APPENDIX D
Viability Assessment for Species of Special Concern on the Gallatin National Forest

Applicable Laws, Regulations, Policy and Forest Plan Goals

Various laws, regulations, and policies direct the Forest Service to assess population viability for wildlife species. Similarly, Management Indicator Species (MIS) require specific attention in wildlife monitoring programs and project-level analyses. These issues are addressed, in part, in Biological Assessment and Evaluations, documents that often contain the most current species-specific population and habitat data. This document will provide a general discussion of population viability for species of special concern on the Gallatin Forest.

The National Forest Management Act (NFMA) of 1976 and the subsequent 1982 planning rule mandate the maintenance of viable populations of all native and desired non-native species of vertebrates (36 CFR 219.19). In addition, the Gallatin Forest Plan (p. I I-1) states a Forest-wide goal of providing habitat for viable populations of all indigenous wildlife species. A viable population is defined as "one which has the appropriate estimated numbers and distribution of reproductive individuals….that habitat must be well distributed so that those individuals can interact with others in the planning area" (NFMA). The planning area has been defined as the area covered by the Land and Resource Management Plan. The Act also states that 'fish and wildlife *habitat* shall be managed to maintain viable populations….".

MIS are selected in order to 'indicate the effects of management activities' [CFR 219.19(a)(1)]. The populations of these species are to be monitored in relation to habitat change. This is very different from the viability requirement.

INTRODUCTION

The Forest Service, Region 1, uses several different strategies to ensure that NFMA viability constraints are met (Table 1). For sensitive species with fairly broad habitat requirements, the best approach involves determining species-specific habitat needs and then comparing habitat availability between historic and contemporary conditions. This is considered a coarse filter approach. Maintaining vegetative communities and ecological processes is key to protecting the viability of native species populations. Species may be at risk if there is a decrease in available habitat. Therefore, habitat restoration is usually the best recourse in these circumstances.

Conversely, for rare species that have very narrow and specific habitat requirements a fine filter approach is used. Ideally, a Population Viability Analysis (PVA) should be conducted for these species; however, data are seldom sufficient to accomplish this. Alternatively, factors that negatively affect a species are identified, the amount of habitat a species needs for its continued existence are determined, and/or management actions to restore a species are developed.

For federally listed species, a different strategy is used. The Endangered Species Act of 1973 (ESA) directs the U.S. Fish and Wildlife Service to identify recovery goals that would, when met, allow a species to be removed from the list of threatened and endangered species. While the language in ESA doesn't necessarily equate recovery with viability, it is assumed that meeting the recovery goals and dropping a species from the list is the first step towards maintaining long-term species viability.

Table 1. Approaches to viability analysis.

Species with fairly broad habitat requirements- changes in habitat availability over time are quantified (coarse filter approach).
Examples: Black-backed woodpecker (forest that have recently burned or have insect/disease outbreaks) Wolverine (high elevation, cirque basins, spruce/fir forest) Goshawk (mature and old forest) Pine marten
Species with narrow habitat requirements- habitat protection measures are identified (fine filter approach)
Examples: Townsend's big-eared bat (caves and mines) Peregrine falcon (cliffs near water) Northern leopard frog (surface water) Boreal toad (surface water) Harlequin duck (clear, rushing streams)
T&E species with recovery plans or conservation strategies, goals and/or standards
Examples: Grizzly bear Lynx Wolf Bald eagle

APPROPRIATE SCALE OF ANALYSIS

For species with a broad global distribution, such as the Canada lynx or grizzly bear, consistency with species viability strategies can seldom be addressed on small scales. Project areas are invariably too limited to determine whether or not management actions are consistent with sustaining population viability. Consequently, large-scale analyses are usually required. Planning units (usually homologous with National Forest boundaries) are a more logical scale at which to make these determinations.

MULTIPLE SCALE ANALYSES

It is also important to assess consistency with strategies for maintaining species viability at multiple scales. For instance, large natural events, such as wildfires, may make it impossible to meet recovery goals or management strategies on small landscapes. However, analysis at larger scales may reveal that such events will have an overall beneficial effect and therefore are consistent with recovery objective

For example, almost any project on the Gallatin National Forest, south of Interstate-90, lies within current grizzly bear habitat. The grizzly bears occurring in this area are part of the Yellowstone Area population. Therefore, it is appropriate to address grizzly bear status throughout this ecosystem when analyzing the effects of Gallatin Forest projects. For bald eagles, which are more broadly distributed, it is appropriate to look at even larger scales such as the western states or Montana.

SPECIES GIVEN DETAILED MULTI-SCALED DISCUSSION

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The grizzly bear, bald eagle, black-backed woodpecker, lynx, wolverine, and goshawk are potentially all affected by broad scale changes in the landscape, including natural processes and human disturbances. They will receive detailed discussion in this analysis.

Species occupying microsites or affect by human disturbance activities that may be unrelated to the particular project include –

The Townsend's big-eared bat, peregrine falcon, northern leopard frog, boreal toad and harlequin duck, either occupy microsites and/or are affected by very specific types of human disturbance. For example, the Townsend's big-eared bat is closely associated with caves and mines, the peregrine falcon requires cliffs for nesting, the harlequin duck requires rushing streams and the northern leopard frog needs surface water. Therefore, none of these species are affected by large-scale vegetative projects as long as water quality laws are obeyed. For these reasons, projects involving vegetation alteration rarely compromise population viability for this species group.

Grizzly Bear

There are several grizzly bear recovery areas in Region 1 of the US Forest Service and population recovery goals and criteria are different for each. Gallatin National Forest grizzly bears are part of the Yellowstone Ecosystem population. Population recovery criteria for the Yellowstone grizzly are addressed in a Conservation Strategy completed in March 2003.

Recovery Criteria

Rather than using a specific bear population size as the determinant for delisting the Yellowstone ecosystem grizzly bear, the following criteria are used to gauge population recovery. They must be met for delisting to occur.

1. Fifteen females with cubs-of-the-year (COY) must be observed over a six-year running average inside the Recovery Zone and within 10 miles of the Recovery Zone.
2. Females with young must occupy 16 of 18 Bear Management Units on a six-year sum of verified sightings and evidence and no 2 adjacent BMUs can be unoccupied
3. Known human-caused mortality cannot exceed 4% of the population estimate based on the most recent three-year sum of females with COY
4. -No more than 30% of the mortality can consist of females. Mortality limits cannot be exceeded during any consecutive years.

These recovery parameters were met in 1995, 1998, and 1999 (ICST 2000 pp. 11,14,21).
The number of females with cubs-of-the-year (COY) has exceeded the recovery criterion for a number of years (ICST 2000 p. 11). Distribution has varied. and occasionally sows with young were not counted in adjacent BMU's. Mortality levels have been higher than allowed by the recovery criterion in most recent years.

Population Size and Distribution

The exact size of the grizzly bear population in the Yellowstone area is not known, and several interpretations exist for the status of the population. Recent population estimates (USGS 1999; Eberhardt and Knight 1996) describe a minimum of 344 bears and a range of 245 to 390, respectively. Eberhardt et al. (1996) and Boyce (1995) believe the Yellowstone grizzly population is growing at about 3 to 4 percent per year, but Pease and Mattson (1999) disagree. The best information suggests that the Yellowstone population is stable and may be increasing.

The number of sows with COY is well above the recovery criterion, and bears are appearing in locations where they have not been seen for many years. The number of sows with COY has been well above the recovery criterion. The 6-year running average of sows with COY has gradually increased from 13 in 1984 to 28 in 1999 (USGS 2000 p. 11). The highest annual count of sows with COY was 35 in 1998. Litter size has also shown a slight increase (*USGS 2000 p. 11*).

The distribution of grizzly sows with young is tracked each year. In the last few years, the number of BMUs occupied by sows with young has ranged from 12 to 17 (ICST 2000; see Table 2).

BMU's with yearly occupancy from 1994 to 1999 include Gallatin, Lamar, Shoshone, South Absaroka, Two Ocean/Lake, Thorofare, and Buffalo/Spread Creek. Other BMUs were occupied for varying years during this time period with Hellroaring/Bear and Plateau having the least number of years occupied by sows with COY.

Table 2. BMUs and Subunits by Forest, 1999 Confrontations andCconflicts, and 1994-99 occupancy by sows with COY, and Subunits in Need of Access Reduction.

BMUs all or partially on National Forests	Subunits	Forest	in need of improvement (reduced mot. access route density)	# bear/human confrontations in 1999 by BMU[1]	# bear/ human conflicts in 1999 by BMU[2]	Years ('94-'99) occupancy by sows w/ coy by BMU
Hilgard	1 2	GNF/B-D GNF		7	0	94,95,97,99
Gallatin	3	GNF	Y	21[3]	18[4]	all
Hellroaring/ Bear	1 2	GNF GNF		4	3	97,99
Boulder/ Slough	1 2	GNF GNF		3	0	95,96,97,99
Crandall/ Sunlight	1 2 3	GNF/SNF SNF SNF		0	0	95,97,98,99
Lamar	1	GNF/SNF		5	2	all
Shoshone	1 2 3 4	SNF SNF SNF SNF		1	0	all
South Absaroka	1 2 3	SNF SNF SNF		0	1	all
Two Ocean/Lake	1 2	B-T B-T		13[5]	0	all
Thorofare	1 2	B-T B-T		0	0	all
Buffalo/Spread Creek	1 2	B-T B-T		1	0	all
Bechler/Teton	1	B-T/T-C		0	11[6]	96-99
Plateau	1 2 3	T-C T-C T-C/GNF	Y Y	0	0	94,99
Henry's Lake	1 2	T-C T-C/GNF	Y Y	0	2	95,97,98
Madison	1 2	GNF GNF	 Y	11[7]	4	94,97,98,99

[1] Bear/human confrontations include aggressive encounters, bear approaching humans, bear in camp, bear in development and other.
[2] Bear/human conflicts include human injuries, property damage, anthropogenic foods, gardens/orchards, beehives, and livestock depredation.
[3] Comprised of 5 aggressive encounters, 1 bear approach, 3 bear in camp, 12 bear in development.
[4] Comprised of 2 human injuries, 5 property damage, 4 anthropogenic foods, 3 gardens/orchards, and 4 livestock depredation.
[5] Comprised of 2 bear in camp and 11 bear in development.
[6] Comprised of 11 livestock depredations.
[7] Comprised of 3 aggressive encounters, 1 bear in camp, and 7 bears in development.

Grizzly Bear Conflicts, Confrontations and Mortality

Gunther (USGS 2000 p. 68) reported 96 grizzly bear/human confrontations (aggressive encounters) in the Yellowstone area in 1999 (Table 4). Almost half of these (46) were bears entering developed areas, 29 were bears acting aggressively but not injuring people, of these 13 involved bears entered occupied backcountry camps, 5 where bears that approached or followed people, 2 were bears frequenting private ranch lands, and 1 involved a bear claiming a hunter killed animal. Most (89%) of these confrontations occurred on public land with 11% on private land. Only 14% occurred outside the Recovery Zone.

The Gallatin BMU accounted for 25% of the confrontations. Two Ocean/Lake and Madison BMUs were the next highest in number of confrontations. A majority of these incidents were in developments such as campgrounds. (Confrontations in the state of Wyoming outside of Yellowstone National Park are not recorded.)

Grizzly bear/human conflict situations (includes human injury, property damage, livestock depredation, damaged beehives, anthropogenic foods being obtained or damaged, or orchard fruits and vegetables being obtained) were recorded 113 times in 1999 (USGS 2000 p. 68; see Table 4). The Gallatin BMU had the most conflicts and Bechler/Teton had the second most. The conflicts were mixed in the Gallatin BMU but were all livestock depredations in the Bechler/Teton. The number of bear/human conflicts in Montana appears to be increasing with approximately 60% occurring on public land and 40% on private land. Due to an increasing number of human numbers and activities, and an expanding grizzly bear population, bear/human confrontations are likely to increase rather than decrease (USGS 2000 pp. 92-93).

Grizzly bear mortalities can occur from a variety of causes, including intra-specific predation and, more rarely, from disease, parasites, and/or starvation. Mortality can also result from interactions with human, especially when bears frequent areas where they may have found human related foods or during encounters with armed humans. Human-caused mortality can also be due to mistaken identity by black bear hunters, management control actions, poaching, defense of life or property, etc. Natural mortality is extremely difficulty to quantify, while human-caused mortality is more easily documented.

The Interagency Grizzly Bear Study Team (IGBST 2000, pp. 1-2) reported known human caused mortalities of grizzly bears in the Yellowstone area from 1992 to 1998. Of the 58 man-caused bear mortalities, 43% were hunting related, 10% were poaching, 28% were food conditioned bears, 7% were related to protecting livestock, and 12 % were accidental deaths. Mortality has more than doubled in recent years with most of the bear deaths being self-defense in the fall by big game hunters. The conflicts with humans often occur in poor natural food years for bears. Livestock conflicts were independent of natural food availability. Human conflicts peak in September, while livestock conflicts peak in August. Mortality trends associated with human garbage and property damage have not changed appreciably from 1985-98. In the case of bears that have been translocated,
they may be killed in locations other than where the conflict with humans occurred.

A summary of the known and probable grizzly bear mortalities throughout the Greater Yellowstone Area (GYA) from 1975-2000 is presented in Table 3. These data indicate mortalities in five categories: poached/malicious, hunting related, habituation/aggression, livestock related, and accidental. Mortalities in the poached/malicious category accounted for 22% of the bear mortalities, while 26% was attributed to hunting, 27% to habituation/aggression, 12% to protecting livestock and 13% to accidental deaths. Most of the poaching, malicious killings, hunting related and livestock related mortalities occurred, as expected, on the national forests surrounding the Parks. Livestock related bear mortalities were also fairly high on private land in Montana. Most of the mortalities in the habituated and aggression categories occurred in Yellowstone National Park and private land in Montana, while most of the accidental mortalities were specific to Yellowstone National Park. Twenty

percent of the bear mortalities occurred on private land, 63% on national forests, 16% in national parks, and less than 1% on state land.

Table 3. Known and probable grizzly bear mortalities by reason and land ownership from 1975-2000 (excluding natural causes, unknown causes and humane removals).

Jurisdiction	Poached/malicious	Hunting related	Habituation/aggression	Livestock related	Accidental	Total
Gallatin	10	12	7		4	33
B-D				1		1
Shoshone	11	13	5	3	3	35
B-T	15	22	3	1		41
Targhee	3	1		10	1	15
YNP	1		16		12	29
GTNP/RMP		1	1	1		3
State MT					1	1
State WY						0
State ID						0
Private MT	2	3	15	8	2	30
Private WY			5		2	7
Private ID	1		2			3
Total	43	52	54	24	25	198

The fact that most recovery criteria have been met or exceeded indicates a favorable status for the Yellowstone grizzly bear population. However, a documented increase in mortality rates is one cause for concern, although this is not unexpected given that the population is increasing in numbers and distribution. As a consequence of these favorable indicators, delisting of the grizzly bear is being discussed. The Conservation Strategy ensures that important measures are in place to protect the bear after delisting. The actions of the Gallatin National Forest are consistent with and promote grizzly bear recovery both on the Forest and in the GYA.

Bald Eagle

Bald eagles are rapidly increasing in Region 1 of the U.S. Forest Service and the population has met recovery criteria in the 7 western states (800 pairs), including Montana. Bald eagles are easily detected. Therefore there is confidence in these population estimates.

The Montana Bald Eagle Management Plan (1994, pp. 12-20) provides direction for recovery of this species. Recovery standards are met by monitoring nesting pairs and nest production to ensure that populations are increasing and meeting recovery goals, and ensuring that the Montana Bald Eagle Management Plan nest protection is applied to all active nests. In the Yellowstone area, the Greater Yellowstone Bald Eagle Management Plan is also used for direction.

There were 138 active nests in western Montana and 297 active nests statewide in 2001. Recovery criteria have been exceeded at all scales (Youmans, 2002, Hillis pers. com.). There are currently about 8 nesting pairs on the Gallatin National Forest. All nests lie within Zone 18 (Greater Yellowstone), although portions of the Forest fall within Zone 38 (Missouri Headwaters) and Zone 40 (Bighorn). The actions of the Gallatin National Forest are consistent with and promote bald eagle recovery.

Gray Wolf

Wolves are rapidly re-colonizing Montana and nearby states. They are easily detectable once packs become established. Recovery goals and population viability for wolves are determined by monitoring populations. The recovery goal for wolves in the tri-sate area (Montana, Idaho, Wyoming) is 30 packs for 3 years (http://westerngraywolf.fws.gov/). There are 23 breeding packs and an estimated 271 individuals in the Yellowstone area (*Ibid*.). There are 43 packs and more than 600 wolves in the tri-state area.

Wolf pack numbers at all spatial scales, including the Gallatin National Forest, Montana, and the tri-state area, indicate that cumulative, broad-scale activities are consistent with wolf recovery objectives. With wolves, it is reasonable to conclude that recovery (delisting population levels) indicates population viability. Wolves have a high birth rate, are very mobile, and are capable of traveling long distances that can connect them to other populations. There appears to be little reason for concern over long-term species viability of the gray wolf in the tri-state area.

Canada Lynx

At present, 5.4 % of U.S. Forest Service Region 1 is lynx habitat, while 19% would have been available historically (Hillis 2002). This suggests that the broad scale foraging habitat may be limiting to lynx, likely due to fire suppression. However, the large areas that burned in 1988, 2000, 2001, and 2003 will ultimately become suitable habitat, which will bring the percentage closer to historic levels.

It is believed that denning habitat is approximately 15.1% of lynx habitat in Region 1, and the historic level is believed to be 10% (Hillis 2002). It appears that fire suppression, that has perhaps limited foraging habitat, has allowed denning habitat to increase in Region 1.

Lynx are a disturbance-dependent species (Ruggiero et al. 1994, p. 39). Stands up to 15 years old are not suitable lynx habitat in the short term, but they will provide foraging habitat in later successional stages. The Gallatin National Forest has experienced several large fires in recent years, including Purdy, Fridley, Beaver Creek, Monument, etc. Burned acres from these fires total approximately 50,000 acres, or about 3% of the Forest (Shea 2003, personal communication.). These areas should become good foraging habitat in the next 15-20 years. The fires of 1988 burned approximately 100,000 acres of the Forest (about 6%), which may begin to provide lynx foraging habitat in about 2003.

Lynx denning habitat is abundant on the Gallatin National Forest and foraging habitat has increased significantly with recent fires. Moreover, the actions of the Gallatin National Forest are consistent lynx recovery standards and promote species viability both on the Forest and in the GYA.

Black-Backed Woodpecker

In Montana, black-backed woodpeckers are a fire-dependent species occurring primarily in burned areas, from 1 to 6 years post-fire (Hillis et al. 2002). This species also utilizes areas where disease has led to insect infestations (Saab and Dudley 1998). Black-backed woodpeckers are highly mobile and probably migrate at least 30 miles to exploit recent burns (Hoyt 2000, p. 35).

Fire suppression has adversely affected black-backed woodpeckers by reducing the amount of burned forest available for foraging (Hillis et al. 2002). Salvage logging can also reduce black-backed woodpeckers habitat.

Hillis et al. (2002) estimated that, historically, forests 1-6 years post-burn averaged about 2% of the National Forest lands in Region 1. From 1940-1987, this habitat declined to 0.36% due to fire suppression. Because of large fires in 1988, 2000, and 2001 about 1.5% of the same area was

suitable habitat between 1940-2001. However, addressing only the temporal scale of recent intense fire years (1988-2001), 5.7% of National Forest lands in Region 1 were black-backed woodpecker habitat.

Hillis et al. (*2002*.) concluded that the scale at which fires burned was important for black-backed woodpeckers. For example, a few large fires contribute the vast amount of suitable habitat. However, while small fires contribute only a few acres they can be especially important for local populations.

Hillis et al. (*2002*) postulated that black-backed woodpeckers might have been negatively impacted by the 47 year interval (1940-1987) in which available habitat was at such a low percentage of what was historically available. However, black-backed woodpecker numbers are comparatively high in the recent large burned areas (Hejl and McFadzen 2000). Thus, black-backed woodpeckers may have survived this population 'bottleneck' to rebound and take advantage of newly available habitats.

The Gallatin National Forest has experienced several large fires in recent years, including the Purdy, Fridley, Beaver Creek, and Monument fires. Burned acreage from these events totals approximately 50,000 acres, or about 3% of the Forest (Shea 2003, personal communication). These areas should become good black-backed woodpecker habitat over the next 6 years. The fires of 1988 burned approximately 100,000 acres (about 6%) of the Forest, and potentially provided optimum black-backed woodpecker habitat until about 1995, although standing snags may persist and provide good habitat for a much longer period. The Gallatin National Forest is somewhat below the Regional average for the amount of recently burned forest available to black-backed woodpeckers. However, as discussed above, current amounts of habitat appear to be sufficient regionally for this species.

In summary, while the black-backed woodpecker may have recently gone through a population 'bottleneck', available habitat in Region 1 is currently greater than in historic times. This is valid even if proposals to salvage burned trees are realized, especially if management constraints to preserve black-backed woodpecker habitat post-fire are employed in the context of salvage logging. Therefore, actions currently being taken in burned areas of the Region are consistent with maintaining viable populations of black-backed woodpeckers (Hillis 2002).

Boreal Toads

Amphibians, including the boreal toad and other western species, appear to be declining worldwide. Possible explanations for this trend include global warming, ozone depletion, introduced exotic predators, introduced exotic diseases, native predators, pesticides, and chemical pollution (*Maxell 2000, p. 10-11.*).

Toads are terrestrial during their adult life and disperse through a mix of forested habitats. They must reproduce in bodies of water, typically using ponds, lakes, and sloughs (Maxell 2000, pp. 85-100). Maxell describes toads in Region 1 as well distributed but rare. Since 1997, this species was found breeding in only 2-5% of 2000 standing water bodies and there were few females present where there was breeding (Maxell et al. 2003, p. 46).

Toad breeding and nursery habitat is protected by the Montana Streamside Management Zone Law and the Montana Water Quality Act. It is most critical to protect breeding habitat, while retention of upland habitat is a second priority. Because the Forest Service has substantial mechanisms in place to protect riparian areas, the decline in toad populations is not likely due to a failure to protect nursery habitat. This suggests that, at all spatial scales, Forest service management activities are probably not placing toads at risk.

Northern Leopard Frog

The leopard frog is widely distributed in the United States, but it has apparently been extirpated from some portions of its range (Koch and Peterson 1995, p. 84-87). Leopard frogs are associated with aquatic resources. Therefore, adherence to the Montana Streamside Management Zone and

Montana Water Quality Act offers substantial protection to this species through habitat preservation.

Townsend's Big-Eared Bat

The range of the Townsend's big-eared bat includes most of the western U.S. and portions of Canada and Mexico. This species has shown declines throughout this area, particularly in the east. It is more abundant in the western regions (Schmidt 2003). Although these bats forage on moths in many habitats, especially along water, it is closely tied to caves and mines for maternity roosts and hibernacula. The loss of these habitat features is the major risk factor for maintaining species viability.

This species has a Naure Conservancy global rank of G4 and a Montana Heritage Program state rank of S2S3. This means it is probably globally secure, although it may be rare in parts of its range. In Montana, it is considered to be either imperiled or very rare and local throughout its range; i.e. it is found locally in restricted ranges and is vulnerable to extinction (**http://nhp.nris.state.mt.us/animal/mtnhp_info.html**).

This species has a low reproductive rate, producing only one young per year. Therefore, it is subject to fairly rapid population declines if survivorship is decreased. There are a number of factors which can affect bats, such as mortality from high winter levels, lack of suitable roosts with adjacent good foraging areas, and anthropogenic disturbance of maternity roosts and hibernacula (*Schmidt 2003.*). The later may be the most significant risk factor.

The big-eared bat is a classic example of a species that has narrow habitat requirements closely tied to specific risk factors. Consequently, only a fine filter approach can be used for species-specific effects analysis. Protecting roosts and hibernacula from anthropogenic disturbance is the key to protecting this species.

Wolverine

Wolverines are habitat generalists that forage at all elevations on carrion and mammals (Ruggiero et al. 1994, p. 114). Female wolverines den in high elevation, remote locations, usually in glacial landforms in late winter. Several studies suggest that females may be very sensitive to human disturbance at the natal den site (Hillis et al. 2003). They may move many miles when disturbed and potentially lose their litters In addition, the demand for winter backcountry recreation of many kinds is high and increasing. Moreover, snowmobile technology has advanced significantly in recent years. These are important issues for wolverine population viability given the sensitivity of this species to human-caused disturbances. It is uncertain how sensitive wolverines are to such impacts, and wolverines may have individual tolerances for human activities.

A wolverine natal den model was developed in Region 1 (Hillis and Kennedy, 2003). In addition, areas closed to snowmobiling were mapped. Approximately 8% of land in all ownerships in Region 1 was modeled as potential wolverine denning habitat. Forty-six percent of this area is protected as designated Wilderness or National Parks (Hillis et al. 2003).

The wolverine is considered a G4T4 species by The Nature Conservancy, which means that at both the state and global levels it is apparently secure. However, it may be rare in parts of its range, especially the periphery (http://nhp.nris.state.mt.us/animal/mtnhp
_info.html).

On the Gallatin National Forest, there is an estimated 950,130 acres of potential wolverine denning habitat (approximately 5% of the Forest acreage). Of this, about 55% is protected from snowmobiling by being designated as Wilderness. Realistically, snowmobiles are restricted from additional areas because of topography or winter closures (Hillis et al. 2003.).

Forest and Regional management promotes maintaining the most sensitive habitat of this species, and

thus it contributes to an environment that promotes species viability.

Northern Goshawk

The northern goshawk (*Accipiter gentillus atripicaulis*) is both a MIS and a Sensitive Species for the Gallatin National Forest. In addition, the Regional Forester has listed it as a sensitive species for the Northern Region.

The northern goshawk is a large raptor occupying most forested habitats. They commonly nest in mature and old growth conifer stands. Nest site selection depends upon the availability of trees with large enough branches to support a nest. Goshawks tend to forage in a variety of open and forested communities (Hillis et al. 2003b).).

A Forest Service Region 1 analysis (Hillis et al. 2003b) used data from 328 known goshawk nests. Habitat for 6th code hydrologic units (HUCs) was then modeled based on these known nests. They found that 68% of the HUCs had sufficient habitat to host one or more goshawk nests. This appears to be an underestimate of the number of actual nests based on the Nature Conservancy database (Hillis et al. 2003b). The inference is that, on a regional scale, the availability of nesting habitat is not limiting for goshawk abundance (*Ibid.*). It is also unlikely that the availability of foraging habitat is population determinant.

The goshawk has a Nature Conservancy rank of G5T5, which represents the species as globally secure, including the subspecific taxon, atripicaulis. The Montana Heritage Program rank for goshawk is S3, indicating vulnerability at the state level.

A coarse filter approach was used for mapping potential northern goshawk distribution on the Gallatin National Forest. Territory components, as represented by forest vegetation, were evaluated on the capability to support a breeding pair of goshawks. The model predicted the number and potential distribution of breeding pairs across the Gallatin NF based on current forest condition (maps available at Gallatin NF Supervisor's Office).

Queries displayed habitat polygons using ArcView and the TSMRS database. The data attributes included stand structural stage, cover type, elevation, aspect and slope. ArcInfo was used to further refine the mapping exercise by evaluating the habitat polygons with a grid. Proportions of available cover types were estimated. Goshawk territories were defined using standards described by (Reynolds et al. 1992) and (Patla 1997 p. 24). According to their criteria, a territory consists of these components:

1. A nest area comprised of 200 acres of contiguous forest cover within mature to late successional stage stands
2. A post family fledging area including 400 acres adjacent to the nest area and comprised of 80% mature forest covers
3. The foraging area, which included 5,400 acres of diverse vegetative cover types containing 60% mature to over-mature cover.

Nest area elevation was restricted to < 7500 ft. elevation a parameter noted in both (Patla, 1997, p.24) and (Clough 2000, p. 20-21). These studies were completed on the Targhee and Beaverhead-Deerlodge National Forests, respectively. Information from these areas was felt to best match the conditions on the Gallatin National Forest.

Susan Patla, (2003 personal communication) recently advocated more stringent mature to over-mature forest cover requirements within the nest and post fledging areas, which is a departure from (Reynolds et al 1997). Nest site data collected after her original 1997 study demonstrated that nests where young are successfully fledged are more likely associated with nest and post-fledging family areas containing higher proportions of mature forest cover than earlier data indicated (See also Patla, 2003, p. 10-11).

Overall, goshawk populations appear to be cycling at low numbers, possibly in response to prey base conditions. In these circumstances, birds successfully fledging young are associated with territories containing an optimal amount of mature habitat. However, this situation should be verified further. In light of this information, it was determined to portray the best conditions for goshawk potential habitat on the Gallatin National Forest. A key difference between the work of Patla and other research is that nest areas are usually based on species presence, rather than models of potential distribution using habitat attributes.

In developing the model used in this analysis, the attributes of slope and aspect were also eliminated in defining potential habitat. Goshawk nest records for the forest do not indicate a consistent preference towards for any particular slope or aspect. When these variables were applied to the model, habitat potential dropped dramatically and did not appear to represent field verified observations. Similarly, (Squires and Ruggiero 1996, p. 173) did not find a strong preference for aspect at nest sites; rather aspects were proportionate to their representation across the landscape sampled in south-central Wyoming.

In this portrayal of potential habitat, nesting habitat was displayed in its entirety rather than partitioning it into concentric circles as described by Patla. Core nest areas are actively defended within a 2-mile area (*Patla 1997, p.24*). A range of potential nest sites was developed for large polygons of nest attributed forest structure through estimating a two-mile buffer for each potential site. Table 4 reports the range of potential nests and associated territories by mountain range on the Gallatin National Forest.

Table 4. Potential Goshawk Nest Distribution, Gallatin NF

Mountain Range	Potential Goshawk Territories
Bridger Mountains	6 – 10
Crazy Mountains	3 – 5
Absaroka – Beartooth Range	32 – 63
Gallatin Range	17 – 36
Madison Range	10 –17

The model emphasizes optimal conditions for goshawk breeding territories on the Forest, as defined by the habitat attributes evaluated. Less than optimal habitat may also support birds, which, with varying probability, also successfully fledge young. It is difficult to quantify the contribution of marginal habitats in supporting a stable population of northern goshawk.

Potential territories displayed for the Bridger Mountain Range occur on the west slope. Nesting areas are predicted within north aspect Douglas-fir stands found within east to westward drainages. Both post fledging and foraging areas are represented in adequate amounts to support the estimated range of 6 to 10 territories. Fledging habitat was a limiting factor on the eastside of the Bridgers. Previous timber harvest patterns, including logging on the acquired private land sections, limit post-fledging

habitat.
A west slope trend for nesting territories was also displayed within the Crazy Mountain Range. The steep east slope of this range limits the distribution of suitable forests for goshawk nesting.

The Absaroka–Beartooth Range contains the highest potential distribution of gowahwk nesting territories on the Gallatin NF. This reflects large areas of potential nesting habitat present within Suce Creek, West Boulder, and upper portion of the Main Boulder Drainage. Potential territories are also scattered within Deer Creek, Deep Creek, Mill Creek, Sixmile Creek, the north fork of Bear Creek, and Horse Creek. Within the southern portion of the range potential habitat is limited by elevation and the effects of large fires.

Potential nesting habitat and associated territories are well distributed through the Gallatin Range. Bear, Upper Bozeman, Cottonwood, Cliff and Big Creek Drainages contain extensive forests suitable for goshawk nesting habitat. These areas appear to be capable of supporting more than one territory.

The largest coverage of potential nesting habitat predicted within the Madison Range occurs on the west side of Hebgen Lake, including the Trapper Creek Drainage and Watson Creek. Nesting goshawks were located within this area (West Lake Timber Sale, Project files, Hebgen Lake Ranger District). Potential nest areas and territories were also predicted within the Beaver, Kirkwood, Red Canyon, Teepee, Hell Roaring, and Falls Creek Drainages (this list is not all inclusive, rather it indicates the distribution of potential habitat throughout the Range).

This modeling exercise represents a predicted distribution of northern goshawk habitat for the Gallatin Forest. In addition, it provides a visual display, presents a range of potential goshawk territories, helps prioritize survey efforts, and provides a baseline with respect to project related cumulative effects. As such, it is a useful tool for inferring the population viability of this species on the Gallatin NF.

The Gallatin National Forest has conducted monitoring for northern goshawks (Gallatin National Forest Project file goshawk notes, Fitzgerald and Wojetch 1996, and Atkinson and Atkinson 2002). Goshawk nest surveys are required prior to implementing any project involving vegetation disturbance, including timber sales and prescribed burns. If a nest is located in the project area, the project is modified.

Pine Marten

The pine marten is listed in the Gallatin Forest Plan as a MIS for old growth forests (moist spruce forests) (FP, p. II-19). Population trends of MIS are supposed to reflect the efficacy of forest management practices. The pine marten is closely associated with late successional stage mesic forest with abundant woody debris and snags.

A Forest Service Region 1 model indicated that recent changes in patch size and habitat connectivity did not have a significant effect on the pine marten population (Hillis and Lockman 2003). This analysis also found that existing habitat is comparable with historic levels. A similar analysis was also conducted of pine marten habitat on the Gallatin National Forest (Backus 2003). Results indicated that potential habitat for this species is abundant, with the exception of burned areas, the Deer Creeks, and the east side of the Bridger and Crazy Mountains.

Montana Fish Wildlife and Parks (MFWP) annually conducts snow track surveys in western Montana to monitor population trends of several furbearer species, including pine marten (Giddings, personal communication 2003). Representative habitats and land uses characteristic of the eco-region are sampled. The Gallatin National Forest is located within the Southwest Montana eco-region (Montana Trapping District 3). Pine marten detections per 100 transect miles have varied over a 10-year period (1990-2000) in southwest Montana (MFWP Region 3). Detections ranged from 34.7 per 100 mi (1991-92) to 123.4 per 100 mi. (1994-95), while the detection rate in 2000-2001 was 60.2 per 100 mi. The average was 75 per 100 mi. for the 10-year period.

The long-term trend for pine marten populations in Montana is stable (Giddings pers. comm.). Pine marten populations appear to be healthy enough to sustain a trapping harvest in Montana and adjacent states. This is the most abundant predator of those monitored by MFWP in SW Montana (*Giddings, personal communication).*

Although this species was selected as a MIS and is being monitored accordingly, there are many other factors influencing populations besides habitat change. Because it is a harvested furbearer, fur market prices, accessibility to populations by humans, and other factors related to trapping may be the most important population level determinants.

In the early 1990's, the Forest sponsored three master's degree pine marten studies, which increased our understanding of the behavior and ecology of this species. Monitoring is conducted for furbearers, including pine martens, in many areas of the Forest. These efforts indicate that management actions of the Gallatin National Forest are consistent with maintaining pine marten viability both on the Forest and in the GYA.

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Conclusion and Consistency with Applicable Laws, Regulations, Policy and Standards

The assessments in this document demonstrate that population viability does not appear to be a concern for any of the species discussed (threatened, endangered, or sensitive). Three of the four threatened species populations (grizzly bear, gray wolf, and bald eagle) are either close to or exceeding recovery criteria. The grizzly bear is protected by adhering to the constraints stipulated in the Conservation Strategy (2003). The Bald Eagle is protected by adhering to the Montana Bald Eagle Management Plan. The wolf population has reached recovery criteria in this area. In addition, the Forest Service is adhering to direction in the Lynx Conservation Strategy and Assessment (2000).

Species addressed with a coarse filter analysis were the black-backed woodpecker, wolverine, northern goshawk, and pine marten. At a regional level, the black-backed woodpecker may have recently gone through a population 'bottleneck' due to a decrease in available burned habitat, due, in part, to fire suppression. However, in recent years, the amount of burned forests has significantly increased and black-backed woodpeckers appear to be utilizing this newly available habitat. Snowmobile activity is probably detrimental to wolverines. Therefore, wolverine potential natal denning habitat was mapped in relation to snowmobile use areas. The model showed that almost half of potential denning habitat at the regional scale is located in Wilderness or National Parks. Results were similar for a Gallatin National Forest analysis. The potential nesting habitat of northern goshawk was also mapped on a regional and local scale. The regional level analysis found that goshawk-nesting habitat was located in 68% of all 6^{th} code watersheds. A similar analysis also revealed abundant potential habitat on the Gallatin National Forest (maps available through the Gallatin National Forest Supervisor's Office). Potential pine marten habitat was mapped for the Region and no significant changes in patch size or habitat connectivity were found from historic levels. In addition, habitat mapping on the Gallatin National Forest demonstrated adequate habitat to maintain species viability.

Species assessed through a fine filter approach are protected through site-specific mitigation. This includes the boreal toad, northern leopard frog, Townsend's big-eared bat, and the peregrine falcon. Habitat. The Montana Streamside Management Zone Law and the Montana Water Quality Act, to which the USFS adheres, protect habitat for both amphibian species. In addition, the Townsend's big-eared bat requires caves and mines for hibernating and maternal roosting. Peregrine falcons often forage in riparian areas. These habitat features are also protected through special management constraints. .

MIS are selected in order to "indicate the effects of management activities" [CFR 219.19(a)(1)]. The populations of these species are to be monitored in relation to habitat change. This is very different from the viability requirement. As discussed above, the northern goshawk and pine marten are being monitored on the Forest. Other Gallatin National Forest terrestrial MIS, the grizzly bear, elk, and bald

eagle are also monitored by other agencies. There is good data available on all of these species, some of which appears in the preceding assessment.

In the context of the information provided in this assessment, the Gallatin National Forest is in compliance with applicable laws, regulations, policies and standards in relation to the issues of viability and MIS.

Submitted by:

MARION CHERRY
Forest Biologist

Edited by:

DAN TYERS
Wildlife Biologist

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