ISSUE 9: GENERAL WILDLIFE

Changes from the Draft to the Final EIS

One of the changes between Draft and Final EIS was to drop project and most administrative roads from the analysis for the Alternatives 2 through 7-M of the effects of motorized routes on wildlife. Under Alternatives 2 through 7-M, most administrative roads are to be closed to the public, and project roads will gradually go away. (Some administrative roads become motorized trails for ATVs and/or motorcycles, and they are treated as open to motorized traffic in the analysis.) It is believed that administrative routes receiving limited traffic have little true impact on wildlife. Under Alternative 1, the project and administrative roads are not considered closed to the public. The analysis of core wildlife habitat (areas not impacted by human use) by mountain range was shown in figures rather than having as much narrative; there are new figures in this section.

A little more information was added on displacement of wildlife from trails along with some new literature citations. A few new paragraphs were added addressing the effects of noise on wildlife. This was done in response to comments received. Clearing width of roads and trails was corrected to match data from Gallatin National Forest engineering data. The Cumulative Effects section was expanded (see Cherry, 2006, Cumulative Effects Worksheet in the Project Record for this issue) as was the section on Effects of Goals, objectives, standards and guidelines.

This issue, in part, is being addressed in response to public comments. This issue is the general effects of motorized and non-motorized routes and their use on wildlife and their habitat. Specific wildlife comments are more thoroughly addressed in the analyses for other issues such as biodiversity, big game, grizzly bear, etc.

Affected Environment

There are several ways transportation routes and their uses may affect wildlife. They include changes in wildlife mortality and in habitat:

1) The wildlife mortality issue relates directly to the amount of high-speed roads that are under National Forest jurisdiction. There are virtually no high-speed routes managed by the Gallatin National Forest.
2) The issue of habitat change relates to direct loss of habitat due to the presence of road and trail prisms, and again, this is a very minor loss. There are also a few species for which minor habitat improvements occur due to the presence of roads or trails.
3) The major issue in relation to habitat change is the indirect loss of habitat through wildlife displacement from human activity associated with roads and trails.
4) Disruption of wildlife travel routes, or corridors is another wildlife issue. It is discussed in more detail under Issue 3: Biological Diversity.

There is little doubt that recreational activity participation rates are high and increasing. Both motorized and non-motorized forms of recreation are popular (Youmanns 1999:1.5-1.8).

McCool and Harris (1994) conducted research documenting participation rates and distances traveled for a number of motorized and non-motorized activities (Table 3.9.1) Participation rates were higher for non-motorized activities, but the number of miles covered per trip was quite a bit less than for trips of motorized activity.

Table 3.9. 1 Participation rates and distance traveled for some motorized and non-motorized activities (McCool and Harris 1994).

Activity	Participation Rate: (percent of persons surveyed)	Average mileage of participant/trip
Walking/day hiking	70%	2.5
Jogging	19%	2.5
Bicycling	20%	4
Horseback riding	17%	10
Cross-country skiing	15%	4.5
Backpacking	14%	6
Snowmobiling	15%	27
Off-road 4WD	20%	31
Off-road vehicle riding	12%	15
Off-road motorcycling	9%	25

Boyle and Samson (1985) reviewed 166 articles containing original data on the effects of non-consumptive outdoor recreation on wildlife and found that in 81% of them, effects were considered negative. McCool (1978) pointed out the importance of understanding the behavior of recreationists and postulated that different types of behavior (competitive, play, exploratory, affiliation) have an important bearing on the type and intensity of impacts on wildlife.

It is important to understand how wildlife is affected by the roads and trails and their uses on the Gallatin National Forest. A road or trail itself makes a physical "footprint" on the landscape and generally removes wildlife habitat where it lies. The physical footprint is also surrounded by an area of influence that the routes have on wildlife species in the area, which can be referred to as the "virtual footprint" (Forman et al. 2003:113).

The main effects of roads and trails on wildlife may include the direct effects of wildlife mortality (road kill), habitat loss, displacement, fragmentation, and the indirect effects of changing the quality of the habitat adjacent to the route or impeding wildlife movement (Forman et al. 2003:114). These effects are discussed below.

Wildlife Mortality

Users of roads sometimes kill or injure wildlife. Most of the mortality is direct mortality from collision between a motor vehicle and an animal. When this occurs, wildlife is usually the loser, with injury or death resulting. Most research on wildlife mortality appears to be on paved roads with relatively high speed limits (usually highways). In this case, road kill rates may be higher than all natural causes of death. Mortality rates of large mammals and birds are probably the best documented. Road kills of amphibians and reptiles may be underrepresented in sampling because of their size and because scavengers probably remove all traces of these events fairly rapidly. When roads bisect aquatic habitats, seasonal movement of amphibians and reptiles may result in high

mortality rates from road kill. Type of road and volume of traffic appear to be important variables in road kill. Rates of mortality can be high enough to reduce local population densities (Forman et al. 2003:115, 116, 118, 119). Wide-ranging carnivores are especially vulnerable to road mortality due to their large home ranges and fairly low productivity (e.g., wolverines) (Ruediger 1996).

There are two main variables affecting road mortality of wildlife: traffic, road and landscape influences and behavior and ecology of the species. Studies show that factors affecting road kill rates include traffic volume and speed and proximity of cover and wildlife corridors (Ruediger 1996:120, 138).

Some species are more vulnerable to being killed by collision with vehicles than others. Large carnivores (e.g., grizzly bears) that occur in low densities, have low reproduction rates and long generation times are most susceptible to additive mortality. Species that are highly mobile are also more subject to mortality from road kill. Habitat generalists, that tend to move into unfamiliar areas in search of food, may also be more subject to road kill, while species that avoid open habitats and noise are less vulnerable. Some animals that disperse at certain times of year would experience increased mortality during those times. Animal species that may be attracted to roads for reasons like basking in the sun (e.g., reptiles) or availability of carrion or some other food or mineral (salt) may be more vulnerable to being road killed (Ruediger 1996: 121, 122).

Most roads under the jurisdiction of the Forest Service are not paved, and design limits are relatively low. Forest Service trails are rarely paved, and those that are motorized must be driven at low speeds. For the most part, it is believed that there is very low vehicle-caused mortality on Forest Service roads and trails, and it is generally limited to paved, higher speed roads. There is some mortality on paved roads (like state and federal highways) with higher design limits that pass through National Forests. This is not an effect of the proposed Travel Plan. There may be mortality of slow-moving, dispersing species (e.g., reptiles and amphibians) on any type of road within their habitat. Mortality of these species may not be limited to motorized vehicles, but could also occur from bicycles and even horses.

Roads increase the incursion of humans into wildlife habitat and may lead to indirect mortality effects (i.e., trapping and hunting). Roads also serve as conduits for both predators and people. Animals living near roads or trails may be at higher risk of predation as predators may use these routes for travel (Forman 2003:126).

Information in Table 3.9.2 is excerpted from Forman et al. (2003:121).

Table 3.9. 2 Characteristics making a species vulnerable to three major effects of roads.

	Main Effects of Roads		
Characteristics Making a Species Vulnerable to Road Effects	Road Mortality	Habitat Loss	Reduced Connectivity
Attraction to road habitat	X		
High intrinsic mobility	X		
Habitat generalist	X		
Multiple-resource needs	X		X
Low density/large area requirement	X	X	X
Low reproductive rate	X	X	X
Forest interior species		X	X
Behavioral avoidance of roads			X

Habitat Change

Wildlife habitat may be altered in three ways by the presence of roads and trails: habitat loss, reduced quality of habitat, or improved quality of habitat. The latter two effects are determined by the manner in which different wildlife species respond to an altered habitat.

Habitat Loss

The most obvious effect of routes on habitat is the direct loss of habitat by converting some wildlife habitat to a road or trail, sometimes with a cleared right-of-way. Sediment from roads and trails can affect surrounding aquatic habitats and are addressed primarily in the analysis disclosure for the Soils, Water and Fisheries Issues. Studies conflict on whether mobile species are affected more or less than relatively sedentary species by direct habitat loss (Forman 2003*:*123).

Habitat Quality

The presence of roads or trails may also reduce habitat quality near the route. Usually, reduced habitat quality can be seen by a numerical response such as a reduction in abundance or density of a species, or a behavioral response such as road avoidance by wildlife. Traffic noise as measured by vehicles per day seems to affect breeding birds by resulting in a reduced density near roads. Note that these studies occurred at fairly high traffic volumes that are unlikely on most roads under Forest Service management. However, these traffic volumes may exist on roads that pass through the Forest but are under federal, state, or other jurisdictions. Studies of large mammals have shown that these animals tend to avoid both roads and a buffer area around the road (Forman 2003:124-126).

Noise is one of the major factors in wildlife displacement and habitat loss. Noise can be defined as any "human-made sound that alters the behavior of animals or interferes with their normal functioning" (p. 109, Bowles in Knight and Gutzwiller 1995). Sound is a physical disturbance medium that is usually measured in decibels (dB). Some sounds are either higher or lower than what humans and some terrestrial animals can hear. Sound attenuates as it travels away from its source. This is influenced by a variety of environmental factors including temperature, terrain, and humidity. Low frequency sound would travel farther than high frequency sound (Bowles in Knight and Gutzwiller 1995). Noise often accompanies humans traveling by motorized and non-motorized means on the Forest.

Animals can habituate or adapt to sounds depending on the circumstances. Noise is an environmental stressor on wildlife much the same as temperature. Animals may adapt to noise by avoiding it. Noise can interfere with activities such as sleep. Wild animals may continue to respond to noise because they view humans as a threat. Aversive noise may affect breeding, feeding and social behavior of animals. Nocturnal animals tend to have the most sensitive hearing. Some species such as rodents and bats hear better at high frequency while others, such as whales and elephants can detect very low frequencies. Animals can suffer hearing loss with repeated exposure to loud noise. Noise can mask sounds of interest or importance to wildlife species. This can affect predator avoidance. Noise can also shorten the distance over which effective communication among animals may occur. One response to sound is for an animal to

'startle'. This is a rapid increase in heart and cardiac rate and decrease in non-essential functions such as digestion. This mobilizes glucose to the muscles. An increased activity rate can decrease an animal's energetic reserves. In some cases, animals may be attracted to noise where it has been associated with food. In other cases, animals may become tolerant of noise, and this may make them more vulnerable to things such as being killed by traffic (Bowles in Knight and Gutzwiller 1995).

A number of studies have shown that wild ungulates and carnivores increase movement in response to aircraft, snowmobiles, construction noise, road traffic, and walking visitors. Large mammals alter habitat use for 1-2 days after being disturbed by noise Large mammals are able to adapt to predictable disturbance by avoiding an area during this time period. Mammals will habituate to noises without negative consequences, but do not habituate to being hunted, and this actually amplifies their responses. Mammals can track noise and response to noise that is approaching directly rather than to noise approaching them tangentially. Mammals may also abandon newborn young in response to noise. Startled carnivores may kill and eat their own young. Short-term aversive responses in mammals vary from mild reactions such as becoming alert to more severe such as running away while urinating or defecating (Bowles in Knight and Gutzwiller 1995).

Waterfowl are more sensitive to noise than other birds, and they are especially sensitive to aircraft. This may be because they are hunted and have aerial predators. Birds can also react by becoming alert, moving their wings, flying short distances to making aggressive attacks on conspecifics, leaving the nest briefly, or panic flight or running. In waterfowl, the noisier the approaching boat, the greater the response. On occasion, bird reactions are severe enough to cause eggs to be damaged. It is possible that repeated harassment can cause a population effect in birds such as colony nesting pelicans. Reptiles and amphibians often freeze in response to noise (Bowles in Knight and Gutzwiller 1995).

Mammals and birds may lose more young to predators if they are startled away from their young. Mammals and birds tend to remain close to their offspring once bonding has occurred even if noise occurs. At this time it is difficult to find any species in which noise has been disturbing enough in a situation to affect the population size and growth, but it is a potential effect of noise (Bowles in Knight and Gutzwiller 1995).

In general, with repeated exposures to either motorized or non-motorized activity, animals habituate or adapt both physiologically and behaviorally. Unfamiliar noise is more likely to arouse an animal than a harmless, familiar noise. Animals may have one of three responses to noise: attraction, tolerance or aversion. Mild responses may be difficult to detect. If mammals are repeatedly exposed to the same noise stimulus without negative associations, responses decline rapidly. Vertebrates can track the direction of movement and typically respond more strongly to direct approaches than to tangential passes (Knight and Gutzweiler 1995:114, 133).

There can be effects of non-motorized recreation on wildlife, although the preponderance of the literature deals with motorized effects. There is literature that documents the effects of non-motorized human activity on shorebirds, bald eagles, and various species of big game through a myriad of activities such as walking, rafting, and cross-country skiing. For instance, elk can be

easily disturbed by people on foot or skis (Cassierer et al. 1992). There is concern that skiers may influence the ability of elk to survive the winter or successfully reproduce, by displacing them into less suitable habitat during the winter or by increasing their energy expenditure.

Cassierer (1990) found that elk were displaced in Yellowstone Park an average distance of 572 m by people on foot or skis. The elk were temporarily displaced for an average of two days from their home ranges and moved to higher elevations with steeper slopes and closer to forested areas. In some parts of the Park, elk did seem to habituate to human use that was consistent. Disturbed elk expended an estimated 365 kcal for locomotion per displacement event. The effects would be magnified if elk were in poor condition or if forage was lacking on the winter range. Heart rates of elk were greatest when elk were disturbed by people on foot or skis. Cassierer (1990) recommends locating skier activity at least 600 m from elk wintering areas and minimizing displacement of elk by skiers by concentrating skiers in forested areas with topographic relief.

One study on grizzly bears in Montana found that grizzly bears were displaced by both motorcycle and ATV trails as compared with non-motorized trails. In others words, bears use areas near both types of trails less than expected (Graves 2002). The only other known study to look at grizzly bear habitat use in relation to non-motorized trails also found that bears were displaced from these trails (Mace and Waller 1996). Some differences in response by bears to trails may be due to relative amounts of recreational use on trails.

Knight and Cole (1995:71-79 in Knight et al.) present a good summary of the effects of disturbance on wildlife, which includes all types of activities. They believe it is important to understand the characteristics of the disturbance and the characteristics of the species of interest. Other items we need to understand are type of activity (motorized or not, etc.), recreationist behavior (speed and direction of movement), predictability of behavior, frequency and magnitude, timing (in or out of breeding season, winter, etc.), location in relation to the animal, type of animal, body size of animal, and group size of animals.

Bighorn sheep may respond more negatively to humans on foot off-trail than vehicles on roads (MacArthur et al. 1982 and Papouchis et al. 2001). However, these studies point out the importance of animal habituation to stimuli in their environment. In other words, it is easier to habituate to a predictable event than an unpredictable event, and vehicles on roads are predictable.

Ferguson et al (1982) found that cross-country skiing affected winter moose distribution, but not that of elk. Both species tended to move away from areas near heavily-used ski trails. Day-to-day movements away from trails occurred after the onset of skiing, but displacement did not increase with additional skiers.

Physiological responses to disturbance are not always readily observable (MacArthur et al. 1982). Animal behavior as an indicator of stress can be misleading (Stemp 1983:1, 266-267). In addition, association of behavioral cues with physiological stress varies among species.

People generally understand that obvious behavioral responses, such as flight or interference with foraging, have energetic costs. However, many people do not realize that subtle physiological responses, such as an elevated heart rate (MacArthur et al. 1982) and changes in alertness and posture also have energetic costs. Most people are familiar with the typical defense response (fight-or-flight) that is characterized by adrenalin-induced increases in heart rate, blood flow to skeletal muscle, increased body temperature, and elevated blood sugar. However, an animal experiencing a deficit energy budget (i.e., during the winter) may use another behavioral and physiological response to disturbance that is expressed as the opposite of the active-defense response. The passive-defense response is characterized by the inhibition of activity, reduced blood flow to skeletal muscle, reduced blood flow to the digestive system, lower heart rate, respiratory rate and body temperature (Gabrielsen and Smith 1995). This behavior is often misconstrued as lack of response or habituation. Rather, this behavior may indicate that an animal is experiencing a severe nutritional or energetic deficit or a situation that offers no escape option.

Knight and Cole (1995) presented specific effects of the following recreational activities typically associated with roads and trails on wildlife:

Backpacking/Hiking/Cross-country skiing/Horseback Riding: Flight and/or elevated heart rates, displacement.

Motorized vehicles including OHVs (motorcycles, ATVs, quadricycles, dune buggies, amphibious vehicles, and air-cushion vehicles): May cause disturbance (flight and/or stress) and redistribution.

Snowmobiles: May cause disturbance (flight and/or stress) and/or redistribution, and there can be a release of toxic by-products from combustion into snowpack and water.

Research on species such as the grizzly bear substantiates a displacement effect from motorized routes (Mace and Waller 1997:31-34). Mace and Waller (1997) found a relationship among open roads and grizzly bear density at all levels. In other words, bear density increased in all seasons when open road density declined. Bears utilized areas most with the least vehicular traffic. The effect of non-motorized routes has received much less attention in research, and is expected to be less than that of motorized vehicles, but this is not known with any degree of certainty. The grizzly bear is addressed in more detail under the analysis disclosure for the Grizzly Bear Issue. It has been suggested that bears tend to utilize habitat within 500 m of a motorized route less than would be expected by chance (Interagency Conservation Strategy Team 2003:43).

Lyon et al. (1985:6) found that habitat effectiveness for elk declines with increasing road density. Habitat effectiveness can be expected to decline by 25% when open road densities are 1 mi per sq. mi, and by 50% when road densities are 2 mi/sq mi. Topographic features of the landscape influence how far elk are displaced from disturbance such as logging or road traffic. In general, the less the disturbance (e.g., less vehicles/day), the less the displacement (Lyon et al. 1985:2). This will be discussed in more detail in the Big Game Issue.

Some species do respond positively to the presence of roads and trails. The route may increase habitat for some species that prefer edges. New microhabits may be created along roads, such as

bridges that bats may use for roosting. Habitat enhancements may occur along roads, such as perches for raptors, increased forage from planted species, and carrion from road kills (Forman 2003:126, 127).

In general, effects of roads and trails on most wildlife species are negative (Boyle and Samson 1985). The effects vary not only by species of wildlife, but sometimes by individual. They also vary by what activity is occurring on the road or trail. Seasonal closures of routes may offer some benefit to wildlife. Some routes were selected for seasonal closures during important times of year for general wildlife or for a particular species. Times of year and activities considered were elk calving, deer fawning, big game winter ranges, and grizzly bear spring and fall ranges. If motorized routes are closed when and where these activities occur, animals can function with less energy expenditure and more efficiency. For the wildlife species about which enough is known to analyze these effects in detail, see Issue 2: Big Game and Issue 10: Grizzly Bear.

Direct and Indirect Effects

Analysis Methodology

The primary method of the analysis for this issue was a review of recent, relevant literature on the general effects of motorized and non-motorized use of roads and trails on wildlife. In some cases, extrapolations were made from the closest type of activity one could find to motorized and non-motorized use of roads and trails and their effects on wildlife. It should be noted that much of the discussion is from Forman et al. (2003) and much of the research and literature they cite deals with the effects of paved, high-speed roads on wildlife. The Forest manages only a few roads that have these characteristics. However, some extrapolations can be made from their work to the effects of Forest roads on wildlife.

Forest engineering data (2004) were used to determine the likelihood of direct mortality of wildlife and for direct habitat loss. The actual amount of habitat directly lost due to roads would be the average road and trail width multiplied by the miles of roads. This could be done for the entire Forest, each mountain range, each travel planning area (TPA), or other area. The average roadway width is 12-14 feet on the Forest with an average clearing width of 28 feet (GNF Engineering 2004). The average trailway width is 30 inches with an average trail clearing width of about 8 feet.

Ruediger (1996) estimates that displacement of some species, or indirect habitat loss due to roads, may average 1 km on each side of a highway in a forested area and up to 3 km on each side in open habitats. For the affected area for general wildlife, we will assume 1 km (buffer on each side) from both motorized and non-motorized routes, but will emphasize the effects of motorized routes, since this has more support in the literature. This is probably an overestimate of some effects and an underestimate of others. For Alternative 1, administrative and project roads affected core. For Alternatives 2 through 7-M, these were removed from affected core since they will be closed to the public or gated, and project roads will go away over time. (Some administrative routes will become ATV and/or motorcycle trails and are treated as motorized routes in the analysis).

Mortality

Effects common to all alternatives
An analysis was conducted of the current roads on the Forest that are under National Forest jurisdiction. The Forest Service does not design or operate roads for speeds over 30 mph, which greatly reduces the mortality risk to wildlife. Of the 709 miles of roads with speed limits, about 40% have operating speeds of 10 mph and 40% have operating speeds of 15 mph (Gallatin National Forest Engineering 2004). The width of about 90% of the surface of roads on the National Forest is 12 to 14 feet. In addition, less than 1% of Forest roads are paved or asphalt, which is another reason for lower speeds of road traffic on the National Forest. Approximately 90% of the roads on the Forest are native surface, or not improved.

This information means that, at least for larger animals, road mortality on roads under Forest Service management will be almost nonexistent under any alternative. Although mortality risk is extremely low for most animals, there may be localized areas with smaller, slower moving animals such as amphibians and reptiles, for which there could be cause for concern. If such areas are known, mitigation measures could be taken. A Guideline (G-2) is proposed for this under Alternative 7-M.

Direct Habitat Loss

Effects Common to all alternatives
It is estimated that the current trail GIS coverage for the Forest underestimates the length of trail by 15%; therefore, the trail mileage was increased by 15% for these calculations. For Alternative 1 (1999 travel map without the Montana Statewide OHV EIS decision applied), on average, there is one mile of road per square mile of National Forest. Assuming an average road corridor width of 28 feet, including all vegetation removal in the road and sides of the road, an average of 2.8-3.5 acres of habitat is lost per square mile. This is less than 1% of the area. In addition, the Forest has an average of 1.4 miles of trail per square mile of National Forest. At an average trail clearing width of 8 feet, this yields a loss of approximately 1 acre of vegetation for each square mile. This is also less than 1% of the area. Therefore, direct habitat (vegetation loss) lost to roads and trails is less than 1% of the land area of the National Forest and is considered a minor effect for all alternatives. This is the actual "footprint" of the motorized and non-motorized route system on the Forest.

For this analysis, trails include both motorized and non-motorized because they both result in direct habitat loss. The TPAs with the highest road density on the Forest include Gallatin Roaded and Hyalite in the Gallatin Range; Hebgen Lake Basin and South Plateau in the Henrys Mountains; Big Sky, Shields, Bangtails and Mill Creek. The TPAs with the most trails are the Absaroka Beartooth Wilderness, Gallatin Crest, Lee Metcalf Wilderness (Spanish Peaks) and the Taylor Fork. Under alternatives increasing routes, there would be a slight increase in direct habitat loss, and under those decreasing routes, there would be a slight and gradual replacement of habitat that has been impacted. Not all habitat loss is equal. There are some extremely valuable habitats such as riparian and whitebark pine where the impact is much greater than in lodgepole pine forest, for instance. Direct loss of wildlife habitat acreage due to roads and trails is minor under all alternatives.

Indirect Habitat Loss

To analyze the general effects of motorized and non-motorized routes on wildlife, we used the suggested 1 km buffer on either side of the route (Ruediger 1996). This is considered the "virtual footprint" (Forman et al. 2003:113) of the route on the land. This is an average, but the true impacts of routes vary significantly with terrain, vegetation, amount and types of use on the route, species-specific behavior, etc. We analyzed only public Forest Service routes on the National Forest. For this analysis, each route (both motorized and non-motorized) was buffered by 1 km on either side. The percent of each TPA untouched by the 2 km footprint of these routes, which we refer to as "core", is presented. (Core should not be confused with secure habitat for grizzly bears.) Because research has generally shown that motorized routes have more of an impact on general wildlife species than non-motorized routes, we also present these percentages separately. The core is the area in which, for the most part, wildlife is undisturbed by travel routes and the activities that accompany them. Research has been conducted on the specific response of some wildlife species to motorized and non-motorized routes. Refer to other issue analyses for species such as grizzly bear, big game, wolverine and lynx. These analyses are tailored to the species, with reviews of species-specific research, while the analysis presented here is a very general, broad-brush analysis. Administrative (see note in Changes between Draft and Final) and project routes were excluded from the calculations for the Alternatives 2 through 7-M since they are either closed to the public by gates or are expected to go away over time. At present, these routes receive minor public use, and some of the project routes are impassible by vehicles. These routes were included in calculations for Alternative 1.

Seasonal restrictions on some routes mitigate the indirect (or displacement) impacts of these routes on wildlife during important times of the year. Seasonal restrictions were not analyzed here, but are addressed in some other issues in more detail (see Grizzly Bear issue and others).

The percent of each Travel Planning Area (TPA) that is not impacted (outside of the l km buffer) by motorized and non-motorized use combined, as well as by motorized use alone was calculated (see Core maps in the project record). For simplicity, this analysis presents this both by TPA and mountain range. It is acknowledged that TPAs do not have any function as a wildlife habitat unit, but were designed only as areas where travel management was likely to be similar. For this reason, the major discussion will focus on results by mountain range. Occasionally, some TPAs will be mentioned by name only to show what part of a mountain range may have certain core percentages or ratings. For discussion, percentages of core were classed as follows: <20% = low (L), 20-39% = low-medium (LM), 40-59% = medium (M), 60-79% = medium-high (MH), and 80-100% = high (H). These ratings are applied to the motorized routes only. No rating is given for non-motorized use, although percentages are given in (Table 3.9.3). It should be noted that some TPAs have quite a few project or administrative routes that are gated and closed to the general public and usually only lightly used, if at all, by the Forest Service. These routes were not counted in the following analysis although they were in the Draft EIS. It is believed that these routes have little true impact on wildlife.

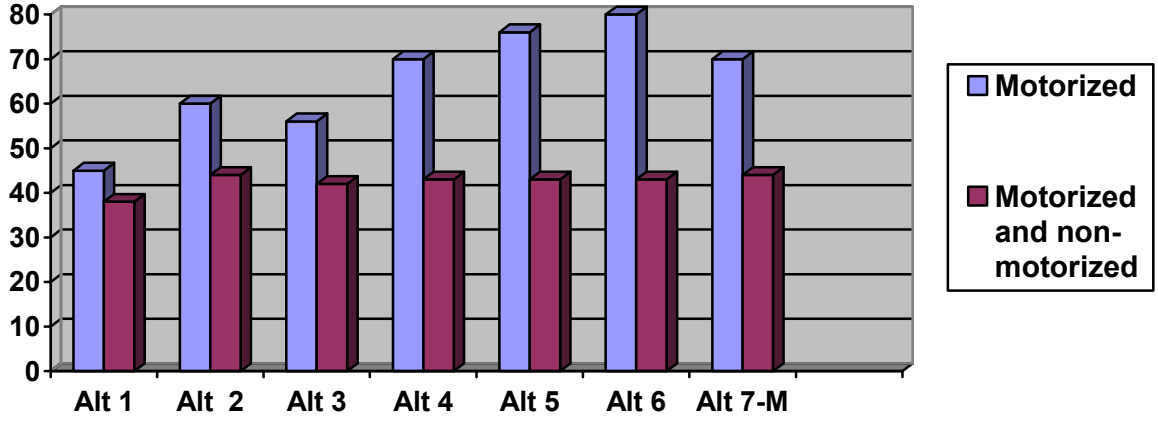
Percentages of core when motorized and non-motorized routes were combined for these TPAs varied little among the alternatives. In almost all cases, because most TPAs have at least some non-motorized routes, the percent core drops when these routes are added to motorized routes. In some cases, the change is not very great. The change is most noticeable for the Wilderness areas

where non-motorized routes are the only routes present. In TPAs with many motorized routes and very poor core, there is often little change when non-motorized routes are added because almost the entire TPA is already utilized by motorized routes and the l km buffer. Taylor Fork TPA is notable because it has fair to good core values for motorized routes only, but when non-motorized routes are added in with a buffer, it drops to 9% core. Because little is known on the effects of non-motorized routes on grizzly bears and other wildlife in the Greater Yellowstone area, it is difficult to draw conclusions, but it is interesting to note that this area has been a high mortality area for grizzly bears.

The Crazy Mountains

For motorized activity only (excluding project and administrative routes), the Crazy Mountain range has 45% core under Alternative 1 and 60% under Alternative 2 (see Table 3.9.3 and Fig. 3.9.1). Core comprises 56% of the mountain range under Alternative 3. (Core habitat is defined as that which is greater than 1 km from a route.) Alternative 4 has 70% core, Alternative 6 has 80% core and 7-M has 70% core, and Alternative 5 has 76% core. Overall this mountain range has a medium to medium-high rating for core habitat. When non-motorized use is added, core habitat declines to between 42 and 44% under all alternatives. The east side of the Crazy Mountains has the most core habitat while the west side has the least. This is also true when non-motorized use is added to motorized use.

Figure 3.9.1. Comparison among alternatives for core habitat (>1 km from a route) for the Crazy Mountains as influenced by motorized and the combination of motorized and non-motorized routes.

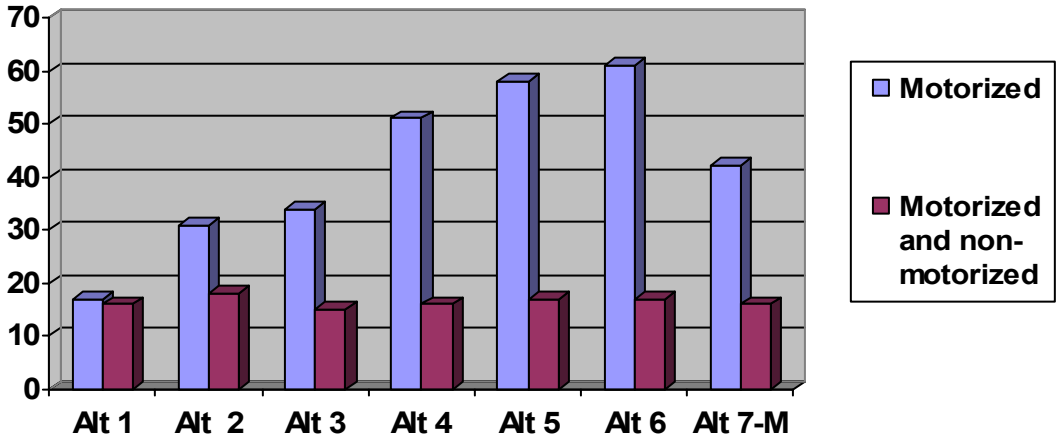


Bridger/Bangtail Mountains

For motorized use only, the Bridger and Bangtail Mountains has 17% core under Alternative 2, 31% core under Alternatives 2 and 34 % under Alternative 3 (see Table 3.9.3 and Fig. 3.9.2). Alternatives 4 and 5 have 51 and 58% respectively, while Alternative 5 has 62% and Alternative 7-M has 42% core for motorized use only. These mountains yield a low-medium to medium-high depending upon the alternative. Once non-motorized activity is added, the core habitat drops to from 15-18% of the area that is unaffected by any type of route under all alternatives.

Several of the TPAs areas are heavily motorized. The Fairy Lake TPA is also heavily impacted by motorized routes. The north and west side of the Bridger Range and Bridger Canyon have the most core habitat when counting public motorized routes only. The Bangtail Mountains are the most heavily motorized. When considering the potential impacts of non- motorized routes along with motorized routes, most of the area is heavily impacted with the possible exception of the West Bridgers North TPA.

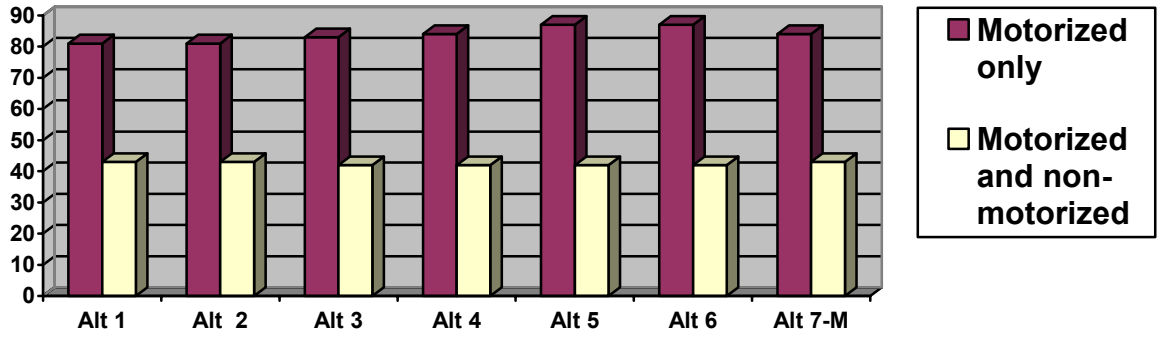
Figure 3.9.2 Comparison among alternatives for core habitat (>1 km from a route) for the Bridger/Bangtail Mountains as influenced by motorized and the combination of motorized and non-motorized routes.



Absaroka Beartooth Mountains

A significant portion of the Absaroka/Beartooth Mountains is designated Wilderness. Thus the motorized core calculated for this area tends to be high (see Table 3.9.3 and Fig. 3.9.3). Under Alternatives 1 and 2, the core area is 81%. Alternative 3 has 83% core, Alternative 4 and 7-M have 84%, and Alternatives 5 and 6 have 87% core. When non-motorized routes are added, this drops to between 42 and 43% for all alternatives, which is still relatively high. The travel planning areas that are entirely Wilderness will have almost 100% core when considering motorized routes only. (The reason they are less than 100% is because the motorized routes are buffered, and occasionally a buffer overlaps the Wilderness boundary.) Gardiner Basin and the Deer Creeks have the lowest amount of motorized core habitat

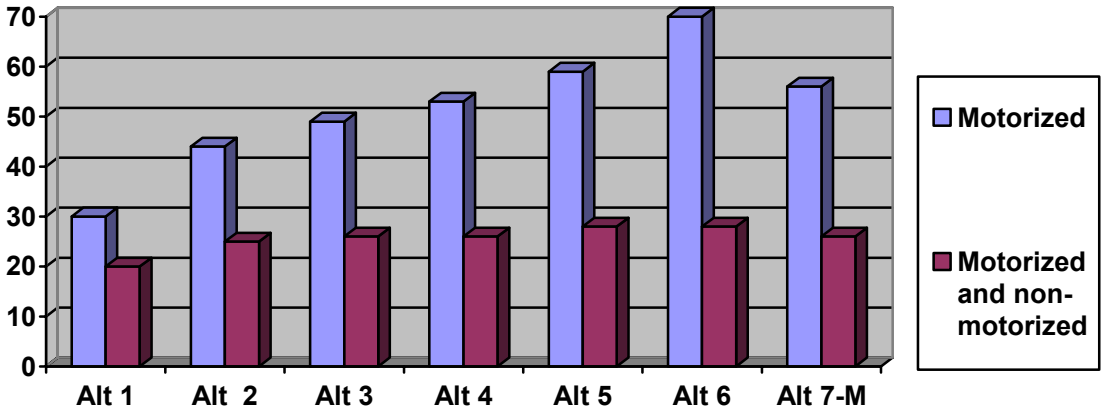
Figure 3.9.3. Comparison among alternatives for core habitat (>1 km from a route) for the Absaroka/Beartooth Mountain Range as influenced by motorized and the combination of motorized and non-motorized routes.



Gallatin Mountain Range

The Gallatin Mountain Range has 30% core under Alternative 1 and 44% Alternative (see Table 3.9.3 and Fig. 3.9.4). Alternative 3 yields 56% core and Alternative 7-M provides 56%. Alternative 4 provides 53%, Alternative 5 has 59%, and Alternative 6 has 70% core for motorized. This rates as medium to medium-high core. When non-motorized is added, core declines to 25-42% under the various alternatives. The 2 TPAs most influenced by motorized routes are Gallatin Roaded and Hyalite. These are the two TPAs also most influenced by the combination of motorized and non-motorized routes and have low core values. The Sawtooth and Bozeman Creek TPAs have the highest core considering motorized routes only.

Figure 3.9.4. Comparison among alternatives for core habitat (>1 km from a route) for the Gallatin Mountain Range as influenced by motorized and the combination of motorized and non-motorized routes.

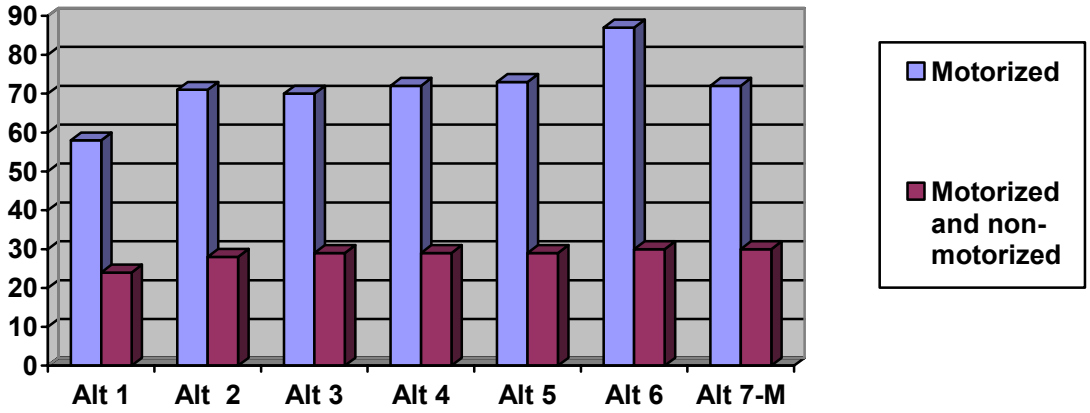


Madison Mountain Range

The Madison Mountain Range has a medium high to high rating for motorized core (see Table 3.9.3 and Fig. 3.9.5). Alternative 1 is 58%, Alternative 2 is 71%, Alternative 3 is 70%,

Alternatives 4 and 7-M are 72%, Alternative 5 is 73% and Alternative 6 is 88% core. When non-motorized routes are added, core declines to 28-30%. One of the reasons for the relatively high motorized core rating is the presence of the Lee Metcalf Wilderness. Cherry Creek TPA also rates high. Some TPAs show a lot of variation across the alternatives. These include Big Sky and Cabin Creek.

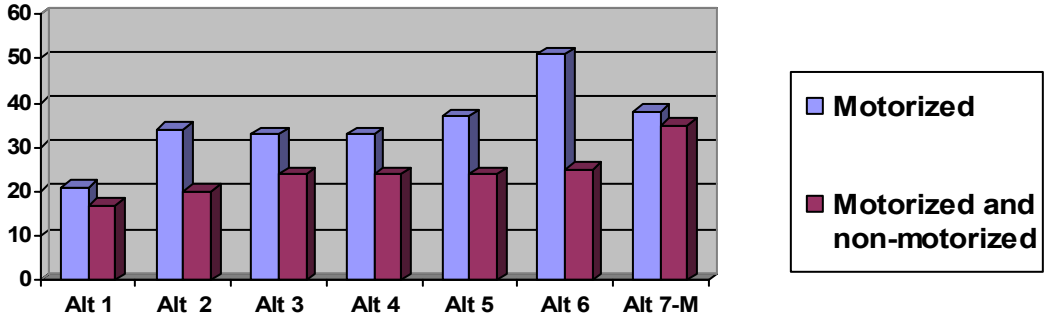
Figure 3.9.5. Comparison among alternatives for core habitat (>1 km from a route) for the Madison Mountain Range as influenced by motorized and the combination of motorized and non-motorized routes.



Henrys Mountains

The Henrys Mountains has low-medium to medium core for motorized routes only (see Table 3.9.3 and Fig. 3.9.6). Alternative 1 has 21% core while Alternatives 3 and 4 have 33% core. Alternative 2 has 34% core. Alternative 5 has 37% core, Alternative 6 has 40% core and Alternative 7-M has 38% core. When non-motorized routes are added, core drops to 17-35% for all alternatives. Of the three TPAs comprising this area, Hebgen Lake Basin has the lowest core for motorized while South Plateau has low-medium core under motorized only, but drops to only 2% core when non-motorized use is added. Lionhead has medium to medium-high core.

Figure 3.9.6. Comparison among alternatives for core habitat (>1 km from a route) for the Henry Mountain Range as influenced by motorized and the combination of motorized and non-motorized routes.



Summary

The entire Gallatin Forest, including Wilderness acreage, offers from 58-79% core (medium to medium-high) under all of the seven alternatives considering motorized routes only (Fig.3.9.7). Alternative 7-M has an increase in percent core over the existing condition (Alternatives 1 and 2), and Alternatives 5 and 6 generally have the highest percentage of core of any alternatives. With both motorized and non-motorized routes counted, the percentage core is virtually the same across all alternatives. The difference amongst alternatives is especially noticeable in the figures due to the existence of administrative and project routes in Alternative 1. The entire Forest, excluding Wilderness acreage (Fig. 3.9.8), shows the same general trend for motorized core with Alternatives 5 and 6 having the highest percentage core of any of the alternatives. Alternative 7-M would be an improvement over the current level of core (in Alternatives 1 and 2). With both motorized and non-motorized routes, the percent core is very similar across all alternatives.

Figure 3.9.7. Entire Gallatin National Forest (including Wilderness) core for motorized and a combination of motorized and non-motorized routes.

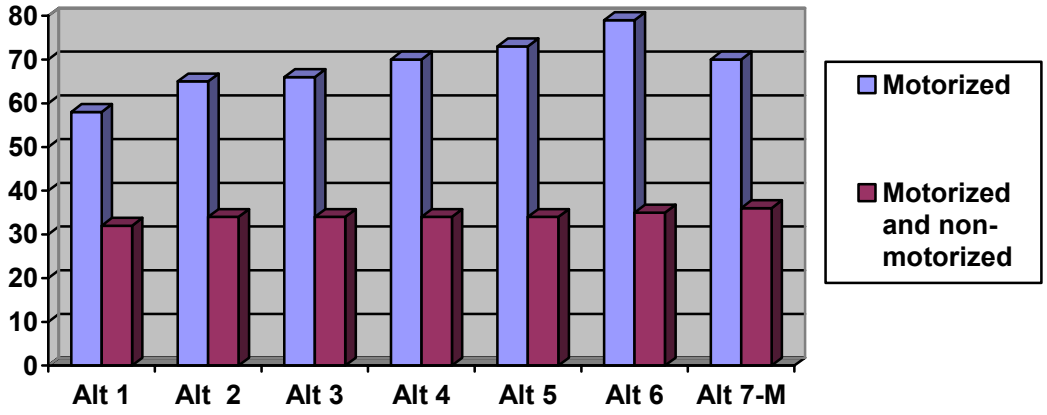
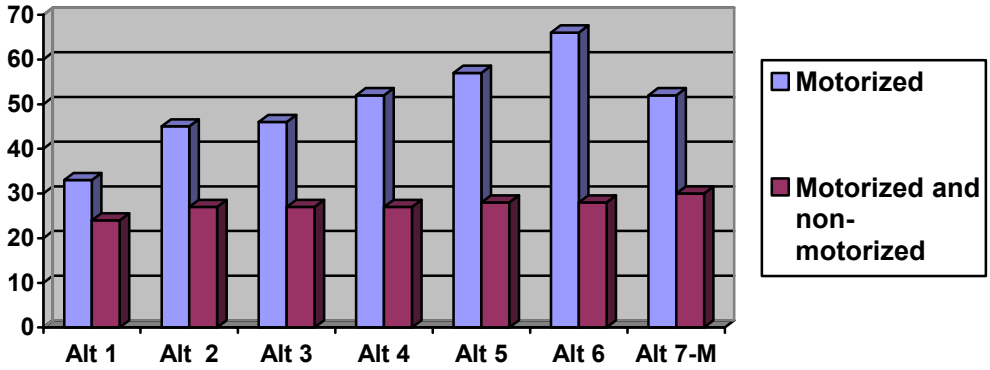


Figure 3.9.8. Entire Gallatin National Forest (excluding Wilderness) percent core for motorized and a combination of non-motorized and motorized.



Cumulative Effects

For a more thorough review see Cherry, 2006 (Cumulative Effects Worksheet in the Project Record for this issue).

Net Effects of Past and Present Programs and Activities

A common theme throughout this issue is the direct and indirect effects of motorized use on wildlife habitat. Wildlife habitat has been affected by numerous other events and activities, but many of these effects are often temporary and benefit some species while having a negative effect on other species. Habitat alteration caused by harvesting timber, livestock grazing, or implementing prescribed fires are relatively temporary in nature, with longer lasting effects to wildlife if all structure (trees and downed material) are removed from the site. In some cases there may be a change in the plant species occurring on the site, which is generally negative for wildlife if they are exotic species or if they are less desirable for most wildlife. Where prescribed fire is used as a tool to reintroduce fire into a fire dependent ecosystem such as this one, the results are generally beneficial for wildlife. Fire suppression has taken us out of the normal fire cycle and resulted in a buildup of fuels. Control of weeds is beneficial for wildlife as an attempt to return the site to native vegetation. Attempts to revegetate or rejuvenate vegetative types that have been reduced on the landscape are beneficial to many wildlife species, especially those using rarer habitats such as whitebark pine and aspen.

Mining activity can result in areas that need to be reclaimed, but can also create habitat for some species such as bats. Activity associated with mining, logging, or burning may displace some wildlife from the area while it is occurring.

Road improvements on the Forest may increase wildlife mortality where speed limits increase. Improvements also tend to lead to increased traffic and a higher risk of wildlife mortality. This same issue exists for roads not under National Forest jurisdiction that exist on the Forest. Most routes involved were 2 lane highways also the 4 lane Interstate-90. These routes, depending on the difficulty of crossing safely, can be a barrier to wildlife movement.

Most of the mortality that occurs to wildlife species occurs on high speed, paved routes such as highways. Mortality on these types of roads can be significant for some species at some times of year. This is a cumulative effect to what occurs on the National Forest system routes.

In terms of direct habitat loss, Ruediger (1996) points out that a 300-foot cleared right-of-way for a road would consume almost 6% of each section (640 acres) that it crosses. These types of rights-of-way rarely exist on the National Forest, but can affect the same wildlife that use the Forest and are a cumulative effect.

The analysis of indirect habitat loss or displacement was presented for public Forest Service motorized and non-motorized routes on National Forest only. Obviously, there is a cumulative effect of private, county, state and federal roads on the National Forest or adjacent lands that were not considered in this analysis. For some TPAs, such as Big Sky, this is a very large impact to the local area. For others, there is no effect or only a small effect. The database on private

roads, in particular, is incomplete, however, it is known that there are increasing private routes on private land and close to local communities. Therefore, the impacts to wildlife on private land and displacement of wildlife from private land are likely to continue to increase.

There are cumulative effects of the human activity associated with roads and trails. One of these is the presence of pets (usually dogs) that can provoke a predator-alarm response, harassment and energy expenditure, and occasionally direct mortality of wildlife. There are also effects of the activities that humans do when they use roads and trails, including hunting, fishing, trapping, firewood cutting, viewing wildlife, rock climbing, spelunking, etc. All of these activities can potentially disturb wildlife, and some can cause direct mortality (Knight and Cole 1995).

The presence of roads may allow non-native species of animals to more easily move into an area or be introduced into an area by humans. An example of this would be the introduction of non-native bullfrogs that can extirpate native amphibians and fish (Maxell and Hokit 1999:2.16). Another example would be the introduction of the raccoon into areas where it had not previously existed. Raccoons can have negative effects on birds via nest predation. The presence of roads may facilitate the introduction of these types of species into areas where they have never existed, where the native fauna is not equipped to respond well to their presence.

One important cumulative effect is the development that is occurring near the National Forest or on private inholdings within the Forest. Ruediger (1996) suggests that as roads of increasingly high quality become available in an area, one can expect development to increase along these linear features. Seasonal use may become year-round. Areas become developed with subdivisions and the supporting infrastructure. This has serious impacts on wildlife habitat that is a cumulative effect of the presence of roads.

There is often a time lag between when habitat alteration occurs and when ecological effects of the alteration can be detected. Habitat loss is the most immediate effect of road/trail construction and wildlife should show a fairly rapid response. The multitude of other factors such as reduced quality of habitat, wildlife mortality, and reduced connectivity has effects that may be much more difficult to detect. The effect of road mortality and disruption of connectivity may take decades or longer to appear. Roads and motorized trails can lead to reduction of wildlife habitat, alteration of habitat and fragmentation. Motorized routes may reduce populations. However, most wildlife populations can and do persist in the presence of motorized routes. The rate of change and the rate of disturbance are critical in allowing species to adapt to change. The threshold motorized route density at which wildlife can no longer survive and function is not known, and probably differs greatly by species. For some large mammal species, some literature suggests that densities of 0.75-1.0 mi/sq mi of motorized routes are tolerated (Maxell and Hokit 1999:134-137).

Dispersed recreation has increased on the Forest, and the appreciation for nonconsumptive uses of wildlife has also increased. Increased human use of the Forest also displaces wildlife and can degrade habitat. Recreational residence sites remove wildlife habitat and may displace wildlife in those areas. Most of the approximately 200 recreational residences on the Forest are located on the Bozeman and Hebgen Lake Ranger Districts. Outfitter/guides are offering more non-consumptive wildlife activities and this type of use is increasing. Outfitter/guides also take many hunters into the Forest. Outfitter/guiding is regulated, and probably is less impactive to wildlife

than non outfitted activities. Developed ski areas are more likely to affect wolverine and lynx which are addressed as separate topics in this EIS. Some wildlife species could be affected by removal of trees from these areas.

The acquisition of lands and conservation easements on lands that were in checkerboard ownership or adjacent to the Forest is of critical importance to wildlife and has made a huge improvement in the Forest's ability to manage wildlife habitat and protect important wildlife areas from development.

The main concern with non-recreation special uses is during the period of construction and then afterwards if any motorized routes are created during the construction and are needed for maintenance.

Many wildlife species have rebounded from the early efforts of hunting, trapping and predator control. Wildlife in Montana is managed by Montana Fish Wildlife and Parks with regulated hunting, fishing and trapping regulations with the intent of conserving these species. Legislation such as the ESA has led to protection of threatened and endangered species and has shown success in the delisting of the peregrine falcon, and potential future delistings of the bald eagle and grizzly bear in the Yellowstone area. These species have met their recovery criteria. The reintroduction of the gray wolf is one of the most interesting things to occur in this area with its subsequent impact on a whole suite of predators as well as prey. Not only are these animals influenced, but apparently there are influences that are occurring on the wildlife habitat as evidenced by an increase in riparian vegetation such as willow and aspen.

The Canada lynx was listed as threatened under ESA in 2000, and the Forest Service is using the Lynx Conservation Assessment and Strategy (Ruediger et al. 2000) to guide its management of lynx habitat.

Fisheries management tends to benefit wildlife habitat as well, especially when riparian areas are improved.

The existence of large Wilderness areas on the Gallatin and adjacent Forests and large protected areas within Yellowstone National Park offers a refuge for many wildlife species sensitive to the presence of humans. This has led to the presence of a high percent of habitat that is non-motorized and where wildlife is relatively undisturbed by large numbers of people.

Projected Combined Effects of Reasonably Foreseeable Programs and Activities

Future vegetation management projects will be more tied to fuels reduction and will tend to be patchier in nature, leaving some structure for wildlife in burned or harvested areas. Few, if any, new roads will be built to access areas for this type of work. Those that are built will be project roads, not open to the public and closed and obliterated after the work is completed. Since this is a major impact of these activities to wildlife species, this is a vast improvement. The increase in use of prescribed fire on the landscape should be beneficial to wildlife in this fire dependent

ecosystem where fire has been somewhat successfully excluded in the last 60 years. Return to a more normal fire cycle and regime will be beneficial to wildlife.

Future livestock grazing on the Forest will consist primarily if not exclusively of cattle and horses, and fewer depredations and conflicts will result. Improved range management practices and monitoring of range condition will improve wildlife habitat. Control of noxious weeds is important for maintaining high quality wildlife habitat and efforts at this should increase in the future. Efforts to restore native vegetation to the landscape or enhance species that are declining are beneficial to wildlife.

Exploration for leasable and locatable minerals is of concern due to its rather unpredictable nature. The greatest potential for leasable minerals is in the Crazy and Bridger mountains at this time.

Future improvements of FS roads and motorized trails may increase the impact of these facilities to wildlife by encouraging greater use. Other routes will be decommissioned, which will benefit wildlife in general.

An increase in dispersed use in which many of the dispersed users are interested in wildlife may actually be somewhat detrimental to the resource they wish to see, photograph, or hunt. Additional education of the public on their wildlife resource is important so that wildlife habitat is protected as are the animals that use it. Increasing public use will decrease the ability of wildlife to fully occupy available habitat, and some species are more likely to be affected than others. Recreation residences are not expected to increase in the future, and their impacts will be about the same as they are at present. Outfitter/guide activity may increase, particularly for somewhat less traditional uses such as kayaking, wildlife watching, and photography. There are likely to be some impacts to wildlife, but outfitters and guides will be under permit and should have less impact to wildlife than non outfitted users. No new impacts from ski areas are foreseen except for a minor loss of cover in these areas where routes are maintained.

The Forest will continue to acquire appropriate lands and conservation easements that will have an overall beneficial effect for wildlife.

Requests for special uses permits for non-recreational uses will continue. The main concern would be during the construction phases of the projects and then afterward if any motorized access routes are created. All of these requests will go through site-specific NEPA.

The expansion of the Food Storage Order Forest-wide will be beneficial for wildlife. It will keep wild animals from becoming habituated to human food and losing their innate fear of humans. The future amendment of the Conservation Strategy for Grizzly Bear to the Forest Plans in the GYA and the Northern Rockies Lynx Amendment will help assure the conservation of these species and likely have beneficial effects on other species.

Future fisheries habitat enhancement will be of benefit to wildlife, especially when riparian areas are improved. Hunting will continue to be used as a management tool by Montana Fish Wildlife and Parks.

As human population and traffic in the area increases, the potential for wildlife mortality on highways increases. Increased driving speeds and poor sight distances contribute to mortality. Working with the highway departments on wildlife passage is important. Requests to access private land across the National Forest are likely to continue and must be granted in most cases. These projects will have to go through separate NEPA.

Implementation of the Gallatin National Forest's travel management plan will result in a reduction of motorized routes on the Forest and thus increase non-motorized habitat for wildlife. Other Forests are also undergoing travel management planning, either by district or Forest. The trends are similar on other Forests.

Cumulative Effects of Past, Present and Reasonably Foreseeable Programs and Activities with the Travel Plan Alternatives

Alternative 1
This alternative in combination with other cumulative actions has the greatest potential impact to wildlife on the Forest. This is because under Alternative 1, the OHV rule is not in place, off-road vehicle use is allowed and routes are not designated. Project roads will continue to be open and administrative roads may or may not be gated. In addition, the motorized and non-motorized routes on the Forest will continue to proliferate, further decreasing core habitat for wildlife.

Alternative 2 through 7-M
Alternatives 2 through 7-M are beneficial to wildlife, with those having the most core habitat, being the most beneficial. By implementing a Travel Plan, human travel will primarily be focused on designated routes (either motorized or non-motorized), and wildlife can tend to habituate to predictable uses in predictable locations. Wildlife is displaced by unpredictable types and locations of human uses. The OHV EIS, which disallows cross country motorized use will reduce displacement away from roads and trails in some species and individuals. In addition, there will be little loss of wildlife habitat by additional routes. Through implementation of a Travel Plan, wildlife movement corridors on the Forest can be protected from further impact. Most impacts to wildlife are a result of private actions, and not the actions of the agency. Implementing any of Alternatives 2 through 7-M, especially those that enhance core habitat the most (Alts. 5, 6, and 7-M) will improve wildlife habitat over Alternative 1. In general, Alternatives 5 and 6 have slightly more core habitat than the other alternatives. Some TPAs have fairly low percent core under all alternatives, and do not appear to have much potential for improvement.

Cumulatively, present and future management actions on the Gallatin National Forest generally improve wildlife habitat over the current condition. There are large pieces of non-motorized habitat found in the National Parks and Forests in the Yellowstone area. Alternatives 2 through 7-M of this travel plan, especially 5, 6 and 7-M, provide increased acreage of non-motorized habitat for wildlife which decreases both direct and indirect habitat loss. Most impacts to wildlife are a result of private land actions, and do not result from the actions of the Forest Service or other agencies. Alternative 7-M directs the Forest to follow current grizzly bear and lynx direction which is also beneficial to other wildlife.

Effects of Proposed Goals, Objectives, Standards and Guidelines

Alternatives 2 through 7-M propose a number of goals and objectives to provide for recreation opportunity, access and to improve other resource conditions that may have been adversely affected by the Forest's transportation system. Goals and objectives, by themselves, have no environmental effect because they do not constitute final agency decisions. Environmental effect under NEPA is more appropriately addressed at such time that specific actions are proposed to achieve these goals and objectives. The proposed Travel Management Plan does include the final agency decisions for management of public travel and this reflects implementation of the goals and objectives proposed for recreation opportunity (for example Forest-wide Goal A, Objective A-1, and Travel Planning Area Goals 1 and 2 and Objectives 1-1 and 2-1). The predicted direct, indirect and cumulative effects of public travel on General Wildlife, and hence the implementation of these goals and objectives are addressed earlier in this section.

Alternatives 2 through 7-M also propose standards and guidelines to provide for protection of other resources during Travel Plan implementation. Standards and guidelines include protection measures within which future proposals for road and trail construction, reconstruction, maintenance and decommissioning must take place. These are considered final agency decisions because they set limitations within which future actions must take place.

The proposed goals, objectives, standards and guidelines that are relevant to the protection and improvement of General Wildlife are discussed below.

Where Alternative 7-M differs from Alternatives 2-6, it is noted below in parentheses. The benefits to general wildlife accrue through the implementation of an alternative which designates routes, places the Forest under the OHV EIS and generally reduces motorized routes and protects wildlife habitat. Many items are fairly general but benefit wildlife by protecting or enhancing habitat for wildlife and/or fish, protecting rare habitats or rare species, promoting connectivity, or reducing human impacts. Additional comments on how this direction affects general wildlife appear below in italics.

Proposed Forest-wide Direction, Alternatives 2-6 and 7-M

Standard A-6. Off-route travel. Wheeled motorized vehicle travel shall be prohibited off of designated routes with the following exceptions. (This standard and the following exceptions under Alternatives 2-6 become Standard A-8 in Alternative 7-M. There are slight modifications of wording in the exceptions from Alts. 2-6 to Alt. 7-M.) *This standard is beneficial to many species of plants and animals by limiting almost all use to designated routes with minor exceptions, rather than allowing off-route use.*

GOAL C. Resources (General). Manage a system of roads and trails and associated public use that is consistent with Forest Plan goals for water quality; wildlife habitat; fish habitat; threatened and endangered species recovery; and historical resources (Note: Until Forest Plan revision refer to Forest Plan (9/87), pages II-1, II-2, and Amendment 19). (This Goal under Alternatives 2-6 becomes Goal D in Alternative 7-M, and the following objectives remain the same.) *This goal is*

beneficial to many species and their habitats on the Forest by allowing uses consistent with water quality, wildlife habitat, fish habitat, etc.

> **OBJ. C-1. Road Rehabilitation.** Close and rehabilitate existing roads that are in excess to administrative, recreation and access needs. (This objective becomes **Objective D-1** under Alternative 7-M.) *This objective reduces the amount of roads which reduces their effects on general wildlife species and habitat.*
>
> **OBJ. C-2. Trail Rehabilitation.** Close and rehabilitate existing non-system trail not otherwise designated for public travel. (This objective becomes **Objective D-2** under Alternative 7-M.) *This objective reduces impacts of humans on general wildlife species and habitat.*

GOAL D. Fisheries. Manage a road and trail system that fully supports the beneficial use of growth and propagation of salmonid fishes and associated aquatic life. This is followed by a number of objectives. (In Alternative 7-M, Goal D becomes **Goal E. Water Quality, Riparian, Fisheries and Aquatic Lif**e with numerous objectives, standards, and one guideline.) *The protection of water quality, riparian habitats, fisheries helps to protect important wildlife habitat. The language in Alternative 7-M is an improvement over the language in Alts. 2-6.*

GOAL E. Wildlife Corridors. Provide for wildlife movement and genetic interaction (particularly grizzly bear and lynx) between mountain ranges at Bozeman Pass (linking the Gallatin Range to the Bridger/Bangtails); in the North Bridgers (linking the Bridger Range to the Big Belt Mountains); across Highway 191 from Big Sky to it's junction with Highway 287 (linking the Gallatin and Madison Mountain Ranges); the Lionhead area (linking the Henry's Lake Mountains to the Gravelly Mountains and areas west); Yankee Jim Canyon (linking the Absaroka Mountains to the Gallatin Range); and at Cooke Pass (linking the Absaroka/Beartooth Range to areas south). *This goal and TPA specific objectives help protect and allow for movement of wildlife between mountain ranges.* (Under Alternative 7-M, Goal E becomes **GOAL F. Wildlife Corridors**, and it is worded differently. Provide for wildlife movement and genetic interaction (particularly for wide-ranging species) between and within mountain ranges throughout the Gallatin National Forest and connecting wildlands. **OBJ. F-1.** Provide habitat connectivity consistent with wildlife movement patterns between mountain ranges such as that at Bozeman Pass (Linking the Gallatin Range to the Bridger/Bangtails); the North Bridgers (linking the Bridger Range to the Big Belt Mountains); the Lionhead Area (linking the Henry's Lake Mountains to the Gravelly Mountains); the Shields (Crazy Mountains to the Castle and Little Belt Mountains) and any additional linkage or wildlife movement corridors recognized by the Forest Service.) *The language change between Alts. 2-6 and 7-M is an effort to move all of the direction into Forest-wide direction, and allows recognition of the potential addition of new corridors in the future. It also names the corridors that seem to be important connections among mountain ranges and deletes a few of the corridors that are currently less well documented. Corridors are recognized as essential for allowing wildlife movement and allowing wildlife populations to be as connected as they have been in the past.*

GOAL F. Threatened, Endangered and Sensitive Wildlife Species. Manage human use of the Forest road and trail system that allows for the recovery of threatened and endangered

species and maintains sensitive species and their habitats. (This becomes **Goal G. Threatened, Endangered and Species of Special Management Designation**. This wording change from Sensitive Species to Species of Special Management Designation allows for the potential change of designations of species that the Forest manages under the New Planning Rule such as Special of Concern.) *This goal helps protect and recover T&E species and other rare species and their habitats.*

> **OBJ. F-1. Grizzly Bear Recovery.** Within the grizzly bear recovery zone reduce total summer motorized access route density and increase core (secure) habitat, consistent with the Grizzly Bear Conservation Strategy, within subunits Gallatin #3, Henry's Lake #2 and Madison #2. Provide effective closures on access routes not designated for motorized use. (In Alts 2-6.) (Under Alternative 7-M **Objective G-1** is: Provide effective closures on access routes not designated for motorized use. Grizzly Bear subunits Gallatin #3, Henry's Lake #2, and Madison #2 and non-designated routes that are attractive to motorized use within secure grizzly bear habitat should receive high priority.) *This helps assure that priority is given to closing routes in important grizzly bear habitat which can benefit other wildlife species.*
>
> **OBJ. F-2. Grizzly Bear Recovery.** Provide for no human-grizzly bear interaction that results in personal injury or bear mortality. Provide all visitors to the trail system of the Gallatin National Forest with information on proper food storage and safe recreation use. (In Alts. 2-6)
>
> **STANDARD F-1. Grizzly Bear Recovery.** Within the grizzly bear recovery zone (as described in Gallatin Forest Plan, 9/87), any new motorized route constructed and used for administrative or other purposes will be offset by closure of another open motorized route of equal or greater length within the same bear management subunit. (This standard is applicable to alternatives 2 through 6 and is based on Amendment 19 of the 1987 Gallatin National Forest Land and Resource Management Plan (1995) that established certain requirements for the protection of the threatened grizzly bear.)
>
> **STANDARD F-2. Lynx.** In accordance with the Lynx Conservation Strategy there shall be no net increase in any groomed or marked snowmobile or ski routes or designated play areas on the Gallatin National Forest. (This standard applies to alternatives 2 through 6. The standard would mean that there could not be a net increase in groomed or marked routes or play areas once the travel planning decision has been made. This standard does not exist in Alternative 7-M).

Under Alternative 7-M, Guidelines G-2 Species of Special Management Designation, and **Guideline G-3, Threatened and Endangered Species** are brought into the EIS. Under G-2, new proposed routes are located to avoid important habitats of Species of special management designation, and mitigation measures are suggested. **Guideline G-3** for T&E species allows for temporary localized restrictions to prevent conflicts with T&E species.

In addition to the proposed programmatic direction, travel management under Alternative 7-M would follow current direction applicable to the management of grizzly bear and lynx. At the

time of this EIS publication, the applicable direction is based on Memorandums of Understanding (MOU's) and Conservation Agreements (CA) with the United States Fish and Wildlife Service (USFWS). See MOU, Conservation Strategy (ICST 2003:12-13), the USFWS Biological Opinion on Access (1995), and Canada Lynx Conservation Agreement (2005). *Alternative 7-M, by following current direction for grizzly bear and lynx and by that wording allowing the Grizzly Bear Conservation Strategy for Grizzly Bears in the GYA and the Northern Rockies Lynx Amendment to become our current direction as these decisions are made, benefits these T&E species by using the best science and current information in their management. Many actions for T&E species benefit other wildlife species.*

GOAL G. Wildlife. Provide for healthy vegetative conditions in key habitats such as willow, riparian, wetlands, whitebark pine, and potential old growth. (This becomes **Goal H. Wildlife** in Alternative 7-M, and several other key habitats are enumerated.) *Maintaining key habitats, which host more species than other habitats, is important for general wildlife species habitat.*

> **OBJ. G-1.** Strive for no unclassified, undesignated roads and trails within key habitats that have been damaged or is devoid of native vegetation due to motorcycle, ATV, horse or foot use. (This Objective is dropped from Alternative 7-M, and **Guidelines H-1 and H-2** are added. **H-1**. Relocate, reconstruct or take other appropriate action on system roads and trails that are found to have adverse impacts on key habitats. **H-2,** Roads and trails should be located to avoid key habitats or mitigate the impacts.) *Maintaining key habitats that are important for many wildlife species benefits general wildlife.*

GOAL H. Wildlife. Provide high quality security habitat in areas important to wildlife reproduction (e.g. calving, fawning, denning and nesting habitat). (This becomes **Goal I** in Alternative 7-M.) *Protection of reproductive habitats is important for general wildlife species and habitat.*

> **OBJ. H-1.** Minimize stress factors from human recreation use to species of concern during calving, fawning, denning and nesting seasons in habitats used for reproduction. See specific travel management area direction. (This becomes **Guideline I-1** in Alternative 7-M.)

GOAL I. Wildlife. Provide high quality security habitat on important ungulate winter range. (In Alternative 7-M this was consolidated into Goal H.)

> **OBJ. I-1. Ungulates.** Eliminate stress factors from human winter recreation use to ungulates in important winter range areas. (This Objective is part of Objective I-1 in Alternative 7-M.) *Although ungulates tend to be common species, providing security on big game winter range also benefits general wildlife*.
>
> **Guideline I-2**. This is new under Alternative 7-M and states that in management of winter travel should consider MFWP goals for optimal survival on big game winter ranges.

Alternatives 3 and 7-M both have language regarding the consideration of backcountry airstrips. Basically, proposals for airstrips (airplane and helicopter) will be considered and must go through NEPA analysis and would be under special use permits. Under Alternative 3, a number of airstrips are proposed. Under Alternative 7-M, backcountry airstrips for public recreational use will not be considered in designated Wilderness, the Hyalite/Porcupine-Buffalo Horn Wilderness Study Area, the Cabin Creek Recreation Wildlife Management Area, the Lionhead and Republic Mountain Recommended Wilderness Areas, or within the Grizzly Bear Recovery Zone. For general wildlife, it is preferable not to allow airstrips at all, but if allowed, Alternative 7-M, which restricts some areas for this activity, is preferable over Alternative 3, because backcountry airstrips disturb and displace wildlife.

In Alternatives 2-6, there were additional categories of Administrative Uses and Road and Trail Construction, Reconstruction and Maintenance for Forest Plan direction. These do not exist under Alternative7-M, but are meshed with other Goals, Objectives, Standards and Guidelines.

Overall, the modifications of Goals, objectives, standards and guidelines that occur from Alternatives 2-6 to 7-M are more clear and concise and more of them become Forest-wide. The wording in 7-M is preferable over that in the other alternatives for the General Wildlife issue.

Consistency with Laws, Regulations, Policy, and Federal, Regional, State and Local Land Use Plans (including the Forest Plan)

Management to retain core wildlife habitat (habitat undisturbed by human activity) is consistent with the Gallatin Forest Plan and laws, regulations, and policy. There is some direction for general wildlife in the Forest Plan. Forest Plan Goal A.7 is to *"Provide habitat for viable populations of all indigenous wildlife species and for increasing populations of big game animals."* There is also a goal (Goal A.8) to *"Provide sufficient habitat for recovered populations of threatened and endangered species…"*. Most of the Forest Plan standards for wildlife and threatened and endangered species are specific to certain species or groups of species (USDA 1987:II-1, 17-19). Management to retain core wildlife habitat is consistent with these standards, however there is not specific direction which states that the Forest must have a certain percentage core habitat or how it must be distributed.

The Cabin Creek area on the Hebgen Lake Ranger District features a diverse mix of habitats with grass/forb meadows containing abundant forage for grazing animals, large stands of whitebark pine trees providing critical grizzly bear forage, many springs and seeps with green vegetation and water late into the driest parts of summer, along with areas of heavy forest cover. This area provides some of the highest quality wildlife habitat on the Gallatin National Forest, particularly for elk and grizzly bears. This was recognized by the Lee Metcalf Wilderness and Management Act of 1983 (Public Law 98-140), which stated that "the Congress finds that certain lands within the Gallatin National Forest near Monument Mountain have important recreational and wildlife values, including critical grizzly bear and elk habitat." The Act established the Cabin Creek Recreation and Wildlife Management Area (CCRWMA) and provided special protection for wildlife habitat in this area. It states that, "the Secretary shall permit continued use of the area by motorized equipment only for activities associated with existing levels of livestock grazing,

administrative purposes (including snowmobile trail maintenance) and for snowmobiling during periods of adequate snow cover but only where such uses are compatible with the protection and propagation of wildlife within the area." No definable threshold for evaluating compatibility of motorized uses with the protection and propagation of wildlife were included in the Act.

Because the CCRWMA has particularly high quality habitat for elk and grizzly bears relative to other wildlife species, the analysis for the Grizzly Bear and Big Game Issues were used to evaluate the consistency of the alternatives with the Act's requirement to ensure that motorized uses allowed in the CCRWMA are compatible with the protection and propagation of wildlife. All alternatives would be consistent with the Act due to the lack of a definable threshold for evaluating the propagation and protection of wildlife requirement of the Act. However, summer motorized use under Alternatives 5 through 7-M would better provide for the protection and propagation of wildlife in the CCRWMA compared to Alternatives 1-4. The grizzly bear analysis for the Madison #1 BMS noted an increase in secure habitat from Alternatives 1 and 2 to Alternatives 3 through 7-M. It also noted that although secure habitat values in this BMS differed little among Alternatives 3 through 7-M, Alternatives 5 through 7-M would reduce disturbance, displacement, and mortality risk for grizzly bears relative to Alternatives 3 and 4 by restricting ATV use within the CCRWMA to a portion of Trails #68 and 203. The big game analysis in the FEIS noted that elk vulnerability to hunting would be moderate for Hunting District 362 under Alternatives 1-4 because ATV's would be allowed on several trails in the CCRWMA. Increased restrictions on ATV use under Alternatives 5 through 7-M would result in a substantial reduction in elk vulnerability to hunting.

The CCRWMA does not provide elk winter range because it is a high elevation area with deep snow cover, and winter travel was therefore not an issue for elk in this area. The Grizzly Bear Issue disclosed that the effects of snowmobile use on grizzly bears are generally not significant, and that the effects of winter travel would be limited to some potential disturbance of individual bears. All Alternatives for winter travel would therefore be consistent with the Act's requirement for protection and propagation of wildlife.

The current condition for travel management, Alternative 1, which allows for a proliferation of motorized use, and does not limit motorized use or cross-country use, will reduce core habitat if allowed to continue. Motorized creep would occur with many more user built routes and double track routes appearing throughout the Forest. Alternative 1 could threaten the viability of some species in the future.

Alternatives 2 through 7-M take positive action by removing project roads and most administrative routes from public use and limiting cross-country routes as well as designating routes. The alternatives that take the strongest measures to limit motorized use and protect connectivity are the alternatives that best provide core wildlife habitat. These are Alternatives 5, 6, and 7-M.

Table 3.9. 3 Percent of core acres, or habitat not affected by motorized (M) and motorized and non-motorized (M/N) routes combined, by alternative. Project and administrative roads were excluded from this analysis for Alternatives 2 through 7-M, but were included for Alternative 1.

MOUNTAIN RANGE/ Travel Planning Area	PERCENT CORE ACRES														Motorized Rating
	Alt. 1		Alt. 2		Alt. 3		Alt. 4		Alt. 5		Alt. 6		Alt. 7-M		
	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	
CRAZY MOUNTAINS	45	38	60	44	56	42	70	43	76	43	71	43	70	44	M-MH
East Crazies	68	55	74	56	80	56	95	57	97	57	97	57	89	57	MH-H
Ibex	13	13	28	13	30	28	42	28	64	28	78	28	62	28	LM-MH
Shields	10	10	44	30	16	16	27	20	37	21	43	21	34	24	L-M
	17	16	31	18	34	15	51	16	58	17	62	17	42	16	LM-MH
Bangtails	1	1	25	4	12	1	13	1	13	1	15	1	2	1	L-LM
Bridger Canyon	14	14	69	16	81	7	87	7	88	7	88	7	79	7	MH-H
Fairy Lake	8	6	34	10	7	7	12	8	16	8	28	8	12	7	L-LM
North Bridgers	13	13	19	14	40	19	65	19	74	23	74	23	64	18	L-MH
West Bridgers North	38	38	39	39	39	31	62	37	81	37	82	37	60	36	L-MH
West Bridgers South	15	14	15	14	53	11	90	11	90	11	90	11	53	11	L-H
BEARTOOTH MOUNTAINS	81	43	81	43	83	42	84	42	87	42	87	42	84	43	H
Beartooth Plateau	99	62	99	62	98	62	99	62	99	62	99	62	99	62	H
AB Wilderness	97	44	98	45	98	45	99	45	99	45	99	45	99	45	H

MOUNTAIN RANGE/ Travel Planning Area	PERCENT CORE ACRES														Motorized Rating
	Alt. 1		Alt. 2		Alt. 3		Alt. 4		Alt. 5		Alt. 6		Alt. 7-M		
	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	
Cooke City	51	45	53	45	53	44	53	44	55	45	62	45	53	45	M-MH
Deer Creeks	16	16	20	18	32	18	35	18	54	18	60	18	30	19	LM-MH
East Boulder	40	40	44	44	44	43	62	43	62	43	62	43	43	42	M-MH
Gardiner Basin	12	8	24	15	27	16	27	16	27	16	27	16	27	16	LM
Main Boulder	49	31	56	32	67	34	76	34	76	34	76	34	75	40	M-MH
Mill Creek	46	41	63	47	54	30	58	31	62	31	62	31	62	42	M-MH
Mission	50	39	59	39	75	41	75	41	75	41	75	41	85	43	M-MH
Yankee Jim Canyon	58	42	81	43	88	47	88	47	88	57	88	57	88	48	H
GALLATIN RANGE	30	20	44	25	56	42	53	43	59	28	70	28	56	26	M
Bear Canyon	22	21	35	30	36	20	36	27	56	27	56	27	44	20	LM-M
Bozeman Creek	45	28	83	29	84	28	86	28	86	35	86	28	86	28	H
Gallatin Crest	37	20	44	22	59	22	67	22	74	22	92	22	68	23	M-H
Gallatin River Canyon	41	24	43	25	47	26	47	26	51	26	50	26	50	27	M
Gallatin Roaded	1	1	12	5	8	6	8	6	8	6	8	6	8	7	L
Hyalite	4	4	6	6	16	5	16	5	16	5	18	5	16	5	L
Porcupine Buffalo Horn	37	30	40	32	39	33	41	33	63	33	95	33	55	33	M-H
Sawtooth	92	64	99	67	99	67	99	67	99	80	99	80	99	67	H
Tom Miner Rock	25	20	55	39	45	43	55	43	59	46	59	46	55	43	M
Yellowstone	16	9	48	14	48	24	59	24	59	24	59	24	60	25	M

MOUNTAIN RANGE/ Travel Planning Area	PERCENT CORE ACRES														Motorized Rating
	Alt. 1		Alt. 2		Alt. 3		Alt. 4		Alt. 5		Alt. 6		Alt. 7-M		
	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	M	M/NM	
MADISON RANGE	58	24	71	28	70	29	72	29	73	29	88	30	72	30	MH-H
Big Sky	58	21	51	25	30	14	41	14	41	14	85	25	41	14	F-H
Cabin Creek	36	26	55	28	52	28	53	28	54	28	83	28	54	28	F-H
Cherry Creek	61	27	94	32	94	37	97	37	97	37	97	37	94	40	H
LM Wilderness Hilgards	95	44	97	46	98	46	98	46	98	46	98	46	98	46	H
LM Wilderness Monument	99	49	99	49	100	49	100	49	100	49	100	49	100	54	H
LM Wilderness Spanish Peaks	98	29	98	29	98	29	98	29	98	29	98	29	98	29	H
Taylor Fork	27	9	44	12	44	17	46	17	49	17	82	17	49	17	M-H
HENRYS MOUNTAINS	21	17	34	20	33	24	33	24	37	24	51	25	38	35	LM-M
Hebgen Lake Basin	14	12	17	15	18	15	18	15	18	16	20	18	18	16	L
Lionhead	40	32	48	34	51	39	50	39	62	39	65	39	61	56	M-MH
South Plateau	2	2	32	6	25	13	25	13	25	13	28	13	29	29	LM
FOREST TOTAL (including Wilderness)	**58**	**32**	**65**	**34**	**66**	**34**	**70**	**34**	**73**	**34**	**79**	**35**	**70**	**34**	**MH**
FOREST TOTAL (not including Wilderness)	**33**	**24**	**45**	**27**	**46**	**27**	**52**	**27**	**57**	**28**	**66**	**28**	**52**	**30**	**M-MH**

Rating: 0-19% = low (L), 20-39% = low-medium (L-M), 40-59% = medium (M), 60-79% = medium-high (M-H), 80-100% =high (H), based on motorized use only.