add to an increase in access or snow compaction in the longterm. All temporary roads will be recontoured and revegetated; and skid trails will revegetate.

Ongoing disturbances associated with roading, rural home development, maintenance of the Basin Municipal Watershed, private residences in and around Roosevelt drive degrade the quality of lynx habitat. These activities are expected to continue long into the future. Proposed treatments, temporary road construction and all disturbances associated with this proposal are short-term and not expected to contribute to the long term cumulative effects on private and other non-federal lands. The project complies with applicable LCAS standards and guidelines shown in Table 5.

Table 5. Lynx Conservation Assessment and Strategy conservation measures to address risk factors (or limiting factors) that can affect the productivity and survival of lynx that are applicable to programmatic and project level planning in the affected LAUs.

STANDARD	PRE-TREATMENT	POST-TREATMENT COMPLIANCE YES OR NO (Y/N)
Programmatic Planning (7-3)		
if more than 30% of lynx habitat within a LAU is currently unsuitable, no further reduction shall occur as a result of vegetation management by Federal agencies.	Complies. < 1% of lynx habitat in the Basin-Butte and Blacktail LAUs are currently unsuitable from vegetation management practices that have occurred within the last 10 years.	Y, 11% in Basin-Butte; < 1% Blacktail
Project Planning (7-4)		
Within each LAU, maintain denning habitat in patches generally larger than five acres comprising at least 10% of suitable lynx habitat.	70% and 60% of lynx habitat in the Basin-Butte and Blacktail LAUs, respectively, include mapped denning habitat for lynx.	Y, 7% denning in Basin-Butte would be converted to foraging habitat. 0% change in Blacktail
Maintain habitat connectivity within and between LAUs.	Forested riparian corridors, ridges, saddles, and a matrix dominated by forest currently provide high	Y, only lower elevations below the Roosevelt Drive Subdivision and along the

STANDARD	PRE-TREATMENT	POST-TREATMENT COMPLIANCE YES OR NO (Y/N)
	connectivity. State, interstate, Forest, and private roads; motorized trails; and subdivision and single dwelling developments surround the analysis area on all sides. A motorized trail bisects the inventoried roadless area in the Basin-Butte LAU.	Forest Boundary on the north will be fragmented from harvest. The unroaded portions of the analysis area will remain in tact. All temporary roads will be reclaimed. No change in open or total road density.
Timber Management (7-4)		
Management actions shall not change more than 15% of lynx habitat within a LAU to an unsuitable condition within a 10-year period.	< 1 % of lynx habitat in affected LAUs are considered unsuitable from vegetation treatments in the past 10 years.	Y, 11% change to unsuitable in Basin-Butte; <1% in Blacktail
Following a disturbance (wind, fire, insect/disease) that could contribute to lynx denning habitat, do not salvage when the effected area is smaller than 5 acres (except in areas that would propose a safety hazard such as developed recreation areas).	Currently, a mountain pine beetle epidemic is moving through the LAUs with mortality expected in 40 to 70% of mapped denning habitat. Salvage has occurred in 44 acres in developed recreation areas considered unsuitable for lynx.	Y, large areas of mountain pine beetle-killed lodgepole pine will remain on the landscape.
In aspen stands within lynx habitat, apply harvest prescriptions favoring aspen regeneration.	Aspen is in decline in riparian and upland settings primarily from conifer succession and sustained heavy browsing of sprouts by ungulates.	Y, treatments designed to promote aspen regeneration.
Wildland Fire Management (7-6 to 7-8)		
Design burn prescriptions to regenerate or create snowshoe hare habitat.	No prescribed fires have occurred in the LAUs in over 10 years. Lightning-caused fires in 2000, 2002, and 2003 were suppressed and burned less than 5 total acres.	Y, burning in sage/grass communities will stimulate grass/forb production.
Recreation Management (7-8 to 7-9)		
On Federal lands in lynx habitat, allow no net increase in groomed or designated over the snow routes and snowmobile play areas.	Existing plowed roads receive dispersed snowmobile use in winter; the analysis area receives dispersed snowmobile and cross-country ski use.	Y, no net change [2]
Forest/Backcountry Roads and Trails (7-9 to 7-10)		
On Federal lands in lynx habitat, allow no net increase in groomed (includes plowed roads) or designated over-the-snow routes and snowmobile play areas by LAU (winter logging activities are not restricted).	Same as above.	Y, no net change [2]
Livestock Grazing (7-10 to 7-11)		
Do not allow livestock use in openings created by fire or timber harvest, which would delay successful regeneration of	Livestock currently graze in the analysis area.	Y

STANDARD	PRE-TREATMENT	POST-TREATMENT COMPLIANCE YES OR NO (Y/N)
shrubs and trees.		

[1] The mountain pine beetle epidemic will promote, naturally, the regeneration of hare foraging habitat (i.e. aspen, conifer seedlings, shrubs, forbs) as openings are created from the canopy gaps created by beetle-killed and fallen trees.

[2] Although winter logging activities are not restricted by LCAS standards, an increase in snow compaction would be expected on temporary roads (and skid trails) constructed and used for log hauling in winter and subsequent fire-wood gathering by the public during the 4-year project implementation period.

Determination of Effects

I have determined that implementation of the proposed Federal Action may effect, but is NOT LIKELY TO ADVERSELY AFFECT lynx or lynx habitat. My determination is based on the following rationale: The proposed action is consistent with all applicable LCAS standards and guidelines; treatments and treatment-related disturbance would be concentrated in the lower elevations over a 4-year period (short-term), leaving unroaded more suitable areas in tact; foraging and denning habitat will improve in the long-term.

When considered with past and reasonably foreseeable actions listed on page 4 through 5 above, the proposed action (preferred Alternatives 3) likely would not affect the ability of lynx to inhabit or disperse through the analysis area, adjacent LAUs, the surrounding Highland Mountain Range, or adjacent mountain ranges.

Recommendations For Removing, Avoiding, or Compensating Adverse Effects

None. Refer to mitigation and or special project design standards pertinent to Threatened and Endangered species conservation on page 5 above.

Gray Wolf (*Canis lupus*)

Population and Habitat Status

Table 6. Gray Wolf; Population and Habitat Status.

Wolf Activity	Den Site	Rendezvous Site
No known pack, or individual inside the project or analysis area.	Unknown	No known or potential in project area.

Although wolves have not been documented inside the analysis area, individual wolf sightings and pack activity has been increasing across the entire Forest over the past several years. Since the mid- to late-1990s, hunters and private landowners have reported numerous wolf sightings on the fringes of the analysis area on the west (transient in fall/early winter on Fleecer Mountain and resident on Mount Haggin), and east (transient in the western Whitehall Valley in late fall, early

winter). Technically, any wolf that enters the analysis area is considered part of the experimental population that was reintroduced into Yellowstone National Park in 1995 and 1996. Yet, in 2000 and 2001, lone wolves that had been reintroduced into Idaho from Canada and fitted with radio collars dispersed from Idaho and were detected near Fleecer Mountain (via radio-telemetry), just seven miles west of the analysis area in the Idaho Management Area. Several sightings of wolves of unknown origin have occurred sporadically within five miles east and west of the analysis area (J. Fontaine, Gray Wolf Recovery Coordinator, pers. comm.).

Wolves are habitat generalists that use a diversity of forested and grassland habitats, but tend to avoid areas with heavy human use (USFWS 1996). Vegetative cover affects wolf survival by providing shelter for prey species such as deer and elk. In general, healthy wolves need little cover (Mech 1970 and 1974).

The analysis area itself provides wolves with sub optimum habitat, as large concentrations of primary prey do not occur there; and the area is surrounded by roads and human developments (that receive use yearlong) that would preclude any longterm occupancy by an established wolf pack.

The analysis area does provide wolf dispersers and seasonal transients with over 11,000 acres of roadless, mostly forested security habitat wherein a widely dispersed population of wolf primary prey (elk, moose, and mule deer) use the analysis area in spring, summer, and fall, and move to lower elevations during periods of deep snow. More optimum, year-round habitat for wolves is located west of the analysis area (west of Interstate 15) in the Fleecer Mountain area, where 1,800+ elk from the Fleecers and Anaconda-Pintlers concentrate in winter, and where suitable security habitat for wolves is located in close proximity to areas with large concentrations of ungulate prey.

Direct, Indirect, and Cumulative Effects Analysis

Habitat security: During the 4-year project implementation period, increases in total road density and treatment-related disturbance would reduce habitat security for wolves. Any increase in access would increase the risk of mortality to wolves from an increased chance of human/wolf interactions. After project implementation, all temporary roads would be recontoured and revegetated and the risk to wolves would return to pre-project implementation levels.

Ungulate prey base (alternative prey): Effects to ungulates are summarized from the elk analysis portion of the EIS (USFS 2003, pp. 3.128-3.132). The elk analysis indicated that a short term increase in total road density coupled with a long term (approximately 15-year) decrease in elk hiding cover would decrease summer and fall habitat security for elk, the primary ungulate prey of wolves. As a result, the vulnerability of elk to fall hunter harvest would increase (Weber et al. 2000). The total available biomass of elk prey would not be expected to change for wolves.

In the short and long term, the foraging potential for elk, and therefore wolves, would increase across treated, open grown Douglas-fir and grassland/shrub parks as elk forage plants (i.e. bunchgrass sp.) regenerate from the increased light and growing space. In treated and untreated lodgepole pine, the foraging potential for alternate prey (i.e. snowshoe hare), and therefore wolves,

would increase as conifers, grasses, forbs, and shrubs reestablish in clear cut areas and in canopy gaps created by mountain pine beetle-related mortality.

Cumulative Effects to Wolves

The proposed, temporary increase in total road density, increase in human activities and treatment-related disturbance, coupled with the removal of hiding cover for large ungulate prey, when considered with all past and reasonably foreseeable future actions (described above) would add adverse cumulative effects to habitat security for wolves.

Foreseeable actions that would facilitate increased human access in the analysis area and therefore increase the risk of wolf mortality from human/wolf interactions include: (1) construction of the proposed Continental Divide National Scenic Trail on the northern and western boundaries of the analysis area is expected to increase horse and foot travel in the area; and (2) reconstruction of Bear Gulch Trail #108, an existing ATV trail that bisects the inventoried roadless area, is expected to facilitate increased ATV use; (3) ongoing and foreseeable road use and recreation cabin authorizations will continue to cause, and in some cases increase, human-related disturbance on the east and south sides of the analysis area; (4) increased rural home development on private parcels on the eastern portion of the analysis area would be expected to increase vehicle traffic on Forest roads and human use on adjacent Forest Service lands.

Foreseeable actions that would benefit wolves by reducing motorized access on the east side of the analysis area include the Thompson Park and Blacktail Creek Watershed Restoration Plan that proposes to close 7.14 miles of road that is currently open to public vehicular travel year round.

None of the reasonably foreseeable activities in addition to implementation of the proposed action would adversely affect the long-term ability of wolves to disperse through the analysis area or to colonize habitats in the surrounding Highland Mountains or adjacent lands. The analysis area lacks large concentrations of ungulate prey that precludes long-term use of the area by breeding wolf packs. Highly suitable security and foraging habitat is available for wolves in the Fleecer Mountains on the west where large numbers of ungulate prey (1800+) concentrate in close proximity to large security areas. When considered with all past, present, and reasonably foreseeable activities, the proposed Federal Action would not add adverse cumulative effects to the experimental/nonessential gray wolves In the long term, habitat security in the analysis area would return to pre-treatment levels after all proposed temporary roads are recontoured and reseeded and hiding cover returns. Likewise, the foraging potential for wolves would increase in the short and long term. Implementation of the proposed federal action is NOT LIKELY TO JEOPARDIZE the continued existence of the nonessential/experimental gray wolf.

Determination of Effects

I have determined implementation of the proposed Federal Action is NOT LIKELY TO JEOPARDIZE the continued existence of the nonessential/experimental gray wolf. My determination is based on the following rationale: key wolf habitat (denning or rendezvous areas) would not be affected; the project area provides wolves with suboptimum habitat (i.e. no large concentrations and primary prey and the area is surrounded by roads and human developments that preclude longterm occupancy by a wolf pack); effects to habitat security from temporary roads and harvest related disturbance would be temporary (4-years); in the longterm, the foraging potential for elk, and therefore wolves would increase.

Recommendations For Removing, Avoiding, or Compensating Adverse Effects

None. Refer to mitigation and or special project design standards pertinent to Threatened and Endangered species conservation page 5 above.

Bald Eagle (*Haliaeetus leucocephalus*)

Population and Habitat Status

Table 7. Bald Eagle; Population and Habitat Status.

Bald Eagle Activity	Nest Site	Roost Site	Foraging Habitat
None known, suspected spring/early winter migrant	No	No	No

The primary analysis area for eagles includes the Basin-Butte 6th Code Hydrologic Unit, which is located in the southeastern portion of Upper Columbia Basin Recovery Zone 7 (USDI-FWS 1986; MBEMP 1994). Bald Eagles occur on the Beaverhead-Deerlodge as yearlong residents and seasonal migrants. There are no known or historic nests or winter communal roost sites in or near the analysis area. The analysis area does not contain key use areas as defined in the Montana Screens for Bald Eagles developed by the Regional Level One Team (02/21/02). Individual bald eagles could occur in the analysis area as seasonal migrants, but none have ever been recorded there. Foraging opportunities for migrant eagles include gut piles from large ungulates harvested during the October and November hunting season, ungulates that experience winter die-off, and a few water–bird prey (i.e. duck sp.) that occur in the lower reservoir and side tributaries during spring migration. Though eagles could find suitable nest and perch sites in close proximity to the Reservoir, the Reservoir is unsuitable as foraging habitat. The shoreline is devoid of vegetation from the fluctuating water levels and from treatment of the water with copper sulphate by the city of Butte (see fisheries section). As such, the Reservoir does not provide prey species (such as dabbling or diving ducks or shore birds) with optimum habitat. Given the lack of suitable habitat, and given that the action alternatives would have no effect on the limiting factors for eagles, the species was not analyzed in detail.

Direct, Indirect, and Cumulative Effects Analysis

No direct, indirect, or cumulative effects would be expected from implementation of the proposed action. No known key use or winter communal roost sites are located in or near the analysis area, therefore effects to productivity would not be expected. In the short term, the number of large ungulate carcasses (that would provide scavenging eagles with forage) from hunter harvest could increase with an increased vulnerability of elk to hunter mortality (as determined in the elk analysis section of the EIS); however, effects to eagles would be immeasurable. A net increase in the number of road-killed animals that can attract scavenging eagles and increase the risk of mortality to eagles from car collisions would not be expected to occur. The proposed action is not expected to add environmental contaminants in prey species, therefore an increase in reduced reproduction is not expected to occur.

Determination of Effects

Due to a lack of key habitat features and low risk of effects to scavenging eagles, I have determined that implementation of the proposed Federal Action would have NO EFFECT on bald eagle. The no effect determination is consistent with the screens for Bald Eagle developed by the Regional Level One Team on 02/21/02.

Recommendations For Removing, Avoiding, or Compensating Adverse Effects

None. Refer to mitigation and or special project design standards pertinent to Threatened and Endangered species conservation p. 5 above.

Consultation and Coordination

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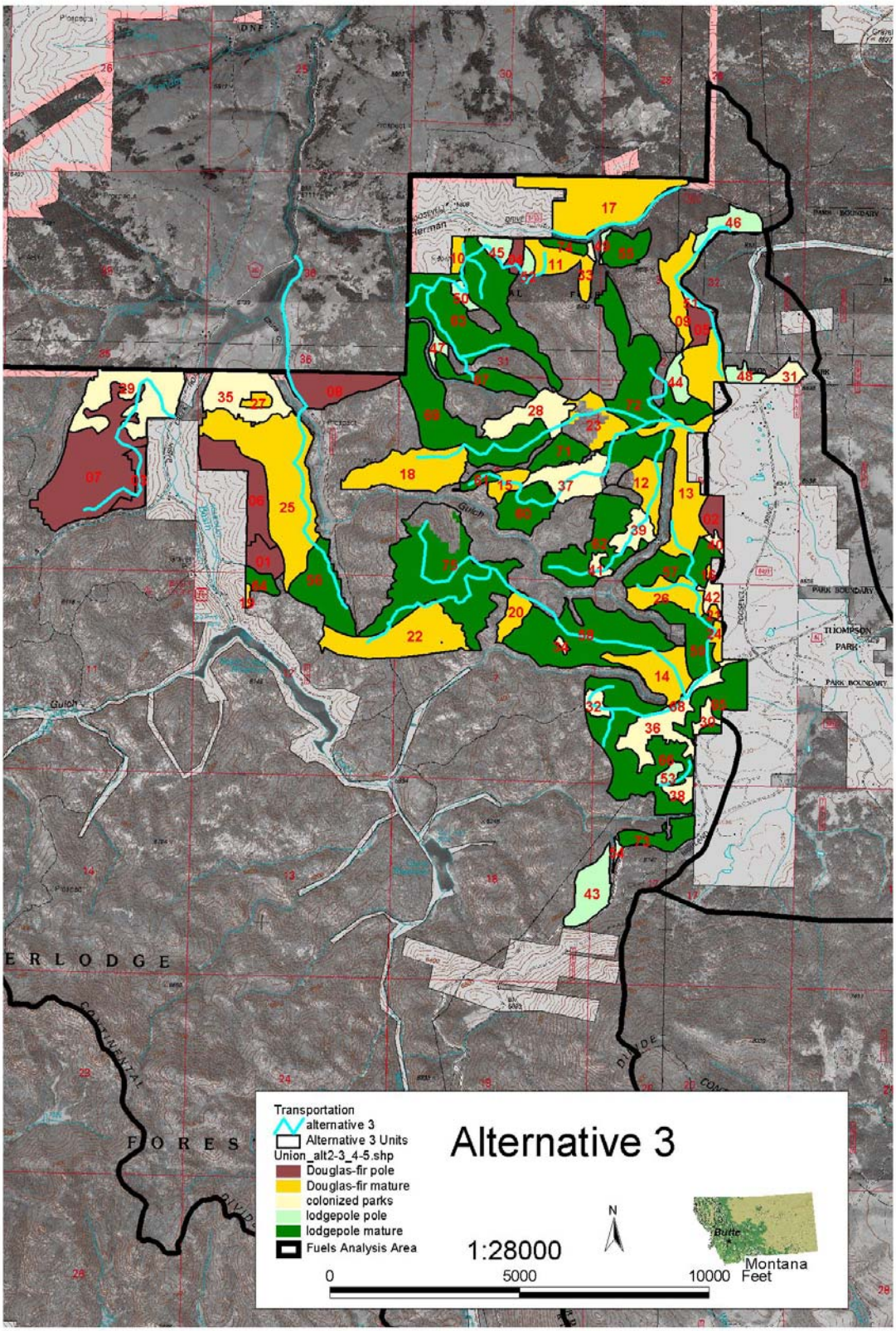
Appendix 1. Map of Proposed Treatment Units. Basin Creek Hazardous Fuels Reduction Project, Butte Ranger District, Beaverhead Deerlodge NF.



Appendix 2. Treatment units showing acres and vegetation type. Basin Creek Hazardous Fuels Reduction Project, Butte Ranger District, Beaverhead Deerlodge National Forest. (Pole = < 9 inches diameter at breast height; Mature = > 9 inches diameter at breast height)

UNIT	ACRES	VEGETATION TYPE
28	60.12	Colonized parks
29	71.85	Colonized parks
30	7.05	Colonized parks
31	9.54	Colonized parks
32	8.41	Colonized parks
33	1.88	Colonized parks
34	1.83	Colonized parks
35	47.77	Colonized parks
36	46.36	Colonized parks
37	35.24	Colonized parks
38	8.51	Colonized parks
39	17.76	Colonized parks
40	3.16	Colonized parks
41	5.91	Colonized parks
42	8.43	Colonized parks
TOTAL	333.82	
01	17.27	Douglas-fir pole
02	13.21	Douglas-fir pole
03	15.24	Douglas-fir pole
04	7.59	Douglas-fir pole
05	13.38	Douglas-fir pole
06	47.86	Douglas-fir pole
07	128.93	Douglas-fir pole
08	39.68	Douglas-fir pole
TOTAL	283.16	
09	66.20	Douglas-fir mature
10	7.01	Douglas-fir mature
11	28.18	Douglas-fir mature
12	23.07	Douglas-fir mature
13	60.92	Douglas-fir mature
14	42.19	Douglas-fir mature
15	13.13	Douglas-fir mature
16	0.95	Douglas-fir mature
17	91.99	Douglas-fir mature
18	63.25	Douglas-fir mature
19	1.97	Douglas-fir mature
20	15.11	Douglas-fir mature
21	2.16	Douglas-fir mature
22	73.56	Douglas-fir mature
23	37.61	Douglas-fir mature
24	6.36	Douglas-fir mature
25	137.60	Douglas-fir mature
26	30.38	Douglas-fir mature
27	5.89	Douglas-fir mature
TOTAL	707.53	
43	32.99	Lodgepole pole
44	11.76	Lodgepole pole
45	10.09	Lodgepole pole
46	21.54	Lodgepole pole
47	5.85	Lodgepole pole
48	8.82	Lodgepole pole
49	2.50	Lodgepole pole

UNIT	ACRES	VEGETATION TYPE
50	6.66	Lodgepole pole
51	3.46	Lodgepole pole
52	4.90	Lodgepole pole
53	6.21	Lodgepole pole
54	1.96	Lodgepole pole
TOTAL	116.74	
55	22.11	Lodgepole mature
56	48.67	Lodgepole mature
57	37.80	Lodgepole mature
58	111.74	Lodgepole mature
59	65.15	Lodgepole mature
60	34.44	Lodgepole mature
61	7.16	Lodgepole mature
62	62.76	Lodgepole mature
63	132.68	Lodgepole mature
64	9.37	Lodgepole mature
65	50.42	Lodgepole mature
66	105.58	Lodgepole mature
67	25.32	Lodgepole mature
68	0.77	Lodgepole mature
69	104.21	Lodgepole mature
70	2.73	Lodgepole mature
71	19.49	Lodgepole mature
72	120.65	Lodgepole mature
73	22.60	Lodgepole mature
74	7.20	Lodgepole mature
75	167.11	Lodgepole mature
TOTAL	1157.96	