WILDLIFE REPORT

BARTON SPRINGS COMMERCIAL THINNING PROJECT
PINTLER RANGER DISTRICT
BEAVERHEAD-DEERLODGE NATIONAL FOREST

INTRODUCTION AND METHODS

This report provides an analysis of the environmental baseline and project and cumulative effects to terrestrial wildlife from implementation of the proposed Barton Springs Commercial Thinning Project, categorical exclusion, located on the Pintler Ranger District, Beaverhead-Deerlodge National Forest (B-D NF). Forest Service policy (FSM 2672.4) requires review of all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on TES wildlife species. A "biological evaluation and assessment" (BE/BA) is the means of conducting the review and of documenting the findings.

The BE/BA process (FSM 2672.43) consists of the following steps:

I. Pre-field review - during which time the list of potentially affected species is identified after reviewing official federal and state lists as well as federal, state, and local observation data;

II. Field reconnaissance - during which time the project site is visited and habitats described. Most often this is not an attempt to locate and document any animals; doing so is costly and impossible in most cases due to the far ranging nature of many animals. Such documentation would typically require a systematic survey over many days. Rather, this is often a consideration of the habitat structure and suitability of the area and of how the site relates to the overall landscape use of the animal. Incidental sightings and sign are of course valuable. If suitable habitat exists and a species is likely to occur in the vicinity, then it is given due consideration regardless of direct evidence found during the site visit. There may be cases where systematic surveys are appropriate depending on the issues surrounding the project.

III. Conflict determination - The biologist considers the project design and the existing habitat conditions to determine the effects, if any, the project would have on species. If the potential for adverse conflict exists:

- **1.** The project may be modified so as to remove the conflict; or
- **2.** If the project cannot be modified:
  - **a.** Formal consultation (or conference) with the U.S. Fish and Wildlife Service is initiated for federally listed (or proposed) species; and
  - **b.** An analysis of the significance of effects is initiated and further steps are taken for Forest Service Sensitive species.

Analysis Area for Project and Cumulative Effects

Project and cumulative effects to terrestrial wildlife were evaluated in 22690 acres of National Forest (NF) lands administered by the Beaverhead-Deerlodge National Forest (BDNF) located in two 6th field hydrologic

unit codes (HUCS) (Appendix A. Map 1 and Appendix B. Table 2). The HUCs were selected because they encompass the two affected timber compartments wherein the proposed treatment unit is located, and including all land ownerships, are large enough in scale to include one or more home ranges of most wildlife species in the area.

In accordance with the Deerlodge National Forest Plan, the analysis area for project and cumulative effects to Rocky Mountain elk includes 31,395 acres of Forest Service lands located in the East Silver King Hunter Recreation Opportunity Geographic Areas (HROGAs) number 42 that encompasses the proposed treatment unit, affected timber compartments and all Forest Service lands within the affected HUCs (Appendix A. Map 2).

Wildlife Species Considered and Regulatory Authority – Prefield Review

Species considered in this analysis include species listed as federally threatened, endangered, candidate or experimental/nonessential on the Beaverhead-Deerlodge National Forest (USDI-FWS 2006) and Forest Service sensitive species (USDA-FS 2005), hereafter TES. Table 2 provides a list of those species, their habitat preferences, whether the habitat or species are present in the analysis area, and whether the habitat or species will be impacted by proposed treatments. Old growth, snag dependent, and commonly hunted Management Indicator Species (MIS) were also addressed to determine project compliance with Deerlodge Forest Plan standards and management area direction.

At this stage in the analysis, the following species and their habitats (Table 2) were **dropped from further review because the analysis area is outside the range of the species' distribution or does not contain any potential habitat based on elevation or other factors: sensitive Great Basin pocket mouse, pygmy rabbit, greater sage grouse, harlequin duck, trumpeter swan, and sage thrasher. The project will have no impact on the above-listed species.**

Table 2. Wildlife species considered in the Barton Springs Commercial Thinning Project, their status on the Forest, general description of habitat preference, whether the species or its habitat is present in the analysis area (Y=yes, N=No), and whether the species or its habitat will be impacted by the proposed treatment (Y=Yes, N=No) along with the abbreviated summary determination (see footnote below table for definitions).

SPECIES	STATUS	HABITAT PREFERENCE	HABITAT OR SPECIES PRESENT IN ANALYSIS AREA	HABITAT OR SPECIES IMPACTED BY PROPOSED TREATMENTS/ SUMMARY DETERMINATION*
Gray Wolf	Nonessential Experimental	Habitat generalists. Lack of human disturbance (corresponding to low road densities), abundant prey (primarily elk) required.	Y	N, NLJ
Bald Eagle	Threatened	Nesting trees/platforms near an open water body (> 80 acres) or major river system; available fish and water bird species prey near nesting habitat; forages on carrion in winter or during spring/fall migration.	Y, foraging for seasonal migrants	N, NE
Yellow-billed cuckoo	Candidate	Riparian areas with cottonwoods or willows.	Y	N, NE
Fisher	Sensitive	Moist coniferous forested types (including mature and old growth spruce/fir), riparian/forest ecotones	Y	N, NI
Great Basin Pocket Mouse	Sensitive	Dry grassland.	N, dropped for further	N, NI

SPECIES	STATUS	HABITAT PREFERENCE	HABITAT OR SPECIES PRESENT IN ANALYSIS AREA	HABITAT OR SPECIES IMPACTED BY PROPOSED TREATMENTS/ SUMMARY DETERMINATION*
			analysis	
North American Wolverine	Sensitive	Large areas of unroaded security habitat; secure denning habitat, ungulate carrion in winter.	Y	N, NI
Northern Bog Lemming	Sensitive	Wet riparian sedge meadows, bog fens.	Y	N, NI
Pygmy Rabbit	Sensitive	Dense clumps of big sagebrush or greasewood forage on grasses (wheat grass, bluegrass) in summer and sage in winter.	N, dropped from further review	N, NI
Townsend's Big-Eared Bat	Sensitive	Roosts in caves, mines, rocks and buildings. Forages over tree canopy, over riparian areas or water.	Y	N, NI
American Peregrine Falcon	Sensitive	Cliff nesting (ledges); riparian foraging (small bird species prey).	Y, foraging for seasonal migrants	N, NI
Black-backed Woodpecker	Sensitive	Burned or insect-killed forest	Y	Y, MIIH
Flammulated Owl	Sensitive	Mature (> 9 inches dbh) and old growth ponderosa pine/Douglas-fir with abundant moth species prey.	Y	Y, MIIH
Greater Sage Grouse	Sensitive	Sagebrush obligate. -	N, dropped from further review	N, NI
Harlequin Duck	Sensitive	During the breeding season, found near large, fast flowing mountain streams.	N dropped from further review	N, NI
Northern Goshawk	Sensitive and Old Growth MIS	Mature and old growth Douglas-fir.	Y	Y, MIIH
Trumpeter Swan	Sensitive	Large lakes.	N, dropped from further review	N, NI
Pine Marten, Hairy Woodpecker	Old Growth MIS	Lodgepole pine mature and old growth, spruce/ subalpine fir mature and old growth.	Y	N, na
Pileated Woodpecker, Northern Goshawk	Old Growth MIS	Douglas-fir old growth.	Y	Y, na
Three-Toed Woodpecker	Old Growth – Snag/Cavity Habitat	Associated with subalpine fir and Engelmann spruce in higher elevations and in lodgepole pine forests at lower elevations. Often utilizes snags killed by bark beetles, fire or other agents to excavate cavities for nesting, feeding on wood boring beetles and bark beetles.	Y	N, na
Northern Water Shrew	Riparian MIS	Observed near small cold streams in streamside vegetation in mature or old growth forest.	Y	N, na

SPECIES	STATUS	HABITAT PREFERENCE	HABITAT OR SPECIES PRESENT IN ANALYSIS AREA	HABITAT OR SPECIES IMPACTED BY PROPOSED TREATMENTS/ SUMMARY DETERMINATION*
Western Jumping Mouse	Riparian MIS	Wet meadows and areas near streams with lush grasses and forbs, with or without a shrub or tree over story.	Y	N, na
Belted Kingfisher	Riparian MIS	(Shrub riparian) on smaller streams, often associated with beaver ponds and pools which they use for foraging.	Y	N, na
Blue-Winged Teal	Riparian MIS	Breeds near lakes, ponds, reservoirs.	Y	N, na
Warbling Vireo	Riparian MIS	Deciduous trees and mixed coniferous/deciduous forest along streams while foraging in the riparian zone.	Y	N, na
Willow Flycatcher	Riparian MIS	Willows along streams	Y	N, na
Montane Vole	Grass/Sage MIS	Natural bunchgrass communities, but may also use early seral sagebrush habitats	Y	Y, na
Sage Thrasher	Grass/Sage MIS	Sagebrush obligate.	N, dropped from further review	N, na
Elk, Mule Deer	Commonly Hunted MIS	Habitat generalist. Winter range in lower elevation conifer/shrub/grasslands.	Y	Y, na
Moose	Commonly Hunted MIS	Often associated with willow riparian areas.	Y	N, na
Great Gray Owl	Montana Species of Special Concern	Similar to northern goshawk. Often nests in historic goshawk stick nests.	Y	N, na

** Species distribution determined from the following sources: Hart et al. 1998, http://www.avianscience.org/research_landbird_data.htm, http://biology.dbs.umt.edu/landbird/mbcp/mtpif/, http://www.natureserve.org/explorer/, http://nhp.nris.state.mt.us/animalguide/species, http://nhp.nris.state.mt.us/mbd/, Rohrbacher 2005.

** **Definitions of Summary Determination Abbreviations**: For TE species: NE = No effect, NLJ = Not likely to jeopardize, NLAA = Not likely to adversely affect, LAA = Likely to adversely affect, BE = Beneficial effect. For Sensitive Species: NI = no impact; MIIH = may impact individuals or habitat, but will not likely result in a trend toward federal listing or reduced viability for the population or species; WIVH = will impact individuals or habitat with a consequence that the action may contribute towards federal listing or result in reduced viability for the population of species; or BI = beneficial impact. For MIS: na=determinations made for TES species not applicable to MIS.

The Forest Service is required by the National Forest Management Act (NFMA) to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." 16 U.S.C. 1604(g)(3)(B). To implement the NFMA, the Forest Service's 2005 regulations state "The overall goal of the ecological element of sustainability is to provide a framework to contribute to sustaining native ecological systems by providing ecological conditions to support a diversity of native plant and animal species in the planning area [forest]. This will satisfy the statutory requirement to provide for a diversity of plant and animal communities based on suitability and

capability of the specific land area in order to meet overall multiple-use objectives." 36 C.F.R. 219.10(b). Prior Forest Service regulations, implemented in 1982, provided that "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" 36 C.F.R. 219.19 (2000).

Further, Forest Plans shall ensure that legal and biological requirements for the conservation of threatened and endangered species are met, ensure compliance with procedural and biological requirements for sensitive species, and include objectives for MIS (FSM 2670.45).

Federally listed threatened and endangered species are regulated by the Federal Endangered Species Act (ESA, PL 93-205), as amended. Under provisions of the ESA, Federal agencies shall use their authorities to carry out programs for the conservation of listed species and shall insure that 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). Management guidelines for programmatic or project-level planning are outlined in species specific recovery plans and/or conservation strategies (USDI-FWS 1986, 1987).

The Region One, Regional Forester identifies FS sensitive species as those species for which population viability is of concern, as evidenced by significant current or predicted downward trends in population number or density or in habitat capability that would reduce a species existing distribution (FSM 2670.45).

Management indicator species (MIS) (considered widespread and common) were designated in Forest Plans to represent species whose population changes are considered "indicators" for the effects of management activities on representative wildlife habitats. In the Deerlodge Forest Plan (FP III-26, USDA-FS 1987), several species were designated as MIS to represent broad cover types, including forest old growth associates for lodgepole pine, spruce/subalpine fir, Douglas-fir, and snags; riparian associates for shrub/tree lined streams, and wet meadow/marshlands; dry grassland/shrub associates; and finally, species that are commonly hunted.

The Deerlodge Forest Plan (1987) divides Forest Service lands into 26 management areas (MA), each with specific standards and guidelines to achieve management goals and objectives identified for the area (see USFS 1987 for a detailed description of each management area). The Forest Plan is currently under revision that will change management area direction. Proposed treatment units lie in two MAs which are described in Table 3 below.

Table 3. Management areas (MA) affected, Forest Plan standards for wildlife in each MA, and acres proposed for treatment in each MA for the Georgetown Lake Hazardous Fuels Reduction Project.

MANAGEMENT AREA AND GENERAL DESCRIPTION	STANDARDS FOR WILDLIFE	ACRES PROPOSED FOR TREATMENT	PROJECT COMPLIANCE WITH WILDLIFE STANDARDS
MA E1 – This includes productive forested lands on slopes less than 40 percent.	Allow habitat improvement projects; incorporate forestwide wildlife standards during project planning.	113 acres thinning.	Forest Plan objectives for elk hiding cover are exceeded, no change in Elk Effect Cover (EEC) or security habitat will occur, an increase in forage on winter range is expected (FP II-17 – II-18). Breeding habitat forTES and MIS will be protected, viability maintained (FP II-20 – 21).

MANAGEMENT AREA AND GENERAL DESCRIPTION	STANDARDS FOR WILDLIFE	ACRES PROPOSED FOR TREATMENT	PROJECT COMPLIANCE WITH WILDLIFE STANDARDS
			Old growth will not be impacted (FP II-26). Snag standards will be met (FP II-19). T&E species will not be impacted (FP II-19 – II-20).
D2 – Includes grasslands, meadows, open timber stands and other forage producing areas on slopes less than 40 percent – important to big game.	Implement joint wildlife-livestock improvement projects to maintain or enhance forage production and minimize social and forage conflicts among livestock and wildlife.	47 acres thinning	Big game forage will be enhanced in the longterm.

Wildlife Population Viability Analysis

To meet the requirements of NFMA and its implementing regulations, the Forest Service focuses on assessing habitat to provide for a diversity of species. Region 1 uses a principle-based approach to population viability analysis (PVA) that is widely agreed to and supported in peer-reviewed, scientific literature (summarized in Samson 2006a with internal citations omitted here). Computer-based PVA models have been developed by various researchers, however, it is not feasible to collect enough long term data for forest dependent species (i.e. number of individuals in a population, age of each individual, birth rate, death rate, immigration rate, and emigration rate) to test the validity of any of these models in the real world (*Ibid.*).

Samson (2006a) recently conducted a region-wide conservation assessment for the northern goshawk, black-backed woodpecker, pileated woodpecker, and flammulated owl based on a principle-based approach to PVA. For each species, he used peer-reviewed science, all known inventory/observation data, vegetation data from Forest Inventory and Analysis (FIA), scientific information on the minimum dispersal distances for species, their home range and body sizes, and well known conservation principles to assess the availability of suitable habitat and ultimately assess short- and long-term viability on each Forest in Region One. In short, habitat for each species is abundant and widely distributed. Samson (2006b) also prepared a paper addressing habitat thresholds for maintaining a minimum viable population for the above species as well as for the fisher and marten which demonstrated habitat Region-wide for the above species is more than adequate to maintain population viability.

The Forest uses a similar approach for all other TES and MIS species that lack a completed regional conservation assessment (preparation at the regional level is ongoing). The Forest's principle-based approach to PVA during project analysis follows Samson (2002). For each affected TES and MIS we examine available population status and distribution information; occurrence records from inventory and monitoring efforts; hunting and trapping data; informal observation data; and the scientific literature for information on the biological and habitat (including home range size) requirements for species as well as species' response to disturbance. In addition, we use the best available forest and rangeland vegetation data collected to date to quantify and spatially display habitat (Appendix A).

DESCRIPTION OF PROPOSED PROJECT ACTIVITIES AND MITIGATION MEASURES

To achieve objectives, the Forest proposes the following treatments on approximately 140 acres located within Township 10 North, Range 15 West, Sections 25, 26, 36.

1. Slash (cut down) small diameter (0.5 to 6.9 inches diameter at breast height (dbh)) Douglas-fir, and lodgepole pine to slow the spread of bark beetle and improve the overall stand health and resistance of ponderosa pine to future beetle damage and cone production.
2. Cut infected/dead trees found in the stand to decrease beetle hatches and decrease shading/cooling that enhances bark beetle activity. All soft snags (Douglas-fir or ponderosa pine) greater than 10 inches dbh will be left in the unit, for snag-dependent wildlife, unless they pose a safety hazard to operators and/or the public (i.e. are located within 1 tree length from a road open to the public for motorized vehicle travel).
3. Commercially thin, using a ground based system with skid trails to landing sites, live Douglas-fir, lodgepole pine, and ponderosa pine trees to slow the spread of bark beetle and improve the overall stand health and resistance to future beetle damage, with the following specifications:
    - A basal area (BA) of 60 to 80 square feet per acre will be maintained (in forested areas) wherever it exists.
    - Leave (do not cut) all Douglas-fir and ponderosa pine trees greater than 11 inches dbh. If the remaining BA is still greater than 80 square feet per acre, then cut trees up to 14 inches dbh as necessary to meet 80 BA. Favor leaving ponderosa pine over Douglas-fir in all cases.
    - If the existing BA is currently less than 60 square feet per acre, do not treat.
4. Existing roads and skid trails (from a 1958 harvest) within the stand will be used for harvest activities. No new or temporary roads are proposed. Roads and skid trails will be reseeded upon the conclusion of harvest activities, with the exception of road which appears on the current forest travel plan. This road will be maintained for public use.
5. Hand pile or remove slashed material followed by burning of hand piles. In some areas, hand piling of existing fine fuels (less than 4 inches in diameter) may occur.
6. Pile burning will be initiated when the piled fuels are dry and weather conditions provide for safe ignition.
7. 5 to 15 tons of downed woody material, using the largest available pieces will be maintained in units for small mammal habitat and soils.
8. Intermittent patches of dense conifers comprised of small diameter trees will be maintained on the edges of openings in the unit, and at the grassland forest interface on the south edge of the unit to provide feeding perches for flammulated owls and other raptor species as well as hiding cover for elk and deer.
9. Post treatment, the stand will have a minimum canopy closure of 35% (wherever it exists) to maintain nesting habitat for flammulated owls (Samson 2006a).
10. Treatments will occur outside the nesting period (mid-April through late-July) for flammulated owl, northern goshawk, and black-backed woodpecker to remove the potential for direct disturbance effects during the breeding season. Review by the wildlife biologist prior to activity will confirm non-activity.

11. No old growth will be treated. The stand does not meet old growth criteria (Green et al. 1995); however; a few small patches of forest located within the stand that had old growth characteristics (i.e. multi-storied with a large diameter tree component in the overstory (greater than 21 inches dbh), large diameter snags with excavated cavities, and large downed woody debris) were completely removed from any treatment activities.

The proposed action is consistent with the Goals and Objectives in the Forest Plan for the Deerlodge National Forest and Record of Decision approved September 1987 (this includes old growth and snag retention).

Thinning will occur in Management Areas E1 and D2 (Table 3).

SPECIES ASSESSMENT

Wildlife Habitat Diversity – Field Reviews

Field reviews of the area for the project, including formal inventories for flammulated owl, were conducted by a wildlife biologist on April 28, and June 20-21, 2006. In addition, the area was reviewed in 2004 in association with the Harvey Creek thinning project (project file). Table 4 provides a breakout of acres of wildlife habitat available in each forested and non-forested cover type by size class, further divided into wet and dry habitat types. Appendix A, Map 3, provides a visual display. The analysis area provides a diversity of habitats that range from the grassland forest interface found at the forest service/private land boundary on the east and north sides of the analysis area as well as in the lower two thirds of the Harvey Creek and other prominent drainages (beginning at around 5600 feet in elevation). Here, wet Douglas-fir habitat types dominate north aspects and dry Douglas-fir habitat types intermixed with grassland parks dominate south aspects. Ponderosa pine is found throughout the dry Douglas-fir habitat types located on south facing slopes near the forest/private land boundary and the north side of Harvey Creek. The Harvey Creek area was prescribe burned in the mid-1990s which removed seedling/sapling encroachment in the understory in a patchy/mosaic pattern.

The higher elevations on the west and south sides of the analysis area and the upper one-third of prominent drainages are dominated by lodgepole pine cover types intermixed with a few patches of subalpine-fir in drainages and whitebark pine on ridgetops (from 6300 to 7851 feet in elevation). Some clearcut and post and pole thinning treatments have occurred in lodgepole pine dominated areas.

The analysis area provides yearround habitat for northern goshawk, black-backed woodpecker, northern bog lemming, elk, deer, moose, pine marten, montane vole, great gray owl, and pileated, hairy and three-toed woodpeckers as well as seasonal or transitional habitat for grizzly bear, bald eagle, yellow-billed cuckoo, gray wolf, fisher, wolverine, Townsend's big-eared bat, flammulated owl, and a number of migratory landbird and small mammal species.

The treatment unit (described in detail above), provides spring/summer/fall nesting and foraging opportunities for the flammulated owl, pileated and blackbacked woodpecker, yearround foraging habitat for the northern goshawk and great gray owl, and spring/summer/fall foraging habitat for elk and mule deer.

Table 4. Wildlife Habitat. Table includes acres of habitat in each forested and nonforested cover type divided into wet and dry habitat types by size class.

Cover Type	Mature and Oldgrowth > 8.9 " dbh (acres)			Mid-aged Pole-sized 5 to 8.9" dbh (acres)			Seedling/ Sapling (acres)	Total (acres)
	Wet	Dry	Total	Wet	Dry	Total		
Subalpine-fir	250[1]		250	12 [1]		12		262
Douglas-fir	8752	19635 [2]	28387	527	1019 [2]	1546		29933 [3]
Lodgepole Pine	3597 [1]	2590	6187	9656 [1]	5836	15492		21679 [3]
Limber/Whitebark Pine		18	18					18
TOTAL FORESTED	12599	22243	34842 (54%) [4]	10195	6855	17050 (26%)	2282 (.4%)	51892
Meadow								12233 (19%) [5] 9703 wet [6] 2532 dry
Rock								546
Water								30
								64701

1. Fisher, marten, hairy woodpecker
2. Flammulated owl
3. Northern goshawk, pileated woodpecker
4. Western big-eared bat, black-backed woodpecker, three-toed woodpecker
5. Northern goshawk foraging, elk, montane vole, western jumping mouse
6. Northern bog lemming

Threatened, Endangered, and Candidate Species

In accordance with Section 7(c) of ESA, and as described in the Wildlife Species Considered and Regulatory Authority section above, the U.S. Fish and Wildlife Service determined that the following listed and proposed threatened or endangered species may be present in the analysis area (USDI-FWS 2006):

Table 5: Threatened, Endangered and Proposed Species List for Granite County

SPECIES	SCIENTIFIC NAME	STATUS
Gray Wolf	*Canis lupus*	**Nonessential Experimental**
Bald Eagle	*Haliaeetus leucocephalus*	**Threatened**
Yellow-billed cuckoo	*Coccyzus americanus*	**Candidate**

Gray Wolf (Nonessential Experimental)

Existing Condition for Gray Wolf

Wolf populations in Montana have achieved biological recovery under ESA, and once state management plans are in place, will be delisted (USDI-FWS 2005). The project is located in the Idaho experimental-non-essential population area where wolves are numerous and considered nonessential to the continued existence of the species (USDI-FWS 1987; Fed. Reg. 59:224, 1994). As such, the Forest Service treats

the population as proposed for listing and only two provisions of section 7 [ESA] apply – section 7(a)(1) which requires Federal agencies to carry out programs for the conservation of the species and section 7(a)(4) which requires Federal agencies to confer (rather than consult) with the Service on actions that are likely to jeopardize the continued existence of a species proposed to be listed (ESA 1973, as amended, Section (j)(2)(C)(i).

Wolves are habitat generalists that use a diversity of forested and grassland habitats, but tend to avoid areas with heavy human use (summarized in USDA-FS 2005, Programmatic BA). Vegetative cover affects wolf survival by providing shelter for prey species such as deer and elk. In general, healthy wolves need little cover.

The analysis area provides yearlong habitat for elk, the primary prey of wolves, other large game species such as whitetail and mule deer and moose, and a diversity of alternate prey such as snowshoe hare. The largest elk and mule deer heard concentrations occur at lower elevations in winter on all land ownerships. The proposed treatment unit provides spring, summer and fall habitat for deer and elk.

The Willow Creek pack, first confirmed between Drummond and Philipsburg in 2002, is thought to move across the analysis area as transients. Den or rendezvous sites are not known to occur in the analysis area. In 2005, 6 individual wolves were sited northeast of the analysis area, including a breeding pair. The Willow pack had no livestock depredation reports for the year (USDI-FWS 2005a).

Direct and Indirect and Effects for Gray Wolf

To ensure conservation of nonessential wolf populations, the Forest Service uses the three limiting factors identified in the Gray Wolf Recovery Plan (USDI-FWS 1987) to evaluate impacts from forest management: 1) potential for wolf/human interaction; 2) effects on the wolf prey base; and 3) impacts to the integrity of key wolf habitat (rendezvous and den sites). The thinning project encompasses 180 acres, representing less than 1% of the analysis area and is located adjacent to an existing road open for motorized travel yearround. The proposal will not increase open or total road density and associated hunter/trapper access. Thinning will not measurably increase the potential for wolf/human interactions, impact the wolf prey base, or change the integrity of key wolf habitat.

Cumulative Effects for Gray Wolf

Appendix B displays past, present and reasonably foreseeable activities on Forest Service and private lands with additional information on cumulative effects provided in the project file. Of the past and reasonably foreseeable activities, access (via roads and trails) during the big-game hunting and trapping seasons (October through February) on public and private lands increases the risk of wolf/human interactions and the potential for wolf mortalities through accidental or illegal shooting or trapping (Jensen et al. 1986, Boyd and Pletscher 1999, and Claar et al. 1999). Forest Service lands along the hydrologic divide on the west and the Inventoried Roadless Areas on the west and south will continue to provide a secure dispersal route for wolves moving through the Sapphire Mountains to adjacent areas (Appendix A, Map 2).

When considered with all past and reasonably foreseeable activities, the project is not expected to cumulatively affect wolf population viability in the analysis area or the Forest.

Determination for Gray Wolf

The project is limited to thinning trees on <1% of the analysis area. The project will not impact key wolf habitat or the wolf prey base, will not increase wolf/human interactions, and will not affect wolf population viability or the existing ability of wolves to occupy or disperse through the analysis area. Therefore, consistent with the screens developed by the Regional Level 1 Team, the project is not likely to jeopardize the continued existence of the wolf within the nonessential experimental population area (USDA-FS 2005). As such, conference with the USDI-FWS is not necessary.

Bald Eagle (Threatened)

The analysis area is located in Management Zone 7 (Upper Columbia Basin) of the Pacific Bald Eagle Recovery Area where management of eagles is focused in zones of habitat that surround occupied nests or communal roost sites during the breeding season (USDI-FWS 1986). In Montana, bald eagle nest sites typically occur around the periphery of lakes and reservoirs > 80 acres (32.4 ha) in area or in forested corridors within one mile (1.6 km) of major rivers (Wright and Escano 1986).

No known current or historic nesting, foraging, or winter roost sites occur in the analysis area. No large water bodies or major river system occur within several miles of the analysis area. The analysis area may provide some foraging opportunities for eagles that migrate through the area during early winter and spring; however, such foraging has never been documented.

Direct, Indirect, and Cumulative Effects to Bald Eagle

Typically, eagles are most sensitive to direct human disturbance during the nest building, egg-laying and incubation periods (February 1 to May 30). Given the lack of suitable nesting and associated foraging habitat and an overall low potential for bald eagle to occur in the analysis area, direct, indirect and cumulative effects are not anticipated.

Determination of Effects

The project as proposed will have no effect on bald eagle based on the lack of suitable habitat and low potential for occurrence. The no effect determination is consistent with the screens developed by the Regional Level 1 Team (USDA-FS 2005).

Yellow-billed cuckoo

The project is located in dry ponderosa pine habitats whereas yellow-billed cuckoo appear in willow/cottonwood riparian areas. As such, the species will not be analyzed in detail, and this project will have no effect on the cuckoo.

Forest Service Sensitive Species

Sensitive species carried forward for analysis from Table 2 above, are listed in Table 6 below. Information from field reviews indicate that the analysis area may provide some pockets of suitable habitat for the

fisher (spruce/fir associated), **northern bog lemming** (wet bog fen associate), and **American peregrine falcon** (riparian foraging/cliff nesting), however, proposed treatments and all access routes are located in drier habitats where these species are not known to occur (see Appendix A, Map 3 (wet/dry habitats). As such, the above species were **dropped from further analysis and the project will have no impact** on them.

The remaining species, North American wolverine, western big eared bat, northern goshawk, flammulated owl, and black-backed woodpecker were carried forward for an analysis of project impacts (Table 6).

The Forest Service assesses population viability for sensitive species by examining key habitat requirements in the analysis area (defined in Table 1 above and displayed in Appendix A Maps) (Inland Empire Public Lands Council et al. v. United States Forest Service, United States Court of Appeals, Ninth Circuit, July 3, 1996).

Table 6. Sensitive species known or suspected of occurring in the Barton Springs Thinning project analysis area, their habitat requirements, acres of available habitat and acres affected by the project. (Old growth = Green et al. 1992; mature = 9.0 inches diameter at breast height (dbh) or greater; pole sized = 5 to 8.9 inches dbh; seedling/saplings = less than 5 inches dbh.). REFER TO INDIVIDUAL SECTIONS FOR EACH SPECIES FOR DETAILED ANALYSIS.

SPECIES	HABITAT REQUIREMENTS	ACRES AVAILABLE IN ANALYSIS AREA	ACRES AFFECTED BY PROPOSED TREATMENTS
North American Wolverine (*Gulo gulo*)	Large areas of unroaded security habitat; secure denning habitat (generally at the base of glacial cirque basins), ungulate carrion in winter.	No denning habitat, ungulate winterrange on the fringes of the analysis area. Security habitat: 17,299 acres (2 blocks of 4236 and 13063 acres, respectively) comprising 55% of the 31395 acre elk HROGA	No effect on existing security habitat. No change in available ungulate carrion.
Townsend's Big-Eared Bat (*Corynorhinus townsendii*)	Roosts in caves, mines, rocks and buildings, or large snags. Forages over riparian areas or water.	Cave roosting habitat unknown. 34,842 acres mature and old growth forest (all tree species combined) with 6.28 (+-3.68) snags per acre. Riparian foraging in numerous streams.	Cave habitat not impacted. No old growth treated. Thinning smaller Douglas-fir trees leaving all snags > 10" dbh and all larger Douglas-fir and Ponderosa Pine (> 14") for future snag recruitment. Riparian foraging not impacted.
Northern Goshawk (*Accipiter gentilis*)	Mature and old growth Douglas-fir (DF) (preferred) or lodgepole pine (LP) for nesting. Forages on a diversity of prey (snowshoe hare, red squirrel, ground squirrels, grouse sp.) mainly in mature and old growth forest, and	28387 mature and old growth DF 1546 pole sized DF 6187 mature and old growth LP 15492 pole sized LP	140 acres non-nesting habitat thinned, no change in size class of upper canopy. No old growth DF or LP treated.

SPECIES	HABITAT REQUIREMENTS	ACRES AVAILABLE IN ANALYSIS AREA	ACRES AFFECTED BY PROPOSED TREATMENTS
	grassland/forest and forest/riparian ecotones.	12233 meadow. Numerous riparian stream corridors.	
Flammulated Owl (*Otus flammeolus)*	Mature (> 9 inches dbh) and old growth ponderosa pine (PP)/Douglas-fir (DF) with abundant moth species prey.	19,635 mature and old growth dry DF 1019 pole sized dry DF	140 acres <.01%) mature dry DF thinned from below maintaining larger diameter trees and at least 35% canopy cover on treated acres. No old growth treated.
Black-backed Woodpecker	Burned or insect-killed forest.	34,842 acres mature and old growth forest (all tree species combined) with 6.28 (+-3.68) snags per acre (see goshawk section above for breakout of age and size classes) Over 4165 acres affected by mountain beetle in patches that range in size from 2 to 310 acres, providing 1 to 15 dead additional trees per acre for snag habitat. 0 recently burned.	No old growth treated. Thinning smaller diameter trees available in 180 acres of mature DF will maintain larger available trees for snag recruitment and all snags >10" will be maintained in treated areas unless a safety concern.

North American Wolverine

Overall Population Status, Distribution, and Local Occurrence Records

In Montana, wolverines were thought nearly extinct by 1920 from over-trapping, then appeared to increase in number from 1950 to 1980, presumed from reduced trapping seasons on other furbearers and increased dispersals from Canada. Today, the wolverine is still considered rare in distribution and number (MNHP 2004). In the Western United States and the interior Columbia basin, wolverines occur widely at very low densities, but only in northwestern Montana are wolverine populations considered to be healthy and thriving (Wittmer et al. 1998). (Also see http://www.predatorconservation.org/predator_info/forest_predators/Wolverine.html and (http://sciweb.onysd.wednet.edu/academics/science/subjects/zoology/ mammalian/weasles/wolverinerm.html).

In 2000 the US Fish & Wildlife Service was petitioned to list wolverine under the Endangered Species Act. That petition was denied after the formal 90 day review because the petition did not present substantial scientific information warranting the listing of the wolverine in the contiguous U.S. (USDI-FWS 2003).

The analysis area is located in MFWP Region 2 where wolverine are considered a furbearer and allowed to be legally trapped under a limited quota system (one wolverine in possession per trapper per year, 5 total trapping quota in Region 2). A review of recent trapping records from 1996 through 2003 in Granite County, Montana Region 2 that encompasses the analysis area showed no wolverine harvested in the entire region (MTFWP). Review of snow track surveys from 1991 through 2001 suggest wolverine occur infrequently (0 to 2.4 track detections per 100 miles surveyed) throughout Montana Region 2 (MTFWP 2001). On the Beaverhead-Deerlodge National Forest from 2000 to 2003, researchers from the Rocky Mountain Research Station (Missoula) conducted snow track surveys and/or live-trapped and radio tracked wolverines in the Pioneer, Pintler (south of the analysis area), and Flint Ranges (east of the analysis area). They have documented wolverines in all three mountain ranges, but none in the analysis area itself.

Biological Information for Wolverine

In southwest Montana, Copeland (1996) found that female wolverines selected natal den sites in glacial cirque basins or at the vegetation/rock interface at higher elevations and commonly left dependent kits at rendezvous sites comprised of large boulder talus or riparian areas associated with mature over story and dense deadfall. In Montana and Idaho, researchers have documented wolverine in forests with low to medium canopy closure in areas dominated by subalpine fir, and wolverine rarely used dense young timber, burned areas, or wet meadows (summarized in Wittmer et al.1998).

Banci (1994) found that wolverine appear to avoid human settlements, subsisting in winter on ungulate carrion at lower elevations, and a variety of foods in summer (i.e. ground squirrels, ungulate carrion, marmots, etc.) at higher elevations.

Home ranges of adult wolverines in North America range from 100 km^2 to over 900 km^2 (38-350+ mi^2) (*Ibid*.). The variation of home range sizes among studies is related to differences in sex, with males ranging further than females, and in the abundance and distribution of food. 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 sub adults, 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 (Ibid.). The long movements of wolverines suggest that recolonization of vacant habitats is not a concern. Typically, wolverines are associated with backcountry or wilderness, but are known to cross areas of human habitation (usually at night).

Wolverine Habitats and Use of the Analysis Area

Over 55% (more than 17,299 acres) of the analysis area provides wolverine with unroaded security habitat distributed on the north and south portions of the analysis area in 2 large blocks (Appendix A, Map 2). The security areas occur on the hydrologic divide in the John Long Mountains that separate the Lolo from the Beaverhead-Deerlodge National Forest. The security areas provide a suitable movement corridor for wolverine moving from denning habitat high in the Anaconda Pintler Wilderness Area on the south to elk winter range on the northeast fringes of the analysis area, although such movements have never been

recorded (B-D NF Wildlife Habitat Viability Analysis, Query 5 –Wolverine Habitat Prediction; Banci 1994; Heinemeyer et al. 2001; maps and supporting literature in project file; and Appendix A, Maps 7 (Security Habitat) and 8 (Elk Winter Range).

Direct, Indirect, and Cumulative Effects to Wolverine

Direct effects to wolverine from the project are not anticipated. 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 1996, Weaver et al. 1996). The project concentrates treatments adjacent to a road that receives light motorized use yearlong, is far removed from any potential denning habitat, and will not affect hunting or trapping season access.

Wittmer et al. (1998) suggested conserving wolverine that occurs in the analysis area through maintenance of large, remote areas of habitat and engaging in management activities that do not decrease ungulate prey density. The project will not impact existing security habitat (Appendix A, Map 2 compared with Map 1, proposed treatment units) and will not change the ungulate prey base (see elk section below).

Given no direct or indirect effects are anticipated, cumulative impacts are not expected.

Determination for Wolverine

The project will have *no impact* on wolverine. Denning habitat is far removed from proposed treatments. Ungulate carrion and potential movement of wolverine from denning to elk winter range will not be impacted. Security areas will not be impacted, given treatments are far removed from such areas. The project will not increase trapper access. The project will not add cumulative effects to the exiting situation for wolverine.

Western Big-eared Bat

Overall Population Status, Distribution and Local Occurrence Records

The western big-eared bat ranges throughout the western half of North America and south into central Mexico (Clark and Stromberg 1987). Scattered state records suggest that Townsend's big-eared bat is distributed statewide except for the northeastern prairie pothole region (Hart et al. 2001). The species is considered globally secure in population and numbers (G4), but locally imperiled in the state of Montana due to its rare and localized occurrence throughout its range as well as specialized habitat needs (MNHP 2004). Only two confirmed breeding colonies exist in Montana, as well as several confirmed hibernacula sites. The maternity colony at Lewis and Clark Caverns has persisted for over a century despite exposure to daily tour groups during the breeding season (http://nhp.nris.state.mut.us/animalguide/species Detail.aspx?elcode=AMACC08010).

During a randomized, grid-based survey conducted at 50 locations (20 west of the Continental Divide and 30 east of the Divide) distributed across five National Forests in Region One, 2 of 795 individual bats captured from late June to mid-August 2005 were Townsend's big-eared bats (Hendrickson and Maxell 2005). Inventory efforts suggest the species occurs in low densities with confirmed reproductive activities

on NF lands. Inventory efforts on the Beaverhead-Deerlodge have been concentrated in abandoned mines and have not confirmed the species' presence (project file).

Biological Information for Western Big-eared Bat

The big-eared bat is associated with cavernous habitat and rocky outcrops of sedimentary or limestone as well as old-growth forests with large diameter hollow trees for roosting. Maternity colonies occur in warm areas of caves, mines, or occasional buildings, and hibernacula occur in caves or mines with winter temperatures at 35 to 45 degrees Fahrenheit and relative humidity greater than 50% (summarized in Hart et al. 1998). It feeds on a variety of nocturnal flying insects, specializing primarily on moth species taken in the area, often near foliage, with a few reports of gleaning directly from foliage. Riparian areas and wet meadow habitat appears important for foraging.

Bat Habitat and Use of the Analysis Area

Riparian foraging habitat for bats is available in wet meadow (Appendix A, Map 3) and riparian areas distributed throughout the analysis area. Cave and abandoned mine roosting habitat has not been documented. The analysis area provides the bat with 34,842 acres mature and old growth forest (all tree species combined) with 6.28 (+-3.68) snags per acre for roosting opportunities.

Direct, Indirect and Cumulative Effects to Bats

The project is not anticipated to cause direct or indirect impacts to bats, therefore, cumulative impacts are not expected. Project activities will not occur in or near any caves or abandoned mines. Since no old growth will be treated, old growth roosting habitat will not be impacted. Thinning in Douglas-fir areas will target smaller diameter trees, leaving the largest diameter trees (> 14" dbh) available for future snag recruitment. Riparian and meadow foraging habitat will not be impacted.

Determination for Bats

Direct, indirect, and cumulative effects are not anticipated (see above). As such the project will have *no impact* on the Townsend's big-eared bat.

Northern Goshawk – Sensitive and MIS

Overall Population Status, Distribution, and Local Occurrence Records

The goshawk is found throughout North America with breeding documented from Alaska to Newfoundland and south through the Rocky Mountains, Sierra Mountains, and into Mexico. In Montana goshawks breed in mountainous or coniferous regions of the state (primarily in the west – Figure 1) and occasionally winter in the lower valleys of western Montana (Montana Bird Distribution Committee 1996, T. McEneaney pers. comm. in Hart et al. 1998).

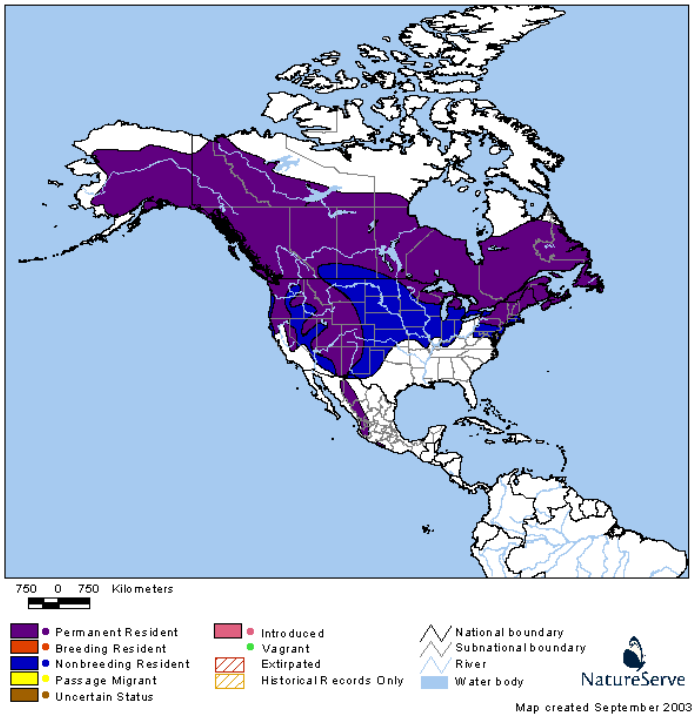


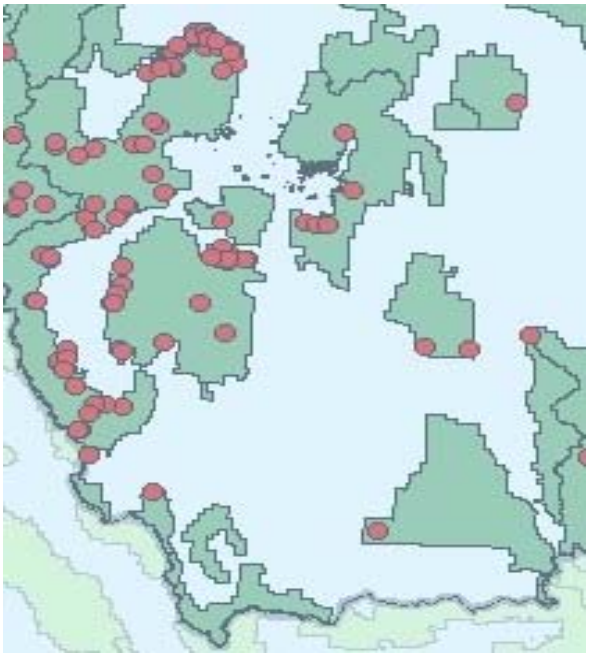
Figure 1. North American goshawk distribution. "Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy - Migratory Bird Program, Conservation International - CABS, World Wildlife Fund - US, and Environment Canada - WILDSPACE."

The species is considered globally secure, and in Montana, the population is considered stable and moderately vulnerable to threats to habitat or population. The goshawk is on the State's "Species of Concern" list (MNHP 2006).

The most recent petition for listing the goshawk under the Endangered Species Act occurred in 1997. After a formal 12-month review by a scientific committee, the U.S. Fish and Wildlife Service (Service) determined that listing under ESA was not warranted. Analysis of data from 17 states comprising 222 million acres indicated "that the goshawk population is well distributed and stable at the broadest scale (63 FR 35183 (June 29, 1998)).

The species and its habitat appears abundant and well distributed across Region 1 (USDA-FS 2005b and Samson 2006a and 2006b, including internal citations). On the Beaverhead-Deerlodge, Kirkley (1998 through 2004) has identified 44 territories and 106 nests through inventory and monitoring efforts, and Clough (2000, 2001) and USDA-FS 2005b) has identified 28 territories and 41 nests (Figure 2, ten new nests discovered in 2005 are not displayed in the map).

Figure 2. Goshawk territories (active and Inactive) on and adjacent to the BDNF (does not include 10 territories discovered during 2005 inventory and monitoring efforts).



Biological Information for Goshawks:

The northern goshawk occurs in a variety of forested areas throughout North America (Squires and Reynolds 1997). Some remain in a breeding area year-round, while others begin migration from breeding grounds in late September and continue through November (Ibid.). In winter, limited information indicates goshawks use a greater variety of habitats than in summer (summarized in Samson 2006, internal citations omitted here).

Pair formation and nest building begins in early April and egg-laying occurs in April and May. The adult female typically defends the nest while males hunt for food. The young fledge off the nest in mid- to late-July, remaining in the territory until September when they disperse from the area, often traveling long distances. Territories range in size from 570 to 3,500 ha (1,409 to 8,649 acres) (Kennedy 2003). From one to five alternate nests are constructed by the northern goshawk within the home range.

Because of wide scale differences among geographic regions and scientific methodology in studies conducted in the interior Pacific Northwest, consistent and precise management recommendations for goshawks are not available, therefore managers draw on information from Reynolds et al. 1992 as well as recent, statically reliable research (detailed in Samson 2006 including extensive internal literature citations). Reynolds et al. 1992 provided the most comprehensive analysis of goshawks in the southwestern United States, describing a nest area of approximately 30 acres with larger trees and dense canopy closure that serves as the center of all activities during the breeding season; a post-fledging area of approximately 170 ha (420 acres) comprised of a variety of forest types and canopy covers, defended by the adult goshawk pair during the nesting season and used by fledglings to refine hunting and flying skills until they disperse in fall; and a 5,400-acre (approximate) foraging area comprised of a diversity of vegetative types. The composition of vegetative types, including tree canopy closures and size class distributions located outside

the nest area (typically composed of higher canopy closures, mature trees, and open understory conditions) blend into the surrounding landscape beyond the PFA scale, such that, no difference in habitat composition in occupied versus random foraging areas can be detected (McGrath 2003). As such, the Region concentrates management efforts at the PFA and nest area scales.

In its comprehensive status review of the species (see above), the Service found that while the goshawk typically uses mature forests or larger trees for nesting habitat (the nest area), it is considered a forest habitat generalist, using a variety of types and ages. The Service found no evidence in its finding that the goshawk is dependent on large, unbroken tracts of "old growth" or mature forest, 63 FR 35183 (June 29, 1998). Conversely, Greenwald et al. 2005 prepared a literature review of a *few* selected studies concluding that goshawks select mature to old-growth forests in their home range and criticizing the management recommendations of Reynolds et al. 1992. However, Reynolds et al. 2005 rebutted Greenwald et al. 2005 by providing a more comprehensive review of the literature, which supports the Service's review, finding that Greenwald's criticisms were based on misunderstandings of the desired goshawk habitats described in the MRNG [Reynolds et al. 1992]; an under-appreciation of the extent of variation in vegetation structure among forest types and seral stages used by goshawks; a limited understanding of the ecological factors limiting goshawks; a failure to understand the dynamic nature of forest habitats; and incomplete reviews of the literature.

In fact, goshawks can use small patches of mature habitat to meet their nesting requirements within a mosaic of habitats of different age classes (detailed in Samson (2006) including extensive internal citations). For example, on the Beaverhead-Deerlodge NF mature habitat quantified in PFAs centered on nests averaged only 11.3% of 420 acres (Clough 2000), whereas, on the Targhee in Wyoming and Montana mature habitat averaged 60% (Patla 1997). Productivity levels of goshawks in the Clough 2000 study that occurred in a heavily managed landscape were greater than those of Patla (1997) and fell above or within the ranges of studies done in managed and unmanaged landscapes through the western United States. More than habitat composition or any other factor (i.e. prey abundance), territoriality determines nest distribution, and spring weather determines nest success (i.e. Joy 2002, Reich 2003).

The goshawk is a generalist, opportunistic predator (detailed in Samson 2006, including extensive internal citations). Prey items are taken on the ground, on vegetation, in the air, and include tree squirrels, ground squirrels, rabbits, hares, songbirds, and grouse that rely on a variety of forested and **non-forested** habitats (*Ibid*.).

Goshawk Habitats and Use of the Analysis Area:

Nesting habitat for goshawks was defined using tree species and size class information derived from TSMRS data intersected with the canopy closure classes used in SILC3. Variables selected were as close to Samson (2006a) as possible. All single or two-storied stands with the upper canopy dominated by lodgepole pine or Douglas-fir trees, with average tree diameters > 9" (measured at breast height, dbh) and upper canopy closures (cc) greater than or equal to 45% were considered suitable for nesting. The canopy closure class 25 to 45 percent was not considered nesting habitat. Foraging habitat included all suitable nesting habitat plus all open grown lodgepole pine and/or Douglas-fir with average tree diameters > 9" dbh and upper cc less than 45%; and all Douglas-fir and/or lodgepole pine with average tree diameters in the 5 to 8.9" dbh class were considered foraging if upper cc was less than 64% (Table 7 and Appendix A Map 4). Unsuitable habitat included seedling/sapling stands and dense lodgepole pine and Douglas-fir pole (5 to 8.9" dbh with > 64% canopy closure), all spruce/fir, and limber/whitebark pine. Rock and water were

considered nonhabitat. Goshawks have been observed hunting on the edge of seeding/sapling stands and occasionally found nesting in spruce/fir (i.e. Clough 2000), however, these habitats are generally not preferred nor considered highly suitable due to their lack of the structural components (i.e. open understory conditions, nest platforms) typical of where the species does occur.

Table 7. Summary in acres of habitat available to goshawks for nesting and foraging in the Barton Springs commercial thinning project analysis area.

FOREST COVER TYPE	Primary Nesting/ Foraging Mature and Old Growth (> 45% cc,> 8.9" dbh)	Other Suitable Foraging			Total Foraging Habitat	Secondary Habitat/ Unsuitable	Total
		Open Forest Mature and Old Growth (< 45% cc, > 9" dbh)	Open Forest Mid-age (< 64% cc, 5 to 8.9" dbh)	Forest/ Meadow Ecotones			
Lodgepole Pine	848	1279	6543		8670	1490 dense pole	11,519
Douglas-fir	2492	5372	999		8863	341 dense pole	29,933
Spruce/fir						132 (all size classes)	132
Limber/White bark Pine						18 (all size classes)	18
Seedling/ Sapling						2282 seedling/sapling (all species)	2282
TOTAL FORESTED	**3340**	**6651**	**7542**		**17533**	**3176**	**20709**
Meadows				12233	12233		12233
Total	**3340**				**19335**		**22511**
Nonhabitat							546 rock 30 water

Table 7 demonstrates that nesting and foraging habitat in the analysis is relatively abundant.

Direct and Indirect Effects

Samson (2006a) summarized recent (2000 and newer) studies on the effects of vegetation treatments on northern goshawks that show: (1) the majority of goshawk pairs move from nest stands when stand structure is modified by more than 30%; (2) human disturbance is not a factor if 70% of the nest stand structure is maintained and timber management operations are time restricted during the nesting period; (3) treatments have no effect on goshawk breeding area occupancy, nest success, or productivity 1 to 2 years after treatment; (4) no difference in the productivity of northern goshawks occurs in logged versus unlogged areas.

Treatments will not occur in or near known occupied or potentially suitable nesting habitat. In addition, treatments will occur outside the courtship, egg laying, incubation, nestling, and early fledgling periods. As such, direct impacts to nesting goshawks and/or nesting habitat are not expected.

All thinning treatments are concentrated in 140 acres of potential foraging habitat (Appendix A, Map 4).

Table 8 shows the vegetative composition of home range habitat available to goshawks in the analysis area compared with the approximations recommended by Reynolds et al. 1992 to support nesting goshawks and their prey. Thinning will not change the overall composition of size classes in the area.

Table 8. Vegetative Composition of Goshawk Home ranges in the Barton Springs Commercial Thinning Project analysis area. Table shows aces and percent of primary and secondary goshawk habitat in forested areas in each of three tree size classes as well as meadow foraging compared with the recommendations of Reynolds et al. 1992(VSS classes) for supporting goshawks and their prey.

TRADITIONAL SIZE CLASSES	ACRES OF FORESTED HABITAT IN EACH SIZE CLASS IN THE ANALYSIS AREA (includes all primary and secondary habitat)	%	REYNOLDS ET AL. 1992 RECOMMENDATIONS.
% mature (> 8.9 inches dbh) and old growth combined (TSMRS) **Old growth (FIA, Green et al. 1992)**	34,842	54% 20%	VSS 4, 5, 6 60% VSS 6 20%
% pole-sized (5-8.9 inches dbh)	17,050	26%	VSS 3 20%
% seedling/sapling (0-4.9 inches dbh)	**2282**	**4%**	VSS 2 10%
TOTAL FORESTED			
meadow	**12233**	**19%**	VSS 1 10%
TOTAL ALL			

Cumulative Effects for Goshawks

Past, present, and reasonably foreseeable future actions were analyzed for cumulative impacts to goshawks (Appendix B with additional information in project file).

Table 1 in Appendix B shows that <.01% (316 of 34,842 acres) of coniferous forest received clearcut logging treatments after Forest Plan implementation, and 612 (2%) were clearcut prior to Forest Plan implementation, all of which are in various stages of regeneration that range in age from 10 to 50 years and likely do not provide suitable nesting habitat for goshawks. Currently, only 4% of the analysis area is in seedling/sapling stage, less than the 10% recommended by Reynolds et al. 1992 (Table 8). The project will not impact the acres classified as seedling/sapling stands.

Understory thinning and ecosystem burning occurred on 1140 (11%) and 1530 (15%) acres, respectively, from 1988 through 1999. The majority of these treatments occurred in dry Douglas-fir habitat types located on south facing slopes, atypical of where goshawks have been found nesting in this part to the species' range (Clough 2000). Treatments were designed to reduce seedling sapling growth in the understory and increase vigor in larger diameter Douglas-fir and ponderosa pine in the overstory. Treatments occurred in a mosaic fashion, leaving the overstory relatively intact. Currently, these areas provide the goshawk with structural characteristics consistent with areas where goshawks have been documented foraging (mature forest, > 40% canopy closure, open understory conditions) (see above). This project will thin an additional 2% and is expected to produce similar results.

Past, ongoing, and foreseeable commercial clearcut and thinning treatments on Plum Creek timber lands and other private lands likely reduces the foraging and nesting potential for goshawks, however, the extent

to which this has occurred is largely unknown. Adequate nesting and foraging habitat will remain available on Forest Service lands.

Forest-wide, only 7% (228,719 of 3.38 million acres) of the Beaverhead-Deerlodge NF has received some sort of harvest treatment or wildfire since 1945 (Harry 2006). In the past 5 years, < 1% of the Forest or 10,464 total acres have been affected, with 7,529 of those burned by wildfire, indicating cumulative impacts from past vegetation management are relatively minor.

The analysis area provides the public with dispersed recreational opportunities in the form of camping, fishing, and hunting. This project will not effect dispersed recreation.

In January-March 2003 the Beaverhead-Deerlodge National Forest Wildlife Biologists made a National Forest wide assessment of northern goshawk. A geographic information system (GIS) was used to evaluate and spatially display potential goshawk habitat, using information collected from satellite imagery or SILC. SILC predicts potential habitat types using life forms, slope, aspect and elevation. Goshawk habitat was defined as mature to old growth (Green et al. 1992) Douglas-fir, Douglas-fir/lodgepole pine, Douglas-fir/ponderosa pine and lodgepole pine. Results indicate that mature to old growth forest is abundant and widely distributed, comprising 64.1% of the Deerlodge portion of the Forest, with 21% of the mature to old growth located in Inventoried Roadless/Wilderness (B-D NF Wildlife Habitat Viability Analysis, Query 1 – Mature to Old Growth Cover-types by Inventoried Roadless/Wilderness Status; Hillis, et. al. 2003).

Bush and Leach (2003) used Forest Inventory and Analysis (FIA) data to estimate old growth and large snags in the Beaverhead-Deerlodge NF and the Clark Fork-Flints Landscape, where the project area is located. For all forest types combined, old growth appears abundant and widely distributed, comprising 20.95% of the Forest, and 20.0% of the Clark Fork-Flints Landscape. The Forest wide old growth estimates for the primary goshawk habitats, Douglas-fir and lodgepole pine are 19.81% and 14.19%, respectively.

Samson (2006a and 2006b) reported similar results for the Forest and demonstrated that viability is not an issue (see above). In addition, monitoring has shown that reproductive rates for goshawks nesting on the Deerlodge average 2.6 fledglings per nest, and adjusted nesting success is about 68%, above or well within the ranges reported in studies throughout the western United States (Clough 2000).

Determination for Goshawks

The project as proposed *May Impact Individuals or Habitat, but is not expected to result in reduced viability for the population or species*. Nesting habitat will not be impacted. Nest areas will not be impacted. A minor amount of potential foraging habitat (2%) will be thinned. The vegetative composition of home range (primary and secondary habitat) habitat available to goshawks in the analysis area approximates those recommended by Reynolds et al. 1992. No change in breeding area occupancy or productivity is expected. Goshawks and goshawk nesting and foraging habitats are abundant and well distributed across the forest and region.

Flammulated Owl

Overall Population Status, Distribution, and Local Occurrence Records

Flammulated owls are small, migratory insectivores that inhabit mountainous forests of western North America. McCallum (1994) noted that flammulated owls are "perhaps the most common raptor of the montane forests of the western United States." The species is ranked by NatureServe as globally secure (G4) with a widespread distribution; however, population data are inadequate for trend assessment (http://www.natureserve.org/explorer/servlet/natureServe?searchname=Otus+flammeolus; access 12/19/2006). In Montana, the Natural Heritage Program ranks the species as S3B; abundant in some areas, but potentially at risk because of limited breeding habitat or populations (http://nhp.nris.state.mt.us /animalguide/speciesDetail.aspx?elcode=ABNSB01020; accessed 12/19/2006).

Holt et al. (1987) reported the first 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. As of 1998, flammulated owls were considered to have a widespread presence in Missoula and Ravalli counties. Prior to 1998, on the Beaverhead-Deerlodge (B-D NF), flammulated owls were documented in western Granite, southwestern Deerlodge and western Jefferson Counties (Wright 1996 in Hart et al. 1998). In 2005, a Region One Inventory and Monitoring project detected singing male owls on the B-D NF at 35 +- 14% of the random points surveyed, suggesting the species is relatively common in the road accessible areas of the Douglas-fir zone (http://avianscience.dbs.umt.edu/research_landbird_ flam.htm).

Samson 2006a estimated flammulated owl breeding habitat available in each National Forest in Region One using habitat variables reported in the scientific literature to build habitat relationships models. The models were then used to query the FIA database, resulting in statistically reliable habitat estimates by National Forest. Results indicate that breeding habitat for the owl is relatively abundant and widely distributed Region-wide. Because the majority of elevations found on the B-D NF are generally above those where owl habitat (ponderosa pine) occurs, nesting habitat for the owl comprises 1,975 ha, enough for about 108 pairs; compared with 16,017 ha found on the Nez Perce NF for example. The greatest amount of ponderosa pine on the Deerlodge NF occurs west of the Continental Divide in the Northern Flint Creek Range, where a group of singing flammulated owl males were documented during the summer of 1995, and in the northern John Long Mountains, that encompass the analysis area, where a group of singing males were also documented in 1995 and again in 2004 (maps and survey data in project file). Douglas-fir occurs at low to mid elevations throughout the forest.

Biological Information for Flammulated Owl

The flammulated owl is a secondary cavity nester, meaning it uses the cavities excavated in previous years by primary cavity nesters (woodpeckers). The following information was taken from the Natural Heritage Program species account (web page). The owl's distribution in winter occurs south of the U.S. border as well as in Arizona and New Mexico. No information for breeding chronology exists for Montana. In Oregon, the breeding season lasts from late April (when the owl arrives in their breeding grounds) to mid-August when the young become independent from their parents (about one month after fledging). The rates of nest success and productivity are unknown. time from the owl arrival is arrives in their breeding grounds in late April, early May. The time from , incubation (recorded in Oregon) lasts 21 to 26 nights (June 8 to July 3); fledging occurred from July 25 to august 16,In Montana, the flammulated owl mainly uses cavities excavated by the pileated woodpecker or northern flicker (McCallum 1994), and the nest cavity is used year after year by the pair. The owl arrives on breeding grounds in mid-April to mid-May

Mean territory size, based on a study of four males, averaged 27.4 ± 4.7 acres in 1982 and 32.9 ± 12.6 acres in 1983 (Linkhart et al. 1998). The flammulated owl subsists on insects, especially moths and beetles, and forages in the tree canopy, between trees, and on the ground. Researchers found one to four areas (1.2 ± 1.0 acres in size) near the nest cavity served as important foraging areas (Ibid).

Young flammulated owls remain within 328 feet of the nest site for a week after leaving the nest cavity (McCallum 1994a). Young flammulated owls gain independence from the parents in foraging for prey in about 25 to 32 days. The owls leave their breeding areas beginning in August and over-winter in middle America, then return to breeding areas in late April and early May (McCallum 1994b). About 50% of the flammulated owls return to the same area with males showing either a higher fidelity to nest area and or survival rate.

McCallum (1994a) summarized the studies of McCallum and Gehlbach (1988) and Goggans (1986). In general, flammulated owls nested in relatively large trees in relatively open areas. McCallum and Gehlbach (1988) report owls selected areas with the most abundant pool of woodpecker cavities and neither McCallum and Gehlbach (1988) nor Goggans (1986) demonstrated differences in occupied and unoccupied habitat.

Linkhart (2001) reported that density of cavity trees is not related to reproduction but fundamentally important to territory establishment by male flammulated owls. Linkhart suggested that flammulated owls aggregate around clusters of nest cavities rather than nesting in colonies.

Linkhart (2001) concluded the association of flammulated owl productivity with higher densities of larger diameter trees suggests that flammulated owls are adapted to forests that were historically maintained by fire.

Forest fragmentation effects on flammulated owls have not been studied. While the flammulated owl is an old growth associate (Reynolds and Linkhart 1992), the pine forest in which it occurs is naturally open with interior edges. McCallum (1994) speculated that "doghair" stands may provide roosting habitat, but may reduce foraging potential. Closed canopy forests shade out grasses and small shrubs needed to support the owl's prey species. Also, the typical foraging maneuvers of the owl may be difficult in dense forests.

The effects of fire on the species have not been directly assessed (McCallum 1994). However, fire suppression has replaced frequent, low intensity events with infrequent high intensity fires, resulting in a stand structure uncharacteristic of ponderosa pine forests that existed before European settlement (Habeck 1990).

Flammulated Owl Habitats and Use of the Analysis Area

As stated above, flammulated owls were documented in the analysis area (at least 300m north and east of the proposed treatment unit) during the summer of 1995 and again in 2004 (maps and survey data in project file). Inventories inside the proposed treatment unit during the summer of 2005 did not document owl presence.

Flammulated owl habitat in the analysis area was quantified using TSMRS stand data intersected with SILC3 canopy closure (cc) classes that resembled Samson (2006a at 57) as close as possible. Suitable nesting and foraging habitat was defined as all dry Douglas-fir > 9” dbh (from Table 4 above) with > 35%

cc. Of the 29,933 acres of Douglas-fir in the analysis area, over 90% (28,387 acres) appears to provide suitable nesting and foraging habitat for the owl (Table 9). None of the stands are classified as ponderosa pine, however, many Douglas-fir stands on south facing slopes have a ponderosa pine component.

Table 9. Flammulated owl habitat in the Barton Springs analysis area

Cover Type	Mature and Oldgrowth > 8.9 " dbh (acres)			Mid-aged Pole-sized 5 to 8.9" dbh (acres)			Seedling/ Sapling (acres)	Total (acres)
	Wet	Dry	Total	Wet	Dry	Total		
Douglas-fir	8752	19635	28387	527	1019	1546	0	29933
> 35% cc on dry slopes		14,535						14,535

Direct and Indirect Effects to Flammulated Owl

Based on size class and canopy closure as well as field reviews of the area (Table 9 and project file), the majority of the proposed treatment unit appears to be comprised of potential flammulated owl habitat (see 2006 stand exam data in project file). This project will treat a modest 140 of 14,535 potentially suitable acres or .01%, leaving 99% untreated. After thinning, canopy closure (> 35%), basal area (60 to 80), and snag densities in the treated stand will remain consistent with habitats where owls have been found nesting (summarized in Samson 2006a).

Inventories in 1995 and 2004 recorded singing males in the analysis area. The locations of those males were estimated using standard triangulation methods at owl broadcast calling points. Treatments proposed in this project will occur greater than 300 meters away from the estimated locations (see maps in project file).

As an extra precaution, ground disturbing activities will occur outside the breeding season (mid-April through late July), therefore direct impacts to breeding owls and their nestlings are not expected.

No old growth will be treated. The stand does not meet old growth criteria (Green et al. 1995); however; a few small patches of forest located within the stand that had some older forest characteristics (i.e. multi-storied with a large diameter tree component in the overstory (greater than 21 inches dbh), large diameter snags with excavated cavities, and large downed woody debris) were completely removed from any treatment activities. All soft snags > 10 " dbh will be maintained in the treated unit, where feasible.

Cumulative Effects to Flammulated Owl

Past, present, and reasonably foreseeable future actions were analyzed for cumulative impacts to owls (Appendix B with additional information in project file).

Understory thinning and ecosystem burning occurred in the analysis area on 1140 (11%) and 1530 (15%) acres, respectively, from 1988 through 1999. The majority of these treatments occurred in dry Douglas-fir habitat types located on south facing slopes, typical of where flammulated owls occur in this part to the species' range (see above). Treatments were designed to reduce seedling sapling growth in the understory and increase vigor in larger diameter Douglas-fir and ponderosa pine in the overstory.

Treatments occurred in a mosaic fashion, leaving the overstory relatively intact. Currently, these areas provide the owl with habitats that are consistent with areas where the owls have been documented during the nesting period (mature forest, > 40% canopy closure, open understory conditions) (see above). This project will thin an additional 3% and is expected to produce similar results.

Past, ongoing, and foreseeable commercial clearcut and thinning treatments on Plum Creek timber lands and other private lands has likely reduced the foraging and nesting potential for the owl, however, the extent to which this has occurred is largely unknown. Adequate nesting and foraging habitat will remain available on Forest Service lands.

Forest-wide, only 7% (228,719 of 3.38 million acres) of the Beaverhead-Deerlodge NF has received some sort of harvest treatment or wildfire since 1945 (Harry 2006). In the past 5 years, < 1% of the Forest or 10,464 total acres have been affected, with 7,529 of those burned by wildfire, indicating cumulative impacts from past vegetation management are relatively minor.

The analysis area provides the public with dispersed recreational opportunities in the form of camping, fishing, and hunting. This project will not effect dispersed recreation.

Flammulated owl habitat on the Forest was defined as mature to old growth Douglas-fir and Douglas-fir/Ponderosa pine using the Region One definitions (Green et. al. 1992). Based on SILC3 GIS maps for the BDNF, mature and old growth Douglas-fir appears evenly distributed for flammulated owl across each of 10 landscapes, covering 18% of the Forest with about 17% of the total occurring in roadless/wilderness areas. Because of high elevations, ponderosa pine dominated stands are not well distributed or well represented, comprising < 1 percent of the Forest. The majority of ponderosa pine appears west of the Continental Divide in the Clark Fork River landscape, with trace amounts ranging from 8 to 169 acres found in the remaining 5 of 10 landscape ecology units (B-D NF Wildlife Habitat Viability Analysis, Query 1 – Mature to Old Growth Cover-types by Inventoried Roadless/Wilderness Status).

Bush et al (2006), used FIA data to estimate Douglas-fir and ponderosa pine (combined) old growth on the Forest, showing that 20.4% +/- 3% of this forest type is in old growth. The project will not impact old growth. In fact, thinning in Douglas-fir/ponderosa pine under the proposed action is expected to leave the overstory relatively in tact and will not change the overall distribution or age class structure of Douglas-fir or ponderosa pine in the analysis area. Furthermore, Bush et al (2006), used FIA data to estimate Snag densities by landscape. For the Upper Clark Fork landscape it was shown with a 90% CI that there is 10-19.9" snags/acre, with a lower 4.7/acre lower bound and a 18.8/acre upper bound and a mean of 11.2/acre. This information is greater than required in Samson 2006a where available literature on snag retention for owls was recommended (1snag/hectare or 1/2.53acres).

Determination for Flammulated Owl

The project as proposed *May Impact Individuals or Habitat, but is not expected to result in reduced viability for the population or species*. Treatments will occur outside the breeding season. Thinning will not occur in or near (greater than 300 meters) areas where the owl has been detected during the breeding season. No old growth will be impacted, leaving the most suitable owl habitats in tact. A minor amount (.01%) of potential nesting/foraging habitat will be thinned from below leaving the overstory relatively in tact. The resulting stand characteristics will be consistent with areas where the owl has been detected. The project

will not change the amount or distribution of owl habitat on the forest. Owl habitat is well distributed on Forest, and in the Region.

Black-backed Woodpecker

Overall Population and Habitat Status and Distribution

The black-backed woodpecker (hereafter referred to as black-backed) breeds in a diversity of conifer forests from central Alaska and northern Canada south to the mountainous regions of California, Wyoming, Black Hills, Upper Great Lakes and New England states, and into Newfoundland (Dixon and Saab 2000).

The species has been observed in Montana year-round (summarized at Montana Natural Heritage site accessed on 5/06/2005 - http://nhp.nris.state.mt.us/animalguide/speciesDetail.aspx?elcode=ABNYF07090. While Hart et. al (1998) do not display black-backed in southwest Montana, unconfirmed breeding records exist that would expand the species' range to most counties in the western part of the state, including areas in southwestern Montana, the Big and Little Belt Mountains area, and the Bridger Range.

Breeding Bird Survey trend data for 1996 through 2003 show greater than 1.5% annual increase in northwestern Montana and along the west central Idaho/Montana border. Population trend data for the BDNF 7 county area is not available (accessed May 6 2005 http://www.mbrpwrc.usgs.gov/bbs/htm03/trn2003/tr04000.htm). From 1994 to 2004, the Northern Region Landbird Monitoring Program documented just 3 detections in unburned areas on the Forest (http://www.avianscience.org/research_landbird_data.htm accessed May 11, 2005).

Hillis (2003) reported a 258% increase in habitat (post-fire) for the species in Region One from 2000 to 2003, and Samson (2006a) reported that black-backed habitat (post-fire and insect outbreaks) has increased across the Region in the last decade (from 278% on the Kootenai to over 300,000% on the Flathead). Samson (2006a) also found that no gap between current post-burn or insect-infested (with no burn) areas occurs that would limit black-backed woodpeckers from interacting Regionwide. Information provided in Dixon and Saab (2000) suggests the species is increasing in numbers in the United States.

A recent state insect and disease condition report shows dramatic increases in acreages of tree mortality from 2002 to 2005 (USDA-FS 2005c). For example, on the Deerlodge portion of the Forest, 21,212 acres of mountain pine-beetle killed lodgepole pine were available for the black-backed. In 2005, beetle-killed acres increased to 152,312 (*Ibid*. at 48).

Biological Information for Black-backed

The black-backed is found in a variety of conifer species with no one species preferred over the other (summaried in Dixon and Saab 2000). They are primary cavity nesters, excavating their own cavities in April and May, often in dead or dying conifers, and the young depart from the nest from early June through early July. Territory sizes appear to range from 61 to 124 ha (151 to 306 acres).

The species has been observed in recently disturbed (i.e. post-fire, insect infestations with no fire) forests where an abundance of bark beetle and/or wood boring insect prey occur (Goggan et al. 1989, Marshall 1992, Hutto 1995, Arnett et al. 1997a and 1997b. and also summarized in Dixon and Saab 2000). Post-

burn area studies in Oregon, Montana, Idaho, and South Dakota consistently report that wood-boring beetles that occur in abundance (2 to 8 years) following a fire are an important food source for the woodpecker; and insect outbreak studies (without fire) suggest the species is attracted to food abundance (summarized in Samson 2006).

Hutto (1995) stated the black-backed appears "nearly" restricted to post-burns, and Murphy and Lehnhausen (1998) postulated that local populations increase in number in post-burned areas and decrease in unburned areas. The species has been found in mountain-pine beetle killed areas (Arnett et al. 1997a and 1997b) as well as in relatively undisturbed, live forests (i.e. Bock and Lynch 1970, Apfelbaum and Haney 1981, Harris 1982, Goggan et al. 1989). Hoyt and Hannon (2002) reported black-backs in old forest stands long distances from any burned areas.

Our understanding of habitat requirements in the northern Rocky Mountains has been limited due to statistical problems with study design (Huffman 1997 *in* Samson 2006). Hoyt and Hannon (2002) noted noted that few studies have considered all habitats in proportion to availability nor considered the difficulty in comparing bird densities observed in open post-fire habitats versus bird densities observed in closed canopy and structurally complex, live forests. In 2006, the Avian Science Center, University of Montana, conducted a stratified random, grid-based survey of mountain pine beetle-killed lodgepole in northern Idaho and parts of western Montana. They detected black-backed woodpeckers in < 1% of the sites surveyed.

Black-backed Habitat and Use of the Analysis Area:

Observations of black-backed woodpeckers in the analysis area have not been reported. The analysis area provides the woodpecker with 34,842 acres of mature and old growth forest (all tree species combined) with 6.28 (+-3.68) snags per acre (Table 10 and Appendix A Maps 6 (sawtimber all species) and Bush and Leach 2003). Recent flight data show the analysis area contains approximately 4,166 acres of beetle-killed lodgepole pine and ponderosa pine (in Douglas-fir dominated stands) that ranges in area from 1 to 247 acre patches with 1 to 15 infested trees per acre > 9" dbh (Appendix A, Map 9). No recent wildfires have occurred in the analysis area.

Direct and Indirect Effects to Black-backed

Direct effects to breeding woodpeckers are not anticipated. Given black-backed woodpeckers appear in low densities in unburned habitats, the chance of disturbing even one individual is low. As an extra precaution, ground disturbing activities will not occur at any time during the breeding season (including from nest building in early April through early July when young leave the nest).

Thinning will occur in 140 acres, a modest .01% of 34,842 total acres of potential woodpecker habitat (Table 10). Black-backed habitat will be maintained across the analysis area because (1) **all** snags > 10" dbh will be maintained in thinned areas, (2) no old growth will be impacted, (2) thinning will maintain the largest available ponderosa pine and Douglas-fir trees in the overstory for ample future snag recruitment, (3) clear-cutting is **not** proposed, (4) thousands of unthinned, high canopy cover acres remain available for natural snag recruitment; and (5) adequate snags (6.28 +-3.68 per acre) to maintain viable woodpecker populations will remain across the entire analysis area (i.e. Cunningham et al 1980, Raphael and White 1984, Bull et al 1997, USDA-FS 2000).

Cumulative Effects to Black-backed

Past, present, and reasonably foreseeable future actions were analyzed for cumulative impacts to black-backed (Appendix B with additional information in project file).

Table 1 in Appendix B shows that .01% (316 of 34,842 acres) of coniferous forest received clearcut logging treatments after Forest Plan implementation, and 612 (6%) were clearcut prior to Forest Plan implementation, all of which are in various stages of regeneration that range in age from 10 to 50 years and likely do not provide suitable habitat for the woodpecker. Currently, only 4% of the analysis area is in seedling/sapling stage.

Past, ongoing, and foreseeable commercial clearcut and thinning treatments on Plum Creek timber lands and other private lands likely reduces the foraging and nesting potential for the woodpecker, however, the extent to which this has occurred is largely unknown. Adequate nesting and foraging habitat will remain available on Forest Service lands.

Forest-wide, the TSMRS stand data base shows only 7% (228,719 of 3.38 million acres) of the Beaverhead-Deerlodge NF has received some sort of harvest treatment or wildfire since 1945 (Harry 2006). In the past 5 years, < 1% of the Forest or 10,464 total acres have been affected (*Ibid*.). From 2000 to 2003, 24,406 acres of post-fire habitat were created (Samson 2006 at 48).

Large fires have occurred in the Anaconda-Pintler Wilderness in recent years (2000 and 2005) to provide for woodpecker post-burn habitat, and insect-killed areas (without fire) have been increasing, exponentially since 2003.

As stated above, and worth repeating here, Hillis (2003) reported a 258% increase in habitat (post-fire) for the species in Region One from 2000 to 2003, and Samson (2006) reported that black-backed habitat (post-fire and insect outbreaks) has increased across the Region in the last decade (from 278% on the Kootenai to over 300,000% on the Flathead). Samson (2006) also found that no gap between current post-burn or insect-infested (with no burn) areas occur that would limit black-backed woodpeckers from interacting Region-wide, indicating habitat is abundant and well distributed across all Forests, including the Beaverhead-Deerlodge. Furthermore, a recent state insect and disease condition report showed dramatic increases in acreages of tree mortality from 2002 to 2005 (USDA-FS 2005). For example, on the Deerlodge portion of the Forest, 21,212 acres of mountain pine-beetle killed lodgepole pine were available for the black-backed. In 2005, beetle-killed acres increased to 152,312 acres, (*Ibid*. at 48). Information provided in Dixon and Saab 2000 suggests the species is increasing in numbers in the United States.

Forest-wide distributions of old growth habitats are detailed in the Goshawk (Douglas-fir and lodgepole pine) section above and in Bush and Leach (2006) which demonstrates that old growth is abundant and well distributed across the Forest. Furthermore, Bush et al (2006), used FIA data to estimate Snag densities by landscape. For the Upper Clark Fork landscape it was shown with a 90% CI that there is 10-19.9" snags/acre, with a lower 4.7/acre lower bound and a 18.8/acre upper bound and a mean of 11.2/acre. This information is greater than required in Samson 2006a where available literature on snag retention for woodpeckers was recommended.

Determination for Black-backed

Based on the above analysis, the project as proposed may impact individuals or habitat but will not affect the viability of the population or species. The probability of disturbing even one individual is low. Timing restrictions will prevent the potential for direct impacts to breeding birds; adequate snag habitat will be maintained in thinned units and untreated areas in the analysis area as well as Forest-wide and Region-wide; habitat for the woodpecker has increased dramatically in the last decade; woodpecker populations have increased in number; no old growth will be impacted, and old growth is abundant and well distributed Forest-wide.

Management Indicator Species

The Forest Plan identifies "Management Indicator Species" (MIS) that are used to judge effects of land management activities on various habitats. Management efforts have historically been directed toward indicator species on the premise that management for these would ensure habitat management for the other wildlife represented by that species. Management indicator species for the Deerlodge National Forest are listed in Table 3 above.

Two management indicator species (MIS) known to occur in Douglas-fir/ponderosa were selected for analysis purposes. They include:

- Elk – Species commonly hunted
- Pileated Woodpecker – Old growth Douglas-fir

MIS not considered for detailed analysis and the justification is contained in Table 10.

Table 10: Management Indicator Species Not Considered For Detailed Analysis

SPECIES	REASON			
	Habitat needs similar to selected MIS for project	**Lodgepole and spruce/fir habitat not affected by the project**	**Riparian and grassland habitats not affected by the project**	**No suitable habitat in analysis area**
Moose, Mule Deer	X			
Three-toed woodpecker, hairy woodpecker, pine marten		X		
Willow Flycatcher, Belted Kingfisher, Western Jumping Mouse, Montane Vole, Northern Water Shrew, Warbling Vireo, Blue-winged Teal, Blue grouse, Moose			X	
Mountain Goat, Bighorn Sheep, Sage Thrasher				X

Commonly Hunted Species (MIS)

The Deerlodge Forest Plan lists seven MIS species that are "commonly hunted" in Montana: elk, mule deer, moose, blue grouse, big horned sheep, and mountain goat. Changes in the above species' population numbers, distribution patterns, and key habitat components resulting from forest management practices are of concern to State management agencies and interested publics. Montanans hunt mule deer, blue grouse, and elk in the analysis area through an unlimited license system (purchased over-the-counter) regulated by Montana Fish, Wildlife, and Parks. Moose are limited through a special draw permit

system and mountain goat and big horn sheep do not occur in the analysis area. Populations of commonly hunted species are considered stable and well distributed across the Forest.

Elk

The Deerlodge Forest Plan divides the Forest into 45 geographic areas called Hunter Recreation Opportunity Geographic Areas (HROGAs) (see below). The analysis area encompasses all National Forest Lands located in HROGA 42: USFS 1987, Appendix N; Appendix A, Map 2).

HROGA 42 is located in the Rock Creek Elk Management Unit (EMU) identified in the 2004 Montana Fish, Wildlife and Parks Elk Management Plan (hereafter "Elk Plan') and comprises a portion of FWP Hunting District (HD) 210. FWP population objectives are based on "maintaining a low level of game damage while providing adequate opportunities for hunters" (MFWP 2004). Issues identified for elk include increased wolf sightings, noxious weed invasions on private and public lands; large elk numbers on private lands (want to improve access on private lands); and elk security on winter range

Overall population objectives for the EMU were exceeded during the most recent counts (Table 11). As such, no restrictions on bull harvest during the bow or general rifle hunting seasons occur. Cow elk are hunted under a limited permit system (1000-1500 tags issued via lottery drawing).

Table 11: Montana Elk Management Objectives and Current Estimates

EMU	Elk Population	Bull:Cow Ratio	Elk Harvest	Hunter Numbers	Recreation Days
ROCK CREEK[1]					
Objectives	2000-3000	10:100	NA	NA	NA
Existing Condition	3,165 in 2003	15:100 in 2003	314 bulls 352 anterless 1999-2001	4,747*	27,739*

Elk Effective Cover

As stated above Hunting Recreational Opportunity Objectives (HROGAs) were assigned to each of 45 geographic areas in the Deerlodge Forest Plan (FP, Appendix N-8). The objectives typify the overall type of hunting recreational opportunity to be provided in an area based on road access, ranging from providing "walk-in" only hunting to "roaded" (Forest Plan Appendix N, p. N-8). Objectives for open road density, elk hiding cover, and elk effective cover were also established for each HROGA.

The Deerlodge FP Elk Habitat Unit Analysis System assumes that the amount of elk hiding cover (defined as forested cover that will hide 90% of an elk at 200 feet from the view of a human) in a HROGA measures the potential for elk to use an area, or elk use potential (EUP). For example, if a HROGA contains 40% or more hiding cover, it is assumed that EUP is 100%. As hiding cover decreases, EUP decreases. Hiding cover is considered important during all seasons of the year. It provides protection from cold weather (thermal cover) and human- or other predator-related disturbances (hiding cover) in winter, during spring calving, and during the summer when heat is a factor and during the time that elk need forage resources to gain weight and strength for fall breeding and winter survival.

Maximum open road density values are used to determine the probability (from 0 to 1) of how effective the habitat in a given HROGA is for elk, or habitat effectiveness (HE). Maximum road density is achieved in

summer, therefore HE gives a measure of summer habitat effectiveness. It is assumed that a road density of 0.0 miles per square mile of land has a HE of 1.0 (or is 100% effective). As open road density increases, HE decreases. HE and EUP are then multiplied together to represent a final measure of the effectiveness of an area as cover, or elk effective cover (EEC).

Forest Plan objectives and existing values for open road density, hiding cover, and elk effective cover for HROGA 42 are shown below (Table 12). Existing open road density was calculated using the Settlement Agreement method, wherein the effects of all open roads were considered at 100%, versus the Forest Plan Method, which discounts the effects of more primitive roads by 30 to 90%. Note, existing hiding cover far exceeds the objectives for the HROGA, whereas, open road densities, and therefore elk effective cover, do not meet the objectives.

Table 12: Elk Hunter Recreation Opportunity Area (EHROA) #18. Forest Plan (FP) objectives and existing condition for open road density, hiding cover, and elk effective cover (EEC).

HROGA	Acres	Maximum Open Road Density	Habitat Effectiveness (HE)	Hiding Cover % (Acres)	Elk Use Potential (EUP)	Elk Effective Cover (EEC)
HROGA 42						
Forest Plan Objective		0.65 mi/mi2	NA	35%	NA	66
Existing Condition	31,395	1.1 mi/mi2*	58	45%	99	57**

*55 mi./49 sq. miles
**EUP (99) x HE (58) = 57

Direct, Indirect, and Cumulative Effects to EEC

Dry, Douglas-fir/ponderosa pine cover types, such as the proposed treatment unit, do not typically provide elk hiding cover because of their low stem densities. Therefore, the proposed unit was not included in cover calculations. The project will not change open road density and therefore the existing EEC will be maintained. Thinning the understory will decrease stem densities further, however, vegetative screening will be maintained along the edges of grassland parks and in intermittent patches throughout the unit.

Security Method

During the hunting season, security areas on Forest Service lands are important to reduce the displacement of elk to adjacent private lands and to reduce the vulnerability of bulls to hunter-caused mortality (Christensen et al. 1993, Hillis et. al 1993). Security is defined as "the protection inherent in any situation that allows elk to remain in a defined area despite an increase in stress or disturbance associated with hunting season or other human activities." Suitable security habitat is defined as forested blocks greater than 250 acres in size located greater than 1/2 mile from an open road. As a general rule, 30% of summer/fall range should be comprised of suitable security areas.

Currently, the analysis area provides elk with 55% security (17,273/31,395 acres) distributed among two habitat blocks that range in size from 4,236 to 13,037 acres (Appendix A, Map 2). Elk security in the analysis area is well above the 30% recommended.

Proposed treatments and associated activities are located a mile from any security areas, therefore, direct, indirect, and cumulative impacts to existing elk security are not expected.

Winter Range

Proposed treatments are located above elevations where elk tend to winter (FWP 2004) and are not in or near any FP designated winter range (FP II-18). Expansive elk winter range areas are concentrated on private lands north and east of proposed activities. Given the above, effects to elk winter range are not expected.

Old Growth Forest Habitat

Forest Plan

The Deerlodge Forest Plan (II-26) defines old growth as "those [stands] that are past full maturity and are showing decadence. They most often have two or more layers or stories, eight or more trees per acre that are of large diameter for the site, and an age of 200 years or older on the largest trees."

The project would have no impact on existing old growth as no treatments are proposed in old growth stands (see Forest Vegetation Report). Small patches of old growth trees that did not qualify as an individual stand were surveyed within the unit boundary and were dropped from the final treatment unit as an extra precaution (*Ibid.*).

Proposed thinning in 140 acres of Douglas-fir will maintain the overstory, with 35% canopy closure, favoring ponderosa pine. The dominant size class in the overstory will not change.

Pileated Woodpecker – MIS for Old Growth Douglas-fir

Existing Condition

The pileated woodpecker functions as an indicator of Douglas-fir old growth forest habitats on the Pintler Ranger District. It is a locally common resident of western Montana, but is thought to have become less common in areas where extensive agricultural or logging practices have eliminated large tracts of old growth forests (DeGraaf et al. 1991).

Being the largest woodpecker in North America, the species requires large (greater than 15" in diameter) dead trees for nesting and feeds primarily on insects in standing or downed deadwood (Bull et al. 1997). The pileated woodpecker plays an important ecological role by excavating nest cavities that are later used by other birds and small mammals (Thomas et al. 1979) and by feeding on forest insect pests (Bull et al. 1997).

Habitat for this species is detailed in the flammulated owl section above. The analysis area provides the woodpecker with 29,933 acres of Douglas-fir dominant cover types, 28,387 (95%) of which is comprised of mature and old growth. FIA estimates show 20% of the landscape is comprised of old growth (Bush and Leach 2003)

Direct and Indirect Effects

Thinning treatments will occur in 140 acres of 28,387available to the woodpecker. Treatments will occur outside the nesting period, and will maintain the largest available trees in the overstory and all snags greater than 10".

Cumulative Effects for Pileated Woodpecker

Refer to the goshawk and flammulated owl sections for cumulative effects to Douglas-fir habitats. Since the project will not change the amount or distribution of mature or old-growth Douglas-fir, cumulative effects to Pileated are not are not anticipated.

Determination for Pileated Woodpecker

No direct, indirect or cumulative effects are anticipated for the pileated woodpecker therefore impacts on the woodpecker or its viability are not expected.

Snag/Cavity Habitat

Forest Plan Standards

The Forest Plan calls for leaving an average of 3 snags per acre, in 5-acre clusters, in each timber compartment. Systematic snag inventories on a compartment-wide basis have not been completed. Forest Inventory and Analysis (FIA) data was used to estimate large snags (> 10 inches dbh) in the analysis area by dominant tree species (Bush and Leach 2003). The average for the Clark Fork Flints landscape that encompasses the analysis area is 6.28 per acre with a 90% confidence interval of 3.09 to 9.96, and the average Forest-wide is 9.78 with a 90% confidence interval of 8.09 to 11.54 snags per acre, both estimates of which exceed Forest Plan standards and meet Region One management recommendations (USDA-FS 2000).

The project will maintain existing snag densities by maintaining all snags > 10 inches dbh in thinned units leaving the largest available trees in the upper canopy for natural snag recruitment. Refer to the black-backed woodpecker section for a more detailed analysis of direct, indirect and cumulative impacts to snag habitat.

Table 13. Forest inventory and analysis Forest snag density estimates by dominant tree species (Bush and Leach 2003).

COVER TYPE	AVERAGE NUMBER OF SNAGS/ACRE ≥ 10"			PLOT FREQUENCY	
	90% CI LOWER BOUND	POINT ESTIMATE	90% CI UPPER BOUND	NUMBER OF PLOTS (NUMBER OF SUBPLOTS)	PERCENT OF THE PLOTS
Subalpine- fir	17.29	25.47	34.67	51 (255)	9.34
Englemann Spruce	12.05	17.17	22.69	50 (250)	9.16
Lodgepole Pine	3.37	5.02	6.85	179 (895)	32.78

COVER TYPE	AVERAGE NUMBER OF SNAGS/ACRE ≥ 10"			PLOT FREQUENCY	
	90% CI LOWER BOUND	POINT ESTIMATE	90% CI UPPER BOUND	NUMBER OF PLOTS (NUMBER OF SUBPLOTS)	PERCENT OF THE PLOTS
Douglas-fir	2.14	3.65	5.35	106 (530)	19.41

Species of Special Concern

The Montana Natural Heritage Program maintains a database that tracks known occurrences of plants and animals that are rare, threatened, or thought to have limited distributions in Montana. These species often have federal status under the Endangered Species Act or the National Forest Management Act (i.e., "sensitive" species) or other federal laws or policies. Species that are considered rare, threatened, or of limited distribution, but not protected by federal laws or policies, are considered "species of special concern". Although no state regulations or policies deal specifically with species of special concern, a number of statutes imply consideration for their protection. The Deerlodge National Forest Plan (Forest Plan) (USDA Forest Service 1987) requires that species of special concern and their habitat be identified and protected to the extent practicable. The Great Gray Owl is the only species of concern in the analysis area.

Great Gray Owl

Great gray owls have been documented in the analysis area and are an expected local favorite for wildlife viewers because of their docile nature. Great gray owls nest in forests similar in structure to goshawks and often use goshawk stick nests. They begin egg laying around three weeks prior to goshawks and can effectively defend the nest area from goshawks. Their hunting strategies differ in that Great Grays feed on mice and vole species found in forest meadow ecotones, whereas goshawks take larger prey (snowshoe hare, grouse species, ground squirrel species, etc. Habitats for Great Gray Owls are quantified in the goshawk section above, and direct, indirect and cumulative impacts would be similar.

/s/ Lorraine Brewer *January 11, 2007*
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LITERATURE CITED

Arnett, E.B., B. Altman, and W.P. Erickson. 1997a. Relationships between salvage logging and forest forest avifauna in lodgepole pine forests of the central Oregon Pumice Zone. Unpubl. 1996 annual report to the Weyerhaeuser Co., Springfield, OR.

Arnett, E.B., B. Altman, and W.P. Erickson. 1997b. Effects of salvage logging on neotropical migratory landbirds in lodgepole pine forests of central Oregon: 1997 preliminary results. Unpubl. report to the Weyerhaeuser Co., Springfield, OR.

Banci, V. 1989. A fisher management strategy for British Columbia. Victoria, British Columbia: British Columbia Ministry of the Environment, Lands and Parks, Wildlife Branch. Wildlife Bulletin No. B-63.

Banci, V. 1994. Wolverine *In* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech. eds. American marten, fisher, lynx, and wolverine: The scientific basis for conserving forest carnivores in the western United States. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. General Technical Rep RM-254, pp. 99-127

Boyd, D.K. and D.H. Pletscher. 1999. Characteristics of dispersal a colonizing wolf population in the central rocky Mountains. Journal of Wildlfie Management in Press.

Bock, C.E. and J.F. Lynch. 1970. Breeding bird populations of burned and unburned conifer forest in Sierra, NV. Condor 72:182-189.

Bull, E.L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR. Res. Note PNW-444. 19 p.

Bull, E.L., C.G. Parks, and T.R. Torgersen. 1997. Trees and logs important to wildlife in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-391. Portland, OR: USDA, Forest Service, Pacific NW Res. Sta. 55p.

Bush, R. and A. Leach. 2003. Detailed estimates of old growth and large snags on the Beaverhead-Deerlodge National Forest. Unpublished Report. 5 pp.

Christensen, A.G., L.J. Lyon, and J.W. Unsworth. 1993. Elk management in the Northern Region: consideration in forest plan updates or revisions. Gen. Tech. Rep. INT-303. Ogden, UT. USDA, For. Ser., Intermountain Res. Sta. 10p.

Clough, L. T. 2000. Nesting habitat selection and productivity of northern goshawks in west-central Montana. Missoula, MT: University of Montana. M.S. Thesis. 87 pp.

Coffin, K.W. 1994. Population characteristics and winter habitat selection by pine marten in southwestern Montana. M.S. Thesis, Montana State Univ., Bozeman. 94 p.

Copeland, J. 1996. Biology of the wolverine in central Idaho. M.S. Thesis, Univ. of Idaho, Moscow, ID. 138 p.

Cunningham, J.B., R.P. Balda, and W.S. Gaud. 1980. Selection and use of snags by secondary cavity-nesting birds of the ponderosa pine forest. USDA, Forest Service Res. Paper RM-222. 15 p. Rocky Mountain Forest and Range Exp. Sta., Fort Collins, Co.

DeGraaf, R.M., V.E. Scott, R.M. Hamre, L. Ernst, and S.H. Anderson. 1991. Forest and rangeland birds of the United States. USDA Forest Service Agric. Handbook 688. 625 pp.

Dixon, R.D. and V.A. Saab. 2000. Black-backied woodpecker (*Picoides arcticus*) *In* the birds of North America, No. 509 (A. Poole and F. Gill, eds). The Birds of North America, Inc. Philadelphia, PA.

Dobkin, D.S. 1994. Conservation and management of Neotropical Migrant Landbirds in the northern Rockies and Great Plains. Univ. of Idaho Press, Moscow, ID. 220 p.

Duncan, J. R. and P.H. Hayward. 1994. Review of technical knowledge: Great Gray Owl. *In:* Hayward, G.D. and J. Verner, tech. Editors. 1994. Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Pp. 159-175.

Faaborg, J.; M. Brittingham; T. Donovan; J. Blake. 1993. Habitat fragmentation in the temperate zone: a perspective for managers. pp 331-338. in : Finch, D.M.; Stangel, P.W. eds. Status and management of neotropical birds; 1992. Sept. 21-25; Estes Park, CO. Gen. TEch. Rep. RM-229, Fort Collins, CO: USDA, For. Serv., Rocky Mountain For. and Range Exp. Sta. 422 p.

Green. P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-growth forest types of the Northern Region. R1 SES 4/92.

Greenwald, N.D., D. Coleman Crocker-Bedford, L. Broberg, K.F. Sucklin, and T. Tibbitts. 2005. A review of northern goshawk habitat selection in the home range and implications for forest management in the western United States. Wildlife Society Bulletin.

Habeck, J.R. 1990. Old-growth ponderosa pine-western larch forest in western Montana: ecology and management. The Northwest Environmental Journal. 6:271-292. Univ. of Washington. Seattle, WA.

Hamann. B., H. Johnston, J. Gobielle, M. Hillis, S. Johnson, L. Kelly, P. McClelland. 1999. Birds, Chapter 3, *in* effects of recreation on rocky mountain wildlife: a review for Montana, Montana Committee on Effects of Recreation on Wildlife, Montana Chapter of the Wildlife Society, 307 p.

Harris, R.B. 1999. Abundance and characteristics of snags in western Montana forests. Gen. Tech. Rep. RMRS-GTR-31. Ogden, UT: USDA. Forest Service, Rocky Mountain Research Station. 19 pp.

Hart, M.M., W.A. Williams, P.C. Thornton, K.P. McLaughlin, C.M. Tobalske, B.A. Maxell, D.P. Hendricks, C.R. Peterson, and R.L. Redmond. 1998. Montana atlas of terrestrial vertebrates. Unpublished report. Montana Cooperative Wildlife Research Unit, The University of Montana, Missoula. MT. 1302 p.

Hendrickson, P. and B.A. Maxell. 2005. Bat surveys on USFS Northern Region lands in Montana, prepared for USDA For. Serv. Northern Region, Agreement #05-CS-11015600-033, by the Montana Natural Heritage Program, Helena, MT.

Heinemeyer, K.S. 1993. Temporal dynamics in the movements, habitat use, activity, and spacing of reintroduced fishers in northwestern Montana. M.S. Thesis, Univ. of Montana, Missoula, MT. 158 p.

Heinemeyer, K.S., and J.L. Jones. 1994. Fisher biology and management in the western United States: a lieterature review and adaptive management strategy. U.S. Forest Service, Northern Region, Missoula, MT. 108. p.

Heinemeyer, K.S., B.C. Aber, and D.F. Doak. 2001. Aerial surveys for wolverine presence and potential recreation impacts to predicted wolverine denning habitats in the southwestern Yellowstone Ecosystem. Unpubl. Report. Univ. of California, Santa Cruz Dept. of Environmental Studies. 33pp.

Hejl, S.J., R.L. Hutto, C.R. Preston; and D.M. Finch. 1995. Effects of silvicultural treatments in the Rocky Mountains. pp 220-244: in : T.E. Martin and D.M. Finch, eds. Ecology and management of neotropical migrant birds - A synthesis and review of critical issues. Oxford Univ. Press. New York.

Hillis, J.M., M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. McCleerey. 1991. Defining elk security: the Hillis paradigm. Pages 38-63 in A.G. Christensen, L.J. Lyon, and T. N. Lonner (compilers). Proceedings of elk vulnerability - a symposium, Montana State University, Bozeman.

Hillis, M., L. Clough, and D. Lockman. 2003. U.S. Forest Service Region One northern goshawk assessment. Unpubl. Report, USDA Forest Service, Missoula, MT. 13 pp.

Hornocker, M.G. and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Canadian Journal of Zoology. 59:1286-1301.

Hutto, R.L. 1995. Distribution and habitat relationships. USFS Northern Region Songbird Monitoring Program, contract # R1-95-05. Second Report. Univ. of Montana, Missoula. 120 pp.

Hutto, R.L., and J.S. Young. 1999. Habitat relationships of landbirds in the Northern Region, USDA Forest Service. Rocky Mountain Range and Experiment Station, Ogden, UT. Gen. Tech. Rep. RMRS-GTR-32. 72 pp.

Hutto, R.L., S.J. Hejl, C.R. Preston, and D.M. Finch. 1993. Effects of silvicultural treatments on forest birds in the Rocky Mountains: Implications and management recommendations. pp 386-391. in :Finch, D.M.; Stangel, P.W. eds. Status and management of neotropical birds; 1992. Sept. 21-25; Estes Park, CO. Gen. Tech. Rep. RM-229, Fort Collins, CO: USDA, For. Serv., Rocky Mountain For. and Range Exp. Sta. 422 p.

Jensen, W.F., T.K. Fuller, and W.L. Robinson. 1986. Wolf, *Canis lupus*, distribution on the Ontario-Michigan border near Sault Ste. Marie. Can. Field. Natur. 100:363-366.

Jones, J.L. 1991. Habitat Use of fisher in northcentral Idaho. M.S. Thesis, Univ. Idaho, Moscow, ID. 146 p.

Kirkley, J. 1998 through 2004. A study of northern goshawk *Accipiter gentilis* in southwestern Montana: Summary of findings for 1998. Unpubl. Reps. Dept. of Environmental Sciences, Univ. of Montana-Western, Dillon, MT.

Koehler, G.M., and K.B. Aubry. 1994. *In:* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon and W. J. Zielinski, tech. eds. 1994. The scientific basis for conserving forest carnivores: american marten, fisher, lynx and wolverine in the western United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 p.

Kujala, Q. J. 1993. Pine marten populations and habitat relationships in southwest Montana. M.S. Thesis. Montana State Univ., Bozeman 58 p.

Maj, M. 1995. In: Range permit issuance, trumpeter swan. Region 1, USDA Forest Service, Missoula, MT. 5pp.

Maj, M. and K. Torquemada. 1995. American peregrine falcon. Species profile, USDA Forest Service, Region One, Missoula, MT.

McCallum, D.A., Gehlbach, F.R., Webb, S.W. (in review) Natural history of the flammulated owl (*Otus flammeolus*) in western New Mexico. Wilson Bulletin, 1994.

McGrath, M.T., S. Destefano, R.A. Riggs, L.L. Irwin, and G.J. Roloff. 2003. Spatially explicit influences on northern goshawk nesting habitat in the interior Pacific Northwest. Wildlife Society Monograph 154.

Mech, L.D. 1989. Wolf population survival in an area of high road density. Am. Midl. Nat. 121:387-389.

Montana Bird Distribution Committee. 1996. P.D. Skaar's Montana bird distribution, fifth edition. Special Publication No. 3. Montana Natural Heritage Program, Helena, MT. 130 pp.

Montana Fish, Wildlife, and Parks. 1996. Transmittal letter from MFWP Region 3 Director with attached historic carnivore harvest and occurrence data collected by MFWP from 1977 through 1996. Bozeman, MT.

Montana Fish, Wildlife, and Parks. 2002, 2003, 2004. Furbearer survey across license years, summary report: trapping, hunting, and harvest, license years 1996 to 2000, 2002, and 2003. http://fwp.state.mt.us/hunting/ planahunt/harvestreports.html#furbearer

Montana Fish, Wildlife and Parks. 2004. Draft State Elk Management Plan for Montana, Wildlife Division, Helena, MT.

Montana Natural Heritage Program. 2004. Montana animal field guide (for Montana federally listed threatened, endangered, Forest Service Region One Sensitive, and Deerlodge National Forest management indicator species). http://nhp.nris.state.mut.us/animalguide/speciesDetail.

Patla, S.M. 1997. Nesting ecology and habitat of the northern goshawk in undisturbed and timber harvest areas on the Targhee National Forest, Greater Yellowstone Ecosystem. M.S. Thesis, Idaho State Univ., Pocatello, ID. 164pp.

Powell, R.A., and W.J Zielinski. 1994. Fisher *In:* Ruggiero, Leonard, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech. eds. 1994. American marten, fisher, lynx, and wolverine: The scientific basis for conserving forest carnivores in the Western United States. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. General Technical Report RM-254. pp. 38-73.

Raphael, M.G., and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. Wildlife Monographs 86. 66 p.

Reichel, J. D. and S. G. Beckstrom. 1996. Northern bog lemming survey: 1992. Montana Natural Heritage Program. Helena, MT. 64 p.

Reynolds, R.T., E.C. Meslow, and H.M. Wight. 1982. Nesting habitat of coexisting *Accipiter* in Oregon.. J. Wildl. Mange. 46(1):124-138.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the Northern Goshawk in the southwestern United States. USDA For. Serv. Gen. Tech. Rep. RM-217. 90pp.

Reynolds, R.T., Linkhart, B.D. 1992. Flammulated owls in ponderosa pine: evidence of preference for old growth. Pages 166-169 In: Old growth forests in the southwest and Rocky Mountain regions: proceedings of a workshop. USDA Forest Service Gen. Tech. Rep. RM-213.

Reynolds, R.T., R.T. Graham, and D.A. Boyce. 2005. Habitat conservation of the northern goshawk in the southwestern united states: response to Greenwald et al., report dated December 18, 2005, submitted part of an appendix to an environmental impact statement, Southwestern Region, U.S. For. Serv., Alberqueque, NM.

Ruediger, B. 1996. The relationship between rare carnivores and highways *in* transportation and wildlife: reducing wildlife mortality and improving wildlife passageways across transportation corridors. Proceedings of the Florida Department of Transportation/Federal Highway Administration Transportation-Related Wildlife Mortality Seminar. pp. 24-38.

Ruediger, B. and J.L. Jones. 1994. Fisher conservation strategy for the western United States. (Fisher istribution map on file in the Butte Ranger District Office.)

Ruediger, Bill, Jim Claar, Steve Mighton, Bob Naney, Tony Rinaldi, Fred Wahl, Nancy Warren, Dick Wenger, Al Williamson, Lyle Lewis, Bryon Holt, Gary Patton, JoelTrick, Anne Vandehey, and Steve Gniadek. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Bureau of Land Management, USDI Fish and Wildlife Service and USDI National Park Service. 120 pp.

Ruggiero, L.F., Aubry, K.B., S.W. Buskirk, L.J. Lyon, W.J. Zielinski, tech. eds. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. USDA Forest Service Gen. Tech. Rep. RM-254. 183 p.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. Ecology and Conservation of Lynx in the United States. U.S. Forest Service, Rocky Mountain

Forest and Range Experiment Station, Fort Collins, CO. General Technical Report RMRS-GTR-30WWW, pp. 207-227.

Ruggiero, L.F., John R. Squires, and Todd J. Ulizio. 2001. Distribution of forest carnivores in southwest Montana. 2000-2001 Annual Progress Report. USDA Forest Service, Rocky Mountain Research Station. Missoula, MT.

Ruggiero, L.F., John R. Squires and Scott Tomson. 2002. Distribution of forest carnivores in southwest Montana. Annual Progress Report, Winter 2002. USDA Forest Service, Rocky Mountain Research Station. Missoula, MT.

Samson, F.B. 1992. Conserving biological diversity in sustainable ecological systems. Transactions of the North American Wildlife and Natural Resources Conference 52: 308-320.

Samson. F.B. 2006. A conservation assessment of the northern goshawk, black-backed woodpecker, flammulated owl, and pileated woodpecker in the Northern Region, Unpublished Report on File, USDA For. Serv., Missoula, MT.

Squires, J.R. and R.T. Reynolds. 1997. Northern Goshawk. No. 298. In The Birds of North America. The Acadamy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washingto, DC.

Squires, J.R., T.J. Ulizio, L.F. Ruggiero. 2003. Carnivore studies in the Pioneer Mountains and adjacent mountain ranges of southwest Montana. Unpubl. Final Report. USDA Forest Service, Rocky Mountain Research Station. Missoula, MT. 61 pp.

Unsworth, J.W.; Kuck, L.; Scott, M.D.; Garton, E.O. 1993. Elk mortality in the Clearwater drainage of northcentral Idaho. Journal Wildl. Manage. 57(3):495-502.

USDA Forest Service. 1987. Forest Plan Deerlodge National Forest, Butte, MT.

USDA Forest Service. 1996. Peregrine falcon nesting habitat inventory and survey report. U.S. Forest Service, unpubl. rep., Beaverhead-Deerlodge National Forest, Dillon, MT. 22. p.

USDA Forest Service. 2000. Northern Region snag management protocol. USDA, Forest Service, Missoula, MT. Unpublished. 34 p.

USDA Forest Service. 2001. The distribution, life history, and recovery objectives for region one terrestrial wildlife species. July, 2001. USDA For. Serv., Region One, Missoula, MT.

USDA Forest Service. 2001a. Discovery Ski Area final environmental impact statement, Beaverhead-Deerlodge National Forest, April 2001, USDA For. Serv., Region One, Dillon, MT.

USDA Forest Service. 2005. Sensitive Species List, USDA For. Serv., Region One, Missoula, MT.

USDA Forest Service. 2005a. Draft survey of the frequency of northern goshawk presence in the Northern Region during 2005, USDA For. Serv., Region One, Missoula, MT

USDA Forest Service. 2005b. Montana forest insect and disease conditions and program highlights. USDA Forest Service, Region One, Forest Health Protection Report 06-1, Missoula, MT.

USDI Fish and Wildlife Service. 1986. Recovery Plan for The Pacific Bald Eagle. U.S. Fish and Wildlife Service, Portland, OR. 160 p.

USDI Fish and Wildlife Service. 1987. Northern Rocky Mountain Wolf Recovery Plan. U.S. Fish and Wildlife Service, Denver, CO. 119 p.

USDI Fish and Wildlife Service. 1996. Gray wolf Fish and Wildlife information exchange data sheet. U.S. Fish and Wildlife Service, Denver, CO. 34 p.

USDI Fish and Wildlife Service. 2005. List of proposed, threatened, and endangered species present by county on the Beaverhead-Deerlodge National Forest. Letter from USDI Fish and Wildlife Service Director, Helena, MT to the Beaverhead Deerlodge National Forest Supervisor, Dillon, MT.

Weaver, J.L., P.C. Paquet, and L.F. Ruggiero. 1996. Resilience and conservation of large carnivores in the Rocky Mountains. Conservation Biology, 10:964-976.

Warren, N.L. 1990. Old growth habitats and associated wildlife species in the northern Rocky Mountains. Unpubl. Report. U.S. Department of Agriculture, Forest Service, Northern Region, Missoula, Montana. 47 pp.

Wittmer, G.W., S.K. Martin, and R.D. Sayler. 1998. Forest carnivore conservation and management in the interior Columbia basin: issues and environmental correlates. Gen. Tech. Rep.PNW-GTR-420. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 51 p. (Quigley, Thomas M., ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Wright, M. and R.E.F. Escano. 1986. Montana bald eagle nesting habitat macro-habitat description. USDA, Forest Service, Missoula, MT. 24 pp..