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File: M19 Beaverhead-Deerlodge National Forest
(Revised Forest Plan)

October 4, 2010

David R. Myers, Forest Supervisor
Beaverhead-Deerlodge National Forest
420 Barrett Street
Helena, Montana 59725

Dear Mr. Myers:

The U.S. Fish and Wildlife Service (Service) has reviewed the revised biological assessment regarding the effects of the Beaverhead-Deerlodge Revised Forest Plan on the threatened grizzly bear (*Ursus arctos horribilis*). Your revised biological assessment, with a determination of likely to adversely affect grizzly bears, was received in this office on August 4, 2010.

We previously completed formal consultation on the effects of the Revised Forest Plan on gray wolves (*Canis lupus*) on September 24, 2008. Since that consultation, on September 21, 2009, a court order enjoined the Service from removing the Yellowstone grizzly bear DPS from the list of threatened species. The final rule designating the Yellowstone DPS and removing the Yellowstone grizzly bear DPS from the list of threatened species was vacated and remanded to the Service. Therefore, Yellowstone Grizzly Bear Ecosystem (YGBE) grizzly bears are once again listed as a threatened species. The revised biological assessment only analyzes the effects of the proposed action on grizzly bears. The attached biological opinion on grizzly bears was prepared in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

A complete project file of this consultation is on file at the Service's Montana Field Office. If you have questions or comments related to this issue, please contact Anne Vandehey or Katrina Dixon or me at (406) 449-5225.

Sincerely,

R. Mark Wilson
Field Supervisor

enclosure

cc: AES, R-6, MS 60120 (Attn: Sarena Selbo)
Montana Department of Fish, Wildlife, and Parks, Helena, MT (Attn: Director)
File: 7759 Biological Opinions - 2010

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

DRAFT BIOLOGICAL OPINION

on the

**Effects of the Revised Land and Resource Management Plan (2008)
For the Beaverhead-Deerlodge National Forest
on Grizzly Bears**

Beaverhead-Deerlodge National Forest

Agency: U.S. Department of Agriculture
U.S. Forest Service
Beaverhead-Deerlodge National Forest
Dillon, Montana

Consultation Conducted by: U.S. Fish and Wildlife Service
Montana Field Office
Helena, Montana

Date Issued: October 4, 2010

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I. INTRODUCTION

In this biological opinion, the U.S. Fish and Wildlife Service (Service) analyzed the revision of the Land and Resource Management Plan (Revised Forest Plan) for the Beaverhead-Deerlodge National Forest (Forest) and the potential effects of implementation of the plan on grizzly bears (*Ursus arctos horribilis*). Formal consultation was initiated on November 3, 2009, the date the Service received the biological assessment (U.S. Forest Service 2009) for grizzly bears. A revised biological assessment was received on August 4, 2010 (U.S. Forest Service 2010).

Section 7(b)(3)(A) of the Endangered Species Act of 1973, as amended (Act) requires that the Secretary of Interior issue biological opinions on federal agency actions that may adversely affect listed species or critical habitat. Biological opinions determine if the action proposed by the action agency is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. Section 7(b)(3)(A) of the Act also requires the Secretary to suggest reasonable and prudent alternatives to any action that is found likely to result in jeopardy or adverse modification of critical habitat, if any has been designated. This biological opinion addresses only impacts to federally listed species and does not address the overall environmental acceptability of the proposed action.

Consultation History

Informal consultation for the proposed Forest Plan Revision began in 2004. Further consultation has been ongoing, through email, meetings, and phone conversations with Forest staff. In addition to grizzly bears, consultation issues included gray wolves (*Canis lupus*), bald eagles (*Haliaeetus leucocephalus*), Canada lynx (*Lynx canadensis*), and bull trout (*Salvelinus confluentus*). Since informal consultation began on the Forest Plan Revision, the bald eagle was delisted (August 8, 2007; 72 FR 37346), the Yellowstone Grizzly Bear Ecosystem population of grizzly bears was delisted (April 30, 2007; 72 FR 14866) and the Forest was determined to be unoccupied by Canada lynx (May 2006; U.S. Fish and Wildlife Service and U.S. Forest Service 2006 *in litt*). The effects analysis for bull trout occurred in a separate formal consultation completed on December 19, 2008 and formal consultation on gray wolves was completed on September 24, 2008. The Revised Forest Plan was issued in January of 2009.

On September 21, 2009, a court order enjoined the Service from removing the Yellowstone DPS from the list of threatened species. The final rule designating the Yellowstone DPS and removing the Yellowstone grizzly bear DPS from the list of threatened species was vacated and remanded to the Service. Therefore, Yellowstone Grizzly Bear Ecosystem (YGBE) grizzly bears are once again listed as a threatened species and the Forest prepared another biological assessment to include an effects analysis and determination for grizzly bears.

The biological assessment found the Revised Forest Plan not likely to adversely affect grizzly bears and we received the request for consultation on the effects of the Revised Forest Plan on grizzly bears on November 3, 2009 (U.S. Forest Service 2009). Since receipt of the biological assessment, discussions between Forest and Service staff have included the potential adverse effects that may result from the Revised Forest Plan. The Service requested that the Forest change the determination for grizzly bears to a likely to adversely affect and request formal consultation via email on February 8, 2010. The Forest responded on February 11, 2010 via

email agreeing to change their original not likely to adversely affect determination to likely to adversely affect. Upon further discussion, the Service requested a revised biological assessment with additional information regarding potential effects of the Revised Forest Plan on grizzly bears. We received a revised biological assessment on May 27, 2010. This revised biological assessment had made the determination that the Revised Forest Plan may affect but is not likely to adversely affect grizzly bears. Again, the Service requested that the Forest change its determination to a likely to adversely affect and request formal consultation. On August 4, 2010, we received a new revised biological assessment with a determination that the Revised Forest Plan may affect and is likely to adversely affect grizzly bears.

The biological assessment (U.S. Forest Service 2009), revised biological assessment (U.S. Forest Service 2010), supplemental information and discussions throughout the informal and formal consultation process were used in the preparation of this biological opinion. A complete project file of this consultation is on file at this office.

II. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the Revised Beaverhead-Deerlodge Land and Resource Management Plan (Revised Forest Plan). The previous management plans for the Beaverhead and Deerlodge National Forests date from 1986 and 1987. The two plans were brought up to date in one management plan for the now combined 3.38-million-acre Beaverhead-Deerlodge National Forest. The Revised Forest Plan was issued in January of 2009. For more detail on the Revised Forest Plan, please see the preferred alternative, alternative 6, in the Final Environmental Impact Statement (EIS) (U.S. Forest Service 2008).

III. STATUS OF THE SPECIES /CRITICAL HABITAT DESCRIPTION

Species/Critical Habitat Description

Grizzly bears are among the largest terrestrial mammals in North America. South of the United States - Canada border, adult females range from 250-350 pounds and adult males range from 400 to 600 pounds. Grizzly bears are relatively long-lived, living 25 years or longer in the wild. Grizzly bears are omnivorous, opportunistic feeders that require foods rich in protein or carbohydrates in excess of maintenance requirements in order to survive seasonal pre-and post-denning requirements. Grizzly bears are homeo-hypothermic hibernators, meaning their body temperature drops no more than five degrees C during winter when deep snow, low food availability, and low ambient air temperatures appear to make winter sleep essential to grizzly bears' survival (Craighead and Craighead 1972a, 1972b). Grizzly bears excavate dens and require environments well covered with a blanket of snow for up to five months, generally beginning in fall (September-November) and extending until spring (March-April) (Craighead and Craighead 1972b; Pearson 1972).

Listing history The grizzly bear was listed as a threatened species under the Act in the lower 48 states on July 28, 1975 (40 FR 31736). The Service identified the following as factors establishing the need to list: (1) present or threatened destruction, modification, or curtailment of habitat or range; (2) overutilization for commercial, sporting, scientific, or educational purposes; and (3) other manmade factors affecting its continued existence. The two primary challenges in

grizzly bear conservation are the reduction of human-caused mortality and the conservation of remaining habitat (U.S. Fish and Wildlife Service 1993).

The grizzly bear recovery plan (Recovery Plan) was completed on January 1982 and was revised in 1993 (U.S. Fish and Wildlife Service 1993). The 1993 revised Recovery Plan delineated grizzly bear recovery zones in 6 mountainous ecosystems in the U.S. The Recovery Plan details recovery objectives and strategies for the grizzly bear recovery zones in the ecosystems where grizzly bear populations still persist. These recovery zones are the Northern Continental Divide (NCDE), Yellowstone Grizzly Bear (YGBE), Cabinet-Yaak (CYE) and Selkirk (SE) Ecosystems. The Recovery Plan also includes recovery strategies for the North Cascades Ecosystem in Washington, where only a very few grizzly bears are believed to remain, and for the Selway-Bitterroot ecosystem of Idaho and Montana, where suitable grizzly bear habitat still occurs.

Based on the best scientific and commercial information available, the Service delisted the Yellowstone grizzly bear DPS, effective April 30, 2007. The Service had determined that the grizzly bear population in the Yellowstone Grizzly Bear Ecosystem had achieved recovered status. The Service also determined that the DPS had sufficient numbers and distribution of reproductive individuals so as to provide a high likelihood that the species will continue to exist and be well distributed throughout its range for the foreseeable future. The Service held that the State and Federal agencies' agreement to implement the extensive Conservation Strategy and State management plans would ensure that adequate regulatory mechanisms remain in place and that the Yellowstone grizzly bear population will not become an endangered species within the foreseeable future. On September 21, 2009, a court order enjoined the Service from removing the Yellowstone DPS from the list of threatened species. The final rule designating the Yellowstone DPS and removing the Yellowstone grizzly bear DPS from the list of threatened species was vacated and remanded to the Service.

Life History

Grizzly bears are large animals with great metabolic demands requiring extensive home ranges. The search for energy-rich food appears to be a driving force in grizzly bear behavior, habitat selection and intra/inter-specific interactions. Grizzly bears historically used a wide variety of habitats across the North America, from open to forested, temperate through alpine and arctic habitats, once occurring as far south as Mexico. They are highly dependent upon learned food locations within their home ranges. Adequate nutritional quality and quantity are important factors for successful reproduction. Diverse structural stages that support wide varieties of nourishing plants and animals are necessary for meeting the high-energy demands of these large animals. Grizzly bears follow phenological vegetative, tuber or fruit development, would seek out concentrated food sources including carrion, live prey (fish, mammals, insects), and are easily attracted to human food sources including gardens, grain, compost, bird seed, livestock, hunting season gut piles, bait and garbage. Bears that lose their natural fear and avoidance of humans, usually as a result of food rewards, become habituated and may become food-conditioned. Grizzly bears will defend food and have been known to charge when surprised. As a result of real or perceived threats to human safety or property, both habituation and food conditioning increase chances of human-caused grizzly bear mortality. Nuisance grizzly bear mortalities can be a result of legal management actions, defense of human life or illegal killing.

Adult grizzly bears are normally solitary, except females with cubs or during short breeding relationships. They will tolerate other grizzly bears at closer distances when food sources are concentrated and siblings may associate for several years following weaning (Jonkel and Cowan 1971; Craighead 1976; Egbert and Stokes 1976; Glenn et al. 1976; Herrero 1978). Across their range, home range sizes vary from about 50 square miles or more for females to a few hundred square miles for males. Overlap of home ranges is common. Grizzly bears may have one of the lowest reproductive rates among terrestrial mammals, resulting primarily from the late age at first reproduction, small average litter size and the long interval between litters. Mating occurs from late May through mid-July. Females in estrus will accept more than one adult male (Hornocker 1962), and can produce cubs from different fathers the same year (Craighead et al. 1995). Age of first reproduction and litter size may be nutritionally related (Herrero 1978; Russell et al. 1978). Average age at first reproduction in the lower 48 states for females is 5.5 years and litter size ranges from one to four cubs that stay with the mother up to two years. Males may reach physiological reproductive age at 4.5 years, but may not be behaviorally reproductive due to other dominant males preventing mating.

Habitat fragmentation is significant to large carnivores requiring wide vegetative and topographic habitat diversity (Servheen 1986). Loss and fragmentation of habitat is particularly relevant to the survival of grizzly bears. Large expanses of unfragmented habitat are important for feeding, breeding, sheltering, traveling and other essential behavioral patterns. Grizzly bears occur at low densities, have low reproductive rates, exhibit individualistic behavior and are largely dependent on riparian habitats also used extensively by people; thus, grizzly bear populations are susceptible to human influences. Grizzly bears may avoid key habitats due to human generated disturbances, or become habituated and food conditioned, which may ultimately lead to the animal being destroyed. Historically, as human settlements, developments, and roads increased in grizzly bear habitat, grizzly bear populations became fragmented. As fragmented population segments become smaller and/or isolated, they are more vulnerable to extinction, especially when human-caused mortality pressures continue. Linkage zones are rather recent concepts in broad management direction for grizzly bears and other large-ranging species (Servheen and Sandstrom 1993). Linkage zones, or zones of habitat connectivity within or between populations of animals, foster the genetic and demographic health of the species. Bader (2000) displayed potential secure areas that are spatially distributed within known male and female grizzly bear dispersal distances and he believes that the available information shows that effective linkages are possible for grizzly bear use and these linkage areas would increase persistence probabilities.

Natural mortality is known to occur from intra-specific predation, but the degree this occurs in natural populations is not known. Parasites and disease do not appear to be a significant cause of natural mortality (Jonkel and Cowan 1971; Kistchinskii 1972; Mundy and Flook 1973; Rogers and Rogers 1976). As animals highly dependent upon learned habitat, displacement into unknown territory (such as subadult dispersal) may lead to submarginal nutrition, reduced reproduction or greater exposure to adult predatory bears or human food sources (which can lead to human-caused mortality). Starvation and loss in dens during food shortages have been surmised, but have not been documented as a major mortality factor. Natural mortality in rare, relatively secretive animals such as grizzlies can be extremely difficult to document or quantify.

Human-caused mortality has been slightly better quantified, but recent models speculate that reported mortality may be up to 50 percent of actual mortality (McLellan et al. 1999). Between 1800 and 1975, grizzly populations in the lower 48 states declined drastically. Fur trapping, mining, ranching and farming pushed westward, altered habitat and resulted in the direct killing of grizzly bears. Historically, grizzly bears were targeted in predator control programs in the 1930's. Predator control was probably responsible for extirpation in many states that no longer support grizzlies. More recent human-caused mortality in Montana includes legal hunting (canceled in 1991), management control actions, defense of life, vehicle and train collisions, defense of property, mistaken identity by black bear or other big game hunters, poaching and malicious killing. Grizzly bears normally avoid people, possibly as a result of many generations of bear sport hunting and human-caused mortality. Avoidance of roads can lead grizzly bears to either avoid essential habitat along roads, or could put them at greater risk of exposure to human-caused mortality if they do not avoid roads.

Population Dynamics and Status and Distribution

The grizzly bear originally inhabited a variety of habitats from the Great Plains to the mountains of western North America, from central Mexico to the Arctic Ocean. With the advent of Euroamerican colonization in the early nineteenth century, grizzly bear numbers were reduced from over 50,000 to less than 1,000 in North America south of the Canadian border. Today, the grizzly bear occupies less than two percent of its former range south of Canada (U.S. Fish and Wildlife Service 1993). In the conterminous 48 States, only five remaining areas have either remnant or self-perpetuating populations. These remaining populations are principally located in mountainous regions in Washington, Idaho, Wyoming and Montana and are often associated with National Parks and wilderness areas.

Status of grizzly bears in the YGBE

The 9,209 square mile YGBE recovery zone includes portions of Wyoming, Montana and Idaho, portions of six National Forests (Beaverhead-Deerlodge, Bridger-Teton, Custer, Gallatin, Shoshone, and Targhee), Yellowstone and Grand Teton National Parks, John D. Rockefeller Memorial Parkway, portions of adjacent private and state lands and lands managed by the BLM. Grizzly bears also frequently use areas outside the defined YGBE recovery zone.

Population recovery criteria are measured within the recovery zone and an adjacent 10-mile buffer. A large proportion of the Yellowstone grizzly bear population occurs within the recovery zone. A large proportion of the grizzly bears in the YGBE recovery zone occur on protected lands in Yellowstone National Park, but grizzly bears also inhabit large areas outside the park boundary. Yellowstone and Grand Teton National Parks make up 39.4 percent of the YGBE recovery zone. Private holdings and other ownership make up 2.1 percent of the recovery zone and the remaining 58.5 percent occurs on Forest Service. National Park Service and National Forest lands support roughly 89 percent of the currently known distribution of the grizzly bears in the YGBE recovery zone. Grizzly bears also frequently occur in and use areas adjacent to the recovery zone.

The YGBE recovery zone is subdivided into smaller units to facilitate both the assessment of projects and recovery objectives. Eighteen bear management units (BMU) were formally delineated throughout the YGBE. BMUs were designed to:

- Assess the effects of existing and proposed activities on grizzly bear habitat without having the effects diluted by consideration of too large an area;
- Address unique habitat characteristics and grizzly bear activity and use patterns;
- Identify contiguous complexes of habitat which meet year-long needs of the grizzly bear; and
- Establish priorities for areas where land use management needs would require cumulative effects assessments.

Three demographic criteria that were formerly in the 1993 Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993) have been reevaluated and updated. The second criterion pertaining to the distribution of females with offspring remains unchanged while the first and third criteria pertaining to the minimum allowable number of females with cubs of the year and sustainable mortality limits have been revised and updated to reflect current methods based on the best available science (U.S. Fish and Wildlife Service 2007). The current demographic recovery criteria to be appended to the 1993 Recovery Plan are:

- Demographic Recovery Criterion 1 – Maintain a minimum of 48 females with cubs of the year in the GYA, as indicated by the model-averaged Chao2 estimate for that year. The number of females with cubs of the year cannot drop below 48 for any 2 consecutive years;
- Demographic Recovery Criterion 2 – Sixteen of 18 bear management units within the recovery zone must be occupied by females with young, with no two adjacent bear management units unoccupied, during a 6-year sum of observations. This criterion is important as it ensures that reproductive females occupy the majority of the recovery zone and are not concentrated in one portion of the ecosystem;
- Demographic Recovery Criterion 3 – For independent females (at least 2 years old), the current annual mortality limit, not to be exceeded in 2 consecutive years and including all sources of mortality, is 9 percent of the total number of independent females. For independent males (at least 2 years old), the current annual mortality limit not to be exceeded in 3 consecutive years and including all sources of mortality, is 15 percent of the total number of independent males. For dependent young (less than 2 years old), the current annual mortality limit, not to be exceeded in 3 consecutive years and including only known and probable human-caused mortalities, is 9 percent of the total number of dependent young.

The first and third criteria were changed because the Service no longer considers the 1993 criterion to represent the best scientific and commercial data available. There is now a method called the Chao2 estimator to calculate the total number of independent females from sightings and resightings of females with cubs. This then allows calculation of total population size instead of the minimum population size as used in the 1993 method. There is also a method to calculate the unknown and unreported mortalities and application of this method allows more

conservative mortality management based on annually updated information rather than the estimate of unknown and unreported mortality as used in the 1993 recovery plan. Data on the reproductive performance of Yellowstone grizzly bears, survival rates of cub and yearling Yellowstone grizzly bears, the trajectory of the Yellowstone grizzly bear population under alternate survival rates, and the impacts of spatial and environmental heterogeneity on the Yellowstone grizzly bear demographics has been improved and updated. See Table 1 for recovery criteria information.

Table 1. 2009 Status of the Yellowstone Grizzly Bear Ecosystem in Relation to the Recovery Plan Criteria (Schwartz et al. 2010).

Population Parameter	Target/Limit	2009 Number
Minimum number of females with cubs of the year	48	55
BMUs occupied by females with young	16	18
Independent female mortality limit is 9% of total number of independent females	22	20
Independent male mortality limit is 15% of total number of independent males	24	20
Dependent young mortality limit is 9% of total number of dependent young	16	8

Based on verified sightings of females with cubs of the year during 2009 and using the Chao2 method, it was determined that the minimum number of females with cubs of the year was 55. Using this number (55), the estimated Yellowstone grizzly bear population size for 2009 is 582.

Using the revised recovery criteria, it was determined that independent female mortality, independent male mortality, and dependent young mortality limits were met in 2009. Both independent female mortality and independent male mortality were exceeded in 2008. Neither of these was exceeded in 2007. The criteria states that independent female mortality cannot be exceeded in 2 consecutive years and that independent male mortality cannot be exceeded in 3 consecutive years. Because the thresholds were not exceeded in 2007 or in 2009, the revised demographic recovery criteria are met.

Access management has been identified as an important tool for conserving grizzly bears and their habitat. The BMUs in the YGBE were further divided into smaller units, termed subunits. Subunits are approximately the size of an adult female grizzly bear home range (roughly 50 square miles) and provide the basic scale for the analysis of impacts associated with access management and vegetation management projects.

The overall habitat condition in the GYA is excellent. The YGBE recovery zone, for example, contains large amounts of secure habitat and very low total and open road densities in the majority of the subunits. In 2003, for the entire YGBE recovery zone, the mean secure habitat was 86.2 percent, the mean OMARD was 10.4 percent in Season one (March 1 - July 15) and 10.7 percent in season two (July 16 - November 30) and the mean TMARD was 5.3 percent (ICST 2003).

The YGBE grizzly bear population has increased from estimates as low as 136 individuals when listed in 1975 to more than 580 animals as of 2004; this population has been increasing since the mid 1990s and is increasing at 4 to 7 percent per year. The range of this population also has increased dramatically as evidenced by the 48 percent increase in occupied habitat since the 1970s. Yellowstone grizzly bears continue to increase their range and distribution annually and grizzly bears in the Yellowstone area now occupy habitats they have been absent from for decades. Currently, roughly 90 percent of females with cubs occupy the Primary Conservation Area (PCA) and about 10 percent of females with cubs have expanded out beyond PCA within the ecosystem.

The Yellowstone Grizzly Bear Ecosystem supports a grizzly bear population which has sufficient numbers and distribution of reproductive individuals so as to provide a high likelihood that the species will continue to exist and be well distributed throughout its range for the foreseeable future. Based on the best scientific and commercial information available, the Service delisted the Yellowstone grizzly bear DPS, effective April 30, 2007. The grizzly bear population in the Yellowstone Grizzly Bear Ecosystem had achieved recovered status. The Service held that the State and Federal agencies' agreement to implement the extensive Conservation Strategy and State management plans would ensure that adequate regulatory mechanisms remain in place and that the Yellowstone grizzly bear population will not become an endangered species within the foreseeable future. However, on September 21, 2009, a court order enjoined the Service from removing the Yellowstone DPS from the list of threatened species. The final rule designating the Yellowstone DPS and removing the Yellowstone grizzly bear DPS from the list of threatened species was vacated and remanded to the Service. Therefore, the YGBE grizzly bear population is once again listed as a threatened species.

Status of grizzly bears in the NCDE

The NCDE extends from the Rocky Mountains of northern Montana into contiguous areas in Alberta and British Columbia, Canada. The U. S. portion of the NCDE includes parts of five National Forests (Flathead, Kootenai, Helena, Lewis and Clark, and Lolo), four wilderness areas (Bob Marshall, Mission Mountains, Great Bear and Scapegoat) and one wilderness study area (Deep Creek North). National Forest System lands encompass 63 percent of the NCDE. Additionally, the NCDE recovery zone includes Glacier National Park, the Flathead Indian Reservation (Salish-Kootenai tribal land), the Blackfeet Indian Reservation, adjacent private and state lands, and lands managed by the U.S. Bureau of Land Management. Grizzly bears from this population also frequently use areas outside the defined NCDE recovery zone.

Recently, two population studies were designed with the objective to more reliably estimate the number of grizzly bears inhabiting the NCDE (U.S. Geological Survey 2004). The U.S. Geological Survey (USGS) DNA-based mark-recapture study in the greater Glacier area collected information from 1998 through 2000. The USGS also conducted an extensive DNA-based study to estimate the grizzly bear population size in 7.8 million acres of occupied grizzly bear range in and around the NCDE recovery zone. The Northern Divide Grizzly Bear Project identified 563 individual grizzly bears alive in the greater NCDE during the summer of 2004 through genetic analysis of noninvasive hair sampling at baited and unbaited barbed wired hair collection sites (U.S. Geological Survey 2008). A final total grizzly bear population estimate of 765 grizzly bears was reported based on the 563 grizzly bears detected in 2004 (Ibid.). Both the raw count of 563 grizzly bears and a total population estimate of 765 for 2004 illustrate the

conservative nature of the recovery plan minimum population estimate of 304 grizzly bears in 2004. The DNA-based estimate is scientifically robust, and is more than two times the recovery plan estimate.

With the recent DNA-based population estimate, the methodology to estimate minimum population size outlined in the 1993 recovery plan has become outdated (Servheen *in litt.* 2008). In an effort to apply the DNA-based population estimate for the year 2004 to the existing recovery plan criteria (U.S. Fish and Wildlife Service 1993), the Service has outlined an interim process (Servheen *in litt.* 2008). This interim process would remain in effect until such time as the five-year status review and the formal recovery plan revision are complete. Because the DNA-based population estimate is for the year 2004, the interim process makes some assumptions in order to be applicable to post-2004 grizzly bear populations, with the primary assumption being that grizzly bear populations do not increase or decrease rapidly. Since we have no information that any major changes in the number of grizzly bears has occurred since 2004 and assuming that grizzly bear populations increase or decrease slowly under most conditions, we will continue to use the 2004 population estimate of 765 grizzly bears post-2004, rather than use the minimum population estimate based on females with cubs.

We continue to use the 1993 Recovery Plan criteria, applying the conservative 4 percent total mortality limit and the 30 percent female mortality limits. However, we will now apply the criteria to the population estimate of 765 grizzly bears. As of 2009, the 6-year average of known human-caused total mortalities in the NCDE is 21.7. Using our criteria limits applied to the population estimate, we find that total known human-caused mortality is below the sustainable mortality level of no more than 30.6 per year. The 6-year average of known human-caused female mortalities in the NCDE is 9.5, above the sustainable mortality level of no more than 9.18 per year. This is an interim application of the DNA-based population estimate of 765 grizzly bears using the methods in the 1993 recovery plan to determine the sustainable mortality limits for the NCDE.

As noted in previous biological opinions (U.S. Fish and Wildlife Service 2005, 2006), 2004 human-caused grizzly bear mortality levels in the NCDE were unusually high. The 34 human-caused mortalities recorded included 22 females (5 adult, 5 sub-adults, 3 yearlings, 8 cubs - including those with unknown fate), 11 males (2 adults, 6 sub-adults, 1 yearling, 2 cubs), and 1 unknown (yet undetermined remains). The 2004 mortalities included 11 illegal kills – the highest in seven years (in 2003, 10 illegal kills were reported). Many of the unprecedented number of conflicts in 2004 can be attributed to a dramatic huckleberry crop failure, and resulting conflicts arising from attractants on private lands luring bears onto private property. Much of the recent grizzly bear mortality continues to be associated with conflicts arising from attractants on private lands. Notable is that annual human-caused grizzly bear mortality levels have decreased since 2004. The number of human-caused female mortalities was less than half of 2004 levels each year: 10, 4, 7, 7 and 7 in 2005, 2006, 2007, 2008, and 2009, respectively (Servheen 2009 *in litt.*).

Status of grizzly bears in the CYE and SE

The Cabinet/Yaak Ecosystem in northwestern Montana and northeastern Idaho has over 1,900 square miles of forested and mountainous habitat occupied by grizzly bears. A minimum population estimate of 47 grizzly bears was made for the Cabinet-Yaak recovery zone during

2000-2008 based on current and previous captures and sightings of unique individuals (Kasworm et al. 2009). Grizzly bears also occur to the north of the U.S.-Canada border, and interchanges of radio-collared bears across the border have been documented (U.S. Fish and Wildlife Service 1993).

The Selkirk Ecosystem of northwestern Idaho, northeastern Washington, and southeastern British Columbia includes about 1,080 square miles in the U.S. portion and about 875 square miles in the Canadian portion of the recovery zone. The Selkirk recovery zone is the only defined grizzly bear recovery zone that includes part of Canada because the habitat in the U.S. portion is not of sufficient size to support a minimum population. The habitat is contiguous across the border and radio-collared bears are known to move back and forth across the border. Therefore, the grizzly bears north and south of the border are considered one population (U.S. Fish and Wildlife Service 1993).

Neither the CYE nor the SE grizzly bear populations have attained the Recovery Plan criteria for females with cubs. With the small sample sizes available to calculate population trend, Kasworm et al. (2009) determined a high probability (78 percent) that the population is declining. The Service determined that the combined SE-CYE grizzly bear recovery zones were warranted endangered but precluded in 1999 and suggested that the two populations might be inter-connected (FR 26725-26733).

The most recent data indicate that population status is also below recovery goals in the CYE for number of unduplicated females and the distribution of females with young in bear management subunits (Kasworm et al. 2009). The 6-year average mortality limits in the recovery zone for both females and males were within calculated limits during 2003-2008 (Ibid). However, it should be noted that the recovery plan established a goal of zero human-caused grizzly bear mortality for the CYE. This goal was not met. Montana Fish, Wildlife and Parks began augmenting the grizzly bear population in the Cabinet Mountains in 2005.

Status of the Selway-Bitterroot and North Cascades Ecosystems

Grizzly bear recovery efforts in the Selway-Bitterroot Ecosystem and North Cascades Ecosystem are in the planning stages. In the North Cascades Ecosystem, most of the grizzly bear population occurs north of the Canada - U.S. border, but a few grizzly bears persist south of the border. Though suitable habitat remains, grizzly bears were extirpated from the Selway-Bitterroot Ecosystem decades ago. The Service released a final environmental impact statement and decision notice addressing the impacts of reintroducing grizzly bears into the Bitterroot Ecosystem in east central Idaho (U.S. Fish and Wildlife Service 2000).

Analysis of the Species/Critical Habitat Likely to be Affected

The biological assessment determined that the Revised Forest Plan would be likely to adversely affect individual grizzly bears. Therefore, formal consultation with the Service has been initiated and this biological opinion has been written to determine whether or not activities associated with this project are likely to jeopardize the continued existence of grizzly bears or result in the destruction or adverse modification of grizzly bear critical habitat. Grizzly bears are listed as threatened under the Act. Critical habitat has not been designated for this species; therefore none would be affected by the proposed action.

IV. ENVIRONMENTAL BASELINE

Under the provisions of section 7(a)(2), when considering the “effects of the action” on listed species, the Service is required to consider the environmental baseline. Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed federal projects in the action area that have undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress. Although the Revised Forest Plan is currently in place, no consultation has occurred because when the Revised Forest Plan was issued grizzly bears were not listed as threatened. The Revised Forest Plan was issued in January of 2009 and as a result of a court order on September 21, 2009, grizzly bears were once again a listed species. To analyze the effects of the Revised Forest Plan on grizzly bears we will use the Forest Plan that was in place prior to the Revised Forest Plan as the environmental baseline.

Table 2. Approximate size of analysis units within the action area (U.S. Forest Service 2009).

Landscape	Size of Landscape (Acres)	Hunting Unit	Size of Hunting Unit (Acres)
Gravelly	474,454	323	99,561
		324	175,551
		327	127,993
		330	71,252
Madison	127,132	311	2,810
		360	71,154
		362	53,016
Tobacco Roots	187,523	320	85,370
		333	102,153
Highland	108,261	340	108,261

Action area, as defined by the Act, is the entire area to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. For the purposes of this biological opinion, we have defined the action area to be the areas on the Forest where grizzly bears occur both inside and outside of the YGBE recovery zone or are likely to occur at sometime within the life of the Revised Forest Plan (10 to 15 years). The action area is within the Butte, Madison, and Jefferson Ranger Districts and includes approximately 897,526 acres within four landscape areas including the Gravelly Landscape (474,610 acres), the Madison Landscape (127,132 acres), the Tobacco Root Landscape (187,523 acres), and the Highland Mountains Landscape (108,261 acres). Portions of the Madison Landscape occur within the YGBE recovery zone. For some sections of the analysis these landscapes are further broken down into hunting units. Ten hunting units occur within the analysis area. Table 2 above displays the sizes of the landscapes and the hunting units. It is important to note that the hunting unit acres do not equal the landscape acres for both the Gravelly and Madison Landscapes. This is due to rounding errors when the GIS runs are made at the different scales. For example, the difference between the Madison Landscape and hunting unit acres is 152 acres, amounting to

1/10 of 1 percent of the landscape. The difference for the Gravelly Landscape versus the hunting units is 97 acres. The width of the lines on the polygons used for the GIS runs likely account for these rounding errors (U.S. Forest Service 2009).

Status of the Species within the Action Area

Grizzly bears are now found in many areas on the Forest, including areas both inside and outside of the YGBE recovery zone. The Madison Landscape occurs both within the recovery zone and outside of the recovery zone. The Madison Landscape includes portions of the Hilgard #1 bear management subunit within the recovery zone. The Gravelly, Tobacco Roots and Highland Landscapes all occur entirely outside of the recovery zone. Outside of the recovery zone, grizzly bears are known to occur within the Madison and Gravelly Landscapes. Grizzly bears have been observed beyond the distribution line established by Schwartz et al. (2006) which displays grizzly bear distribution, including the southeastern portion of the Gravelly Landscape. Grizzly bears have been observed in the heart of the Gravelly Landscape on numerous occasions over the last decade (U.S. Forest Service 2010). The line between the Madison Range and Gravelly Range is very fluid and it appears that grizzly bears move back and forth fairly regularly (*ibid.*). In 2008, a young male grizzly bear was captured for research in the Standard Creek drainage of the Gravelly Landscape. Three other unique grizzly bears were also identified in the same drainage during the same week (U.S. Forest Service 2010). No known occurrence has been verified within the Tobacco Roots or Highland Landscapes however occurrence is possible during the life of the revised plan (10 to 15 years) and both landscapes are therefore part of the action area.

Factors Affecting Species Environment within the Action Area

Access Management

In the previous Forest Plan, the summer and fall seasons were defined as May 15 to December 1 and the winter season was defined as December 2 to May 14. Access on the Forest was calculated for the summer and fall seasons. Open road densities are reduced during the general hunting season (from October 15 to December 1) to increase wildlife security. This fall period represents a huge pulse of dispersed recreation activity related to deer and elk hunting that is unmatched at other times of the year (U.S. Forest Service 2009).

As mentioned previously, one recovery zone bear management unit (BMU) subunit (Hilgard #1) occurs on the Forest within the Madison Landscape. The Hilgard #1 subunit occurs on both the Beaverhead-Deerlodge National Forest and the Gallatin National Forest. The Beaverhead-Deerlodge Forest has no open motorized routes or ongoing projects within the recovery zone. Therefore, the open and total motorized access route densities for the Beaverhead-Deerlodge Forest are zero. The 1998 baseline values for the entire subunit (including the Gallatin Forest) are as follows: open motorized access route density (OMARD) is 25.1, total motorized access route density (TMARD) is 12.5, and security core is 69.8 percent.

Outside of the recovery zone, the action area includes the remaining portion of the Madison Landscape and the Gravelly, Tobacco Roots, and Highland Mountains Landscapes. Habitat for grizzly bears within these areas is generally of lower quality compared to inside the recovery

zone due to road densities and other human activities. Open motorized road and trail densities were calculated for the summer (5/16 to 10/14) and fall (10/15 to 12/1) seasons. Densities in the fall are reduced from those in the summer in order to increase wildlife security during the general hunting season. Table 3 displays the existing landscape motorized route density and percent secure habitat on the landscape scale during the summer season. Table 4 displays the existing motorized route density and secure areas at the hunting unit scale during the fall season. Secure area is defined as areas larger than 10 acres that are 1/3 of a mile from a route open to motorized vehicles.

Table 3. Existing road densities and percent secure area by landscape (U.S. Forest Service 2009).

Landscape	Total Size (Square Miles)	Total Road Miles	Summer Open Motorized Road and Trail Density (miles/square mile)	Summer Secure Area (percent of landscape)
Gravelly	741.3	559	.8	60%
Madison	198.6	.6	0	96%
Tobacco Roots	293.0	358.6	1.2	45%
Highland	169.2	249	1.8	38%

Table 4. Existing fall (10/15 to 12/1) road densities and percent secure area by hunting unit (U.S. Forest Service 2009, 2010).

Management Area	Total Size (Square Miles)	Total Road Miles	Fall Motorized Route Density (miles/square mile)	Fall Secure Area (percent of hunting unit)
311	4.4	0	0	93
320	133.4	112	.8	57
323	155.6	102.4	.7	70
324	274.3	140.7	.5	70
327	200.0	177.5	.9	52
330	111.3	79.9	.7	60
333	159.6	179.1	1.1	46
340	169.2	249	1.5	42
360	111.8	.5	0	96
362	82.8	.1	0	97

Winter motorized use occurs on the Forest outside of designated wilderness. In the previous Forest Plan, where winter motorized use was allowed it was allowed between December 2 and May 14. One 2,067 acre area (the McAtee Basin) within the recovery zone is open to snowmobiling. This area is not included within the designated wilderness. This area is non-motorized during the summer but provides winter motorized opportunities. Legal access to this area during the winter occurs on the Gallatin National Forest. The remaining areas open to winter motorized use occur outside of the recovery zone. Table 5 displays the acreage open to snowmobiling by landscape.

Table 5. Pre Forest Plan Revision Acres Available to Winter Motorized Access (U.S. Forest Service 2010).

Landscape	Acres in Landscape	Acres Open to Winter Motorized Use (percent of Landscape open)
Highland Mountains	108,261	103,790 (95.8%)
Tobacco Root	187,523	164,604 (87.8%)
Gravelly	474,610	377,904 (79.6%)
Madison	127,132	13,162 (10.3%)
TOTAL	897,526	659,460 (73.5%)

Sanitation/Food Storage and Site Development

Attractant management has been required on areas of the Beaverhead portion of the Forest since 1987. The 1987 Regional Special Order required that any nourishing substance (excluding baled hay and water) for humans, pets and livestock be acceptably stored under specified criteria. Further, the 1987 order required that harvested wildlife carcasses be managed to reduce potential human/grizzly bear interaction and camping occurred within specified distances of a known animal carcass. The 1987 special order required attractant management in the area delineated as the recovery zone. For those portions of the Madison Landscape outside of the recovery zone and not included in the 1987 order, area restrictions for attractant management were issued in the 2000 Area Restriction Order. This 2000 order identified the primary goal of the order was to “minimize grizzly bear/human encounters and thereby provide for user safety and protection of grizzly bears.” In 2004, the Forest instituted mandatory attractant management to include the Gravelly and Tobacco Root Landscapes following the general principles of the earlier two orders in place on the Madison Landscape. As mentioned earlier, the Tobacco Roots Landscape is not currently occupied but the food storage order is in effect in this landscape in anticipation of occupancy. The 2004 order expanded the definition of items requiring acceptable storage to include human health care products, refined the definition of animal carcass and clarified the intent of “acceptable storage.” In summary, prior to the Revised Forest Plan, the Forest had three separate attractant management orders in place with slightly different required criteria and restriction dates. The 2004 Food Storage Order encompasses the Madison, Gravelly, and Tobacco Root Landscapes. No attractant management order exists for the Highland Landscape.

The purpose of the food storage order is to minimize adverse interactions between bears and humans. The 2004 food storage order contains requirements for storage and handling of bear attractants such as human foods and garbage, livestock feed, and wildlife and livestock carcasses. The food storage order has been in effect since September 10, 2004 and is effective from March 1 through December 1.

The basic tenets of the 2004 food storage order are:

1. All food and refuse must be acceptably stored or acceptably possessed during the daytime hours.
2. All food and refuse must be acceptably stored during nighttime hours, unless it is being prepared for eating, being eaten, being transported, or being prepared for acceptable storage.

3. Any harvested animal carcass must be acceptably stored, unless the carcass is being field dressed, transported, being prepared for eating, or being prepared for acceptable storage.
4. Camping or sleeping areas must be established at least ½ mile from a known animal carcass or at least 100 yards from an acceptably stored animal carcass.

These basic tenets of the food storage order are further defined within the order itself. See the biological assessment for the entire food storage order.

The Forest has 54 Forest Service developed sites in the action area. The Gravelly Landscape has 26 sites (7 campgrounds, 6 cabins, 3 trailheads, 4 rest areas, 3 dispersed sites, 2 boat launches, and 1 picnic site), the Tobacco Roots Landscape has 9 sites (4 campgrounds, 3 dispersed sites, and 2 trailheads), the Highland Mountains Landscape has 14 sites (5 campgrounds, 3 dispersed sites, 2 trailheads, 2 fishing access sites, 1 cabin, and 1 picnic area), and the Madison Landscape has 5 sites (2 trailheads, 1 cabin, 1 bunkhouse, and 1 campground). No grizzly bear mortalities have been reported related to these sites. Two grizzly bear/human conflicts have been associated with food storage and/or sanitation on the Forest since 1994, including conflicts related to property damage and unnatural foods (Haroldson 2010 *in litt*). Some additional grizzly bear/human conflicts related to unnatural foods and/or property damage have occurred off of Forest lands but near or adjacent to the Forest.

The Forest considers its food storage order as being very effective since it has been in place. During a one year lead-in period they began extensive signing at information kiosks, campgrounds, designated hunting campsites, and public contact throughout the recreation season. Bear proof containers have been installed and are continually being installed to date. Violators of the food storage order can be cited by the Forest law enforcement and some citations have been issued to date.

Livestock Grazing

The Forest has 76 livestock grazing allotments that are distributed across the action area. The Gravelly Landscape has 47 total allotments, the Madison Landscape has 8 total allotments, the Tobacco Roots Landscape has 13 total allotments and the Highland Mountains Landscape has 8 total allotments. Within the Gravelly Landscape, four allotments, encompassing 39,018 acres, have been permanently closed to all grazing since September 30, 2008. Seven sheep allotments are currently active in the Gravelly Landscape with 7,800 permitted sheep. Overall, sheep grazing occurs from July 1 to October 6 (refer to Table 6 for the sheep allotments). The remaining 36 allotments in the Gravelly Landscape are for cattle and/or horse grazing. All allotments within the other three landscapes are for cattle and/or horse grazing. In summary, 7 active sheep allotments and 65 active cattle/horse allotments occur within the action area.

One documented grizzly bear mortality has been associated with livestock depredation within the action area (Haroldson 2010 *in litt*). This mortality occurred in the Gravelly Landscape in 1986. One additional conflict grizzly bear/human conflict related to livestock also occurred within the action area. This conflict also occurred within the Gravelly Landscape in 2001 but did not result in the mortality of a grizzly bear. Additional conflicts with grizzly bears related to livestock have occurred off the Forest but near the Forest.

Table 6. Status of Sheep Allotments in the Action Area (U.S. Forest Service 2010).

Allotment Name	Status	Permitted Season	Livestock Numbers.*
Barnet	Active	7/11-9/21	1,350 e/l 2H
Coal Creek**	Active	7/1-7/18; 9/21-10/6	1,350 e/l 2H
Fossil Hellroaring	Active	7/19-9/20	1,350 e/l 2H
Lyon Wolverine	Active	7/11-9/21	1,350 e/l 2H
Poison Basin; Upper Ruby Middlefork	Active	7/17-10/6; 7/1-7/16	1,350 e/l 4H
Black Butte	Active	7/12-9/16	1,400 e/l 2H
Cottonwood	Active	7/12-9/16	1,000 e/l 2H

* e/l=ewes/lambs; H=horses;

** this allotment is used by the Fossil Hellroaring Bands, with a total of 1,350 sheep on both allotments combined.

Vegetation Management

Suitable timber is defined as those acres that are classified as available for timber production and are specifically managed for growth yield. Approximately 78,730 acres were identified in the previous Forest Plan as in the suitable timber base for the action area. Approximately 210,042 additional acres were identified as not suitable for timber production but available for management entry for other resource benefits, such as fuel reduction, salvage, and wildlife habitat improvement. No harvest was allowed in the remaining 604,842 acres. Table 7 below displays suitable timber acres by landscape.

Fire Management

Wildland fire control efforts and use of prescribed burning occurs within the action area. Fire is also used for resource benefit as a management tool for vegetation and fuels. The acres available and locations where such methods are used vary across the action area. The use of wildland fire for resource benefit may also be used as a management tool across the entire action area.

Table 7. Suitable Timber Acres within the Action Area (U.S. Forest Service 2010).

Landscape	Timber Suitability Classification	Acres	Percent of Landscape
Highland Mountains	Suitable for Timber Production	16,617	15
	Not Suitable, Timber Harvest Allowed	33,554	31
	Not Suitable, No Harvest Allowed	58,040	54
Tobacco Roots	Suitable for Timber Production	20,497	11
	Not Suitable, Timber Harvest Allowed	46,617	25
	Not Suitable, No Harvest Allowed	120,364	64
Madison	Suitable for Timber Production	0	0
	Not Suitable, Timber Harvest Allowed	4,107	3
	Not Suitable, No Harvest Allowed	122,761	97
Gravelly	Suitable for Timber Production	41,616	9
	Not Suitable, Timber Harvest Allowed	125,764	27
	Not Suitable, No Harvest Allowed	303,677	64
TOTAL For Action Area	Suitable for Timber Production	78,730	9 % of action area
	Not Suitable, Timber Harvest Allowed	210,042	23 % of action area
	Not Suitable, No Harvest Allowed	604,842	68 % of action area

Other Factors Affecting Grizzly Bears

During the fall hunting season (10/15 through 12/1), the Forest receives a huge pulse of dispersed recreation activity related to deer and elk hunting. This pulse in activity is unmatched at any other time during the year. Southwestern Montana receives approximately 45 percent of the elk hunting pressure in the state and the bulk of this is focused on the hunting districts located on the Forest (USDA 2009b *in* U.S. Forest Service 2009)

The Montana legislature has created policy to direct Montana Fish, Wildlife and Parks (MFWP) protect, conserve and manage grizzly bears as a rare species of Montana wildlife. With this in mind, the Fish, Wildlife & Parks Commission developed a grizzly bear policy (Section 12.9.103, ARM) to address the need to protect grizzly bear habitat, the need to pursue grizzly research, the role of sport hunting in grizzly bear management, depredations, and the appropriate department

response to depredations, and requires compliance with federal regulations relating to grizzly bears (Montana Fish, Wildlife and Parks 2001). Under this direction, MFWP has implemented a conservation program to manage and enhance grizzly bear populations. In 2002, MFWP prepared the Grizzly Bear Management Plan for Southwestern Montana 2002-2012 and Final Programmatic Environmental Impact Statement with input from the Montana Grizzly Bear Working Group and other interested parties (Montana Fish, Wildlife and Parks 2002).

V. EFFECTS OF THE ACTION

Under section 7(a)(2) of the Act, "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, with the effects of other activities interrelated or interdependent with that action. Indirect effects are those caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). The effects of the action are added to the environmental baseline to determine the future baseline and to form the basis for the determination in this opinion. Should the federal action result in a jeopardy situation and/or adverse modification conclusion, the Service may propose reasonable and prudent alternatives that the federal agency can take to avoid violation of section 7(a)(2). The effects discussed below are the result of direct and indirect impacts of implementing the proposed project.

Access Management

The Interagency Grizzly Bear Committee (IGBC) Taskforce provided standardized definitions for roads and standardized methods to measure road densities and define analysis areas as a result of grizzly bear research information on open and total road densities and grizzly bear core areas (IGBC 1994, 1998). The Service considers the management of roads one of the most important factors in grizzly bear habitat conservation and the IGBC Taskforce guidelines as the best direction with which to manage roads.

General Effects of Roads on Grizzly Bears

This section provides a general discussion of direct and indirect effects of motorized access management on grizzly bears and on the environmental baseline as affected by road densities. Research has confirmed the adverse impacts of roads on grizzly bears (Mace et al. 1996, Mace et al. 1999). Negative impacts associated with roads and excessive road densities influences grizzly bear population and habitat use patterns in numerous, widespread areas. The Grizzly Bear Compendium (IGBC 1987) summarized impacts reported in the literature including:

- Avoidance/displacement of grizzly bears away from roads and road activity;
- Changes in grizzly bear behavior, especially habituation to humans, due to ongoing contact with roads and human activities conducted along roads;
- Habitat loss, modification, and fragmentation due to roads and road construction, including vegetative and topographic disturbances; and
- Direct mortality from road kills, legal and illegal harvest, and other factors resulting from increased human-bear encounters.

Mortality is the most serious consequence of roads in grizzly bear habitat. Mortalities can occur from illegal shooting or collisions with vehicles, or indirectly through habituation to human presence.

Grizzly Bear Mortality The specific relationship between roads and the mortality risk to grizzly bears is difficult to quantify. The level of human use of roads is one of several factors influencing the mortality risk associated with any road. Research supports the premise that forest roads facilitate human access into grizzly bear habitat, which directly or indirectly increases the risk of mortality to grizzly bears. Grizzly bears were increasingly vulnerable to illegal and legal harvest as a consequence of increased road access by humans in Montana (Mace et al. 1987) and in the Yellowstone region (Mattson et al. 1992). In southeastern British Columbia, McLellan and Shackleton (1988) reported roads increased access for legal hunters and poachers, the major source of adult grizzly mortality. McLellan (1989b) reported that 7 of 13 successful legal hunters interviewed had been on a road when they harvested their grizzly bear. McLellan and Mace (1985) found that a disproportionate number of mortalities occurred near roads. In the Yellowstone ecosystem, Mattson and Knight (1991) reported that areas influenced by secondary roads and major developments were most lethal to grizzly bears. Aune and Kasworm (1989) reported 63 percent of known, human-caused grizzly bear deaths on the east front of the Rocky Mountains occurred within 1 kilometer (0.6 miles) of roads, including 10 of 11 known female grizzly bear deaths. In Montana, Dood et al. (1986) reported that 48 percent of all known, non-hunting mortalities during the period of 1967 through 1986 occurred within 1 mile of roads. Grizzly bears were also killed by vehicle collision, the most direct form of road-related mortality (Greer 1985, Knight et al. 1981, Palmisciano 1986).

The presence of roads alone does not necessarily result in direct mortality of grizzly bears, but the proximity of the roads to human population centers, resulting high numbers of people using roads, and dispersed recreation in habitat around roads can pose considerable risks to grizzly bears. Social values and attitudes also contribute to the level of mortality risk to grizzly bears. Incidental or accidental human-caused grizzly bear mortality, combined with a few individuals intent on illegally shooting grizzly bears, can collectively result in serious, detrimental effects to grizzly bear populations. Access management can be instrumental to reducing mortality risk to grizzly bears by managing the present and anticipated future road use-levels resulting from the increasing human population in western Montana.

Displacement and security Some grizzly bears, particularly subadults, readily habituate to humans and consequently suffer increased mortality risk. However, many grizzly bears under-use or avoid otherwise preferred habitats that are frequented by people. Such under-use of preferred habitat represents modification of normal grizzly bear behavior. Negative association with roads arises from the grizzly bears' fear of vehicles, vehicle noise and other human-related noise around roads, human scent along roads and hunting and shooting along or from roads. Grizzly bears that experience such negative consequences learn to avoid the disturbance and annoyance generated by roads. Some may not change this resultant avoidance behavior for long periods after road closures. Even occasional human-related vehicle noise can result in annoying grizzly bears to the extent that they continue to avoid roads.

All factors contributing to direct links between roads and displacement from habitat have not been quantified. As with mortality risk, the level of road-use by people is likely an important

factor in assessing the potential displacement caused by any road. Contemporary research, however, indicates that grizzly bears consistently were displaced from roads and habitat surrounding roads, often despite relatively low levels of human use (Mattson et al. 1987, McLellan and Shackleton 1988, Aune and Kasworm 1989, Kasworm and Manley 1990, Mace and Manley 1993, Mace et al. 1996).

Avoidance behavior is often strongest in adult grizzly bears, with males selecting for high quality habitats and absence of humans (Gibeau et al. 2002). Males that were found using high quality habitat near roads, did so during the night where hiding cover was available (ibid). However, adult females were more likely to avoid humans all together, rather than seek out the highest quality habitats. Mueller et al. (2004) reported all age and sex classes used habitats closer to high-use roads and development during the human inactive period. All bears showed a considerably greater avoidance of high-use roads and development during periods of high human activity. They did show however, that regardless of the time of day subadult bears were found closer to high-use roads than adult bears. Gibeau et al. (2002) also demonstrated that subadults were almost always closer to human activity than adults.

In Montana, Aune and Stivers (1982) reported that grizzly bears avoided roads and adjacent corridors even when the area contained preferred habitat for breeding, feeding, shelter and reproduction. McLellan and Shackleton (1988) found that grizzly bears used areas near roads less than expected in southeastern British Columbia and estimated that 8.7 percent of the total area was rendered incompatible for grizzly bear use because of roads. In Montana, Mace and Manley (1993) reported use of habitat by all sex and age classes of grizzly bears was less than expected in habitats where total road densities exceeded two miles per square mile. Twenty-two percent of the South Fork Study area exceeded two miles per square mile. Adult grizzly bears used habitats less than expected when open motorized access density exceeded one mile per square mile. Further, female grizzly bears in the South Fork Study area tended to use habitat more than 0.5 mile from roads or trails greater than expected. As traffic levels on roads increased, grizzly bear use of adjacent habitat decreased (Mace et al. 1996). In Yellowstone, Mattson et al. (1992) reported wary grizzly bears avoided areas within 2 kilometers (1.2 miles) of major roads and 4 kilometers (2.4 miles) of major developments or town sites.

Mace et al. (1996) and other researchers have used 500 meters as the zone of influence around roads. Waller and Servheen (2005) also demonstrated avoidance of areas within 500 meters of US-2. Benn and Herrero (2002) set zones of influence of 500 meters and 200 meters around roads and trails, respectively. They reported that all 95 human-caused grizzly bear mortalities with accurate or reasonable locations that occurred in Banff and Yoho National Parks between 1971 and 1998 occurred within these zones of influence along roads and trails or around human settlements. Gibeau and Stevens (2005) documented bears further from roads when distant from high quality habitat, indicating avoidance behavior.

Research suggests that grizzly bears benefit from road closures aimed at minimizing traffic on roads within important seasonal habitat, especially in low elevation habitats during the spring (Mace et al. 1999). When roads are located in important habitats such as riparian zones, snowchutes and shrub fields, habitat loss through avoidance behavior can be significant. Mace et al. (1996) found that most of the roads within grizzly bear seasonal ranges were either closed to vehicles or used infrequently by humans. Some grizzly bears avoided areas with a high total

road density even when the roads were closed to public travel. If human-related disturbances such as high levels of road use continue in preferred habitats for extended periods of time, grizzly bear use of the area may be lost, particularly use by female grizzly bears. In the Swan Mountain study (Mace et al. 1996), female grizzly bear home range selection of unroaded cover types was greatest and as road densities increased, selection declined. Zager (1980) reported the avoidance of roads by females with cubs. Aune and Kasworm (1989) and McLellan (1989a) found that female cubs generally established their home range within or overlapping with their mother's home range, whereas males generally dispersed from their mother's home range. Long-term displacement of a female from a portion of her home range may result in long-term under-use of that area by female grizzly bears because cubs have limited potential to learn to use the area. In this way, learned avoidance behavior could persist for more than one generation of grizzly bears before grizzly bears again utilize habitat associated with closed roads. Thus, displacement from preferred habitats may significantly modify normal grizzly bear behavioral patterns.

Grizzly bears can also become conditioned to human activity and show a high level of tolerance especially if the location and nature of human use are predictable and do not result in overtly negative impacts for grizzly bears (Mattson 1993). In Glacier National Park, Jope (1985) suggested grizzly bears in parks habituate to high human use and showed less displacement, even in open habitats. Yonge (2001) found that grizzly bears near Cooke City, Montana, were willing to consistently forage in very close proximity to high levels of human use if cover was sufficient and energetically efficient feeding opportunities were present. Both Mattson (1993) and Yonge (2001) postulated that areas with higher levels of human activity might have a positive effect for bears by serving as a kind of refugia for weaker population cohorts (subadults and females with cubs) seeking to avoid intra-specific competition (adult males). However, Mattson qualified this observation by adding that the beneficial effects vary as to whether hunting is allowed, and how closely the human population is regulated. Further, food conditioned grizzly bears were much more likely to be killed by humans.

Both Yonge (2001) and Mattson (1993) indicated that increases in human use levels can be deleterious if some human activities are unregulated, such as use of firearms, presence of attractants, nature and duration of human uses. Conversely, a level of coexistence between humans and grizzly bears can be achieved if such activities are controlled. Near Cooke City, Montana, the New World Mine reclamation project had minimal effects on grizzly bears, in part because reclamation activities were temporally and spatially predictable and people associated with the work were carefully regulated against carrying firearms or having attractants available to grizzly bears (Tyers, unpublished 2006). In the Swan Valley of Montana, raw location data from a small number of collared grizzly bears show nocturnal use of highly roaded habitat (C. Servheen, USFWS, pers. comm. 2005). The Swan Valley data have not been statistically analyzed and the study was not designed to determine the impact of roads on bears, sample size is very small, and perhaps most importantly, mortality rates for these grizzly bears are not yet known. However, these data indicate that some grizzly bears can apparently habituate to relatively high levels of human activity.

Low-elevation riparian habitats are of significant seasonal importance to grizzly bears. Grizzly bears typically use the lowest elevations possible for foraging during spring. Craighead et al. (1982) described the value of low-elevation habitats to grizzly bears. Montana Fish, Wildlife

and Parks concluded that maximum numbers of grizzly bears can be maintained only if the species continues to have the opportunity to use both the temperate and subalpine climatic zones (Dood et al. 1986).

Research identified the following individual home-range selection patterns in local grizzly bear population segments: (1) some individual animals live almost exclusively (except for denning) in low elevation habitats; (2) other individuals maintain home ranges in more mountainous or remote locations; and (3) some individuals migrate elevationally on a seasonal basis (Servheen 1981, Aune and Stivers 1982).

Specific causes or factors involved in the selection or preferences for certain home ranges by grizzly bears are not well understood. Mace and Manley (1993) found that grizzly bear home ranges in the South Fork Study area included remote areas in high elevations. South Fork Study grizzly bear habitat-use data, road density analyses of the South Fork Study area, previous studies and CEM analysis (U.S. Forest Service 1994a, Mace et al. 1999) suggested that low-elevation habitats were not freely available to grizzly bears because of high road densities and associated human use in these areas. High road densities in low-elevation habitats may result in avoidance of or displacement from important spring seasonal habitat for some grizzly bears or high mortality risk for those individuals that venture into and attempt to exploit resources contained in these low-elevation areas.

Core areas The Service considers significant declines in expected use of habitat by grizzly bears a serious consequence of high road densities. Significant declines in grizzly bear use of MS-1 habitat (habitat areas key to the survival of the grizzly where seasonal or year-long activity, under natural, free-ranging conditions is common), especially those habitat components with high seasonal values, indicate that habitat needed for survival and recovery is less available. Ideal grizzly bear habitat provides some areas isolated from excessive levels of human impact. Because grizzly bears can conflict with humans and their land uses, grizzly bear populations require a level of safety from direct human-caused mortality and competitive use of habitat such as settlement, roading, recreation, excessive logging, mining and livestock grazing.

Analysis in the South Fork Study area (Mace and Manley 1993, Mace et al. 1996) indicated the importance of unroaded habitat, especially for females with cubs. Mace and Manley (1993) reported adult females used habitat further than 0.5 mile from roads or trails more than expected; 21 percent of the composite home range had no trails or roads and 46 percent was unroaded (greater than 0.5 mile from a road). Substantive blocks of unroaded habitat were components of all adult female home ranges. Of the adult female locations within unroaded polygons, 83 percent occurred within 7 polygons that exceeded 2,260 acres in size. Based on grizzly bear habitat use data from the Yellowstone ecosystem, Mattson (1993) recommended that micro scale security areas in that region be an absolute minimum of 6 kilometers (3.6 miles) in diameter or 28 square kilometers (10 square miles) and should be secure for a minimum period of 5, or preferably 10, years.

The IGBC Taskforce (IGBC 1994) recognized the importance of secure areas to grizzly bears. The Taskforce defined "core areas" as those areas with no motorized access (during the non-denning period) or heavily used foot/livestock trails, providing some level of secure habitat for grizzly bears. Motorized use, such as snowmobiling or that associated with timber harvest, could

occur within core areas during the denning (winter) period. The Taskforce recommended the establishment of core areas in all subunits, the size of core area should depend on ecosystem-specific habitat conditions, and that a core area remain intact on the landscape for at least 10 years. In the South Fork Study area of the NCDE, approximately 68 percent of the adult female composite home range was core area (U.S. Forest Service in litt. 1994, K. Ake, U.S. Forest Service, pers. comm. 2005).

Habituation to human attractants Continued exposure to human presence, activity, noise, and other elements can result in habituation, which is essentially the loss of a grizzly bear's natural wariness of humans. High road densities and associated increases in human access into grizzly bear habitat can lead to the habituation of grizzly bears to humans. Habituation in turn increases the potential for conflicts between people and grizzly bears. Habituated grizzly bears often obtain human food or garbage and become involved in nuisance bear incidences, and/or threaten human life or property. Such grizzly bears generally experience high mortality rates as they are eventually destroyed or removed from the population through management actions. Habituated grizzly bears are also more vulnerable to illegal killing because of their increased exposure to people. In the Yellowstone region, humans killed habituated grizzly bears over three times as often as non-habituated grizzly bears (Mattson et al. 1992).

Subadult grizzly bears are more often vulnerable to habituation and illegal killing or they conflict with people and are removed through management action. Subadult grizzly bears frequently traverse long distances or unknown territory, increasing the likelihood of encountering roads, human residences or other developments where human food or other attractants are available, increasing the potential for habituation and/or conflicts with people. Between 1988 and 1993, six of seven grizzly bear management removals from the Flathead National Forest and surrounding area involved subadults (U.S. Forest Service 1994a, 1994b). In the Yellowstone ecosystem, roads impacted individual age and sex classes of grizzly bears differently. Subadults and females with young were most often located near roads, perhaps displaced into roaded, marginal habitat by dominant grizzly bears (Mattson et al. 1987, Mattson et al. 1992).

General Effects of Snowmobiles on Grizzly Bears

Available information regarding the effects of snowmobiles on grizzly bears is generally anecdotal, such as grizzly bear responses to various stimuli other than snowmobiles collected during research. Such reports typically lack information related to the timing of disturbance, type of den, winter conditions or other important factors necessary to assess the significance of disturbance to grizzly bears, if any. Some information collected on black bears or other ursids may have some relevance, but even the data on these species is incidental and largely theoretical.

In the fall of 2000, the science and resource management staff of the Biological Resources Management Division of the National Park Service and the Rocky Mountains Cooperative Ecosystem Studies Unit at the University of Montana organized an expert workshop to summarize the state-of-science on monitoring the effects of snowmobiles on wildlife in national parks and surrounding lands. Graves and Reams (2001) edited the output of this expert workshop for protocols to monitor snowmobile effects on wildlife. The participating scientists and biologists developed a flow-chart depicting possible impacts and prioritized research to address these impacts. They prioritized the need to develop techniques that would demonstrate

and measure actual impacts on bear individuals and populations in the field, and addressed physiological/behavioral responses, mortality and displacement from habitat.

The group concluded that the evidence was inadequate to predict impacts on grizzly bears, but the *possible* effects were identified: den abandonment, loss of young, increased energetic costs while bears were in dens or displaced away from suitable habitat if outside dens, death, and learned displacement from suitable habitat resulting from exposure to disturbance (Graves and Reams 2001). Several issues to monitor were identified, including the effect of presence on emerging animals and the effect of noise on hibernating bears. Impacts to emergent bears were identified as a higher concern than impacts to denning bears.

Some indications of bear species responses to human disturbance are available from the distances of dens from centers of human activity. The fact that some bear dens were documented within 1 kilometer (0.6 mile) of human activity centers (Linnell et al. 2000) indicates that bears do not totally avoid denning habitat based on its proximity to human disturbance. Caution should be used when making inferences with this information, however. Just because some bears were found denning close to human activities does not mean that all bears can or will do so. Likewise, such data usually do not include the long-term productivity or survival of the study animals. Linnell et al. (2000) summarized distances of bear dens to various centers of human activity as documented by nine studies of brown and black of bears; distances ranged from 0.1 to 6.5 km (~109 yards to 4 miles) and did not account for differences in altitude or other factors such as den characteristics, snow depth or activity levels. Harding and Nagy (1980) noted successful grizzly bear dens from 1.6 to 6.4 km (~1 to 4 miles) from active mining camps, although no dens were found within 1 km (~0.6 mile) of active drilling and staging camps. Although Schoen et al. (1987) noted that brown bears in Alaska gradually, from year-to-year, located their annual dens away from an area of increasing mining activity, the short distances to disturbance sources reported for the European brown bear dens were reportedly in proximity to long-established sources (Linnell et al. 2000), which suggests that some bears may become habituated to disturbance sources.

In the Greater Yellowstone Ecosystem, Haroldson (pers. comm. 2001 *in* U.S. Fish and Wildlife Service 2002) noted that grizzly bears captured in the Togwotee Pass area during the nondenning period did not den in the area despite the presence of denning habitat (this area receives heavy snowmobile use – but grizzly bears enter their dens prior to most snowmobile activity). Instead, these grizzly bears denned in nearby wilderness areas. It is unknown whether den site selection in this case was due to higher quality denning habitat in the wilderness or due to avoidance of heavy snowmobile use on the pass.

Regardless of any apparent den site selection/avoidance related to disturbance sources, anecdotal evidence suggests that bears may respond to external disturbance or stimuli while in the den. When considering snowmobile disturbance, such stimulus may not be present when dens are being selected, but only after denning commences. There are no systematic data available on how denning bears react to disturbance using controlled stimuli (Linnell et al. 2000). However, bear responses to denning disturbance appear to occur along a continuum (*Ibid.*). Responses range from waking, to increases in temperature or heart rate, to den abandonment; and the costs to the bear increase as responses escalate.

Heart rates and movement sensors have detected changes in grizzly bears near disturbance, but little comparable baseline information has been recorded to document the normal movement/heart rates or variability in undisturbed bears. Movement, including shivering and shifting, in denning bears is theorized to be important in maintaining the temperature of the bear within 5 degrees of normal temperatures and apparently occurs whether or not there is obvious disturbance. The response of an individual bear to noise may vary with age, sex, experience, presence of young or not, terrain, temperament, denning season chronology, weather, and habituation tendencies of each animal. The impacts of such response have not been documented.

Linnell et al. (2000) summarized the few incidental events describing disturbance to denning bears and noted that activities within 1 km of a den were most likely to elicit response. They also noted that individual bears responded differently, and some bears indicated no response. Repeated exposure to the same stimuli without negative associations caused responses by bears to decline rapidly (*Ibid.*). Reynolds et al. (1986) documented that in three of the five cases where three brown bears were exposed to human activity (seismic shots, drilling, or vehicles driving at distances of 1 to 2 km), the bears displayed increased heart rates or increased physical activity, but noted that a snow-tractor driven within 100 meters of the den caused no observed response. Schoen et al. (1987), and Smith and Van Daele (1990) noted increased activity from denned bear “activity collars” during radio-tracking overflights, but Reynolds et al. (1986) noted no response in heart rates of two denning bears exposed to fixed wing aircraft. Reynolds et al. (1986) noted of bears with increased heart rates that “*all emerged in the spring with no observed deaths of accompanying offspring.*”

Typical high-use snowmobile areas and potential den sites have a limited likelihood of substantive overlap. Grizzly bears generally den in either timbered habitat or very steep slopes, including the slopes of open basins. Most of the heavy snowmobile use occurs on trails, roads, or open basins, and meadows – although some snowmobile riders use steep open basins for “high marking”, in which case there is a potential direct overlap between denning habitat and steep open slopes favored for “high marking” by snowmobiles. However, most denning habitat - except for “high-marking” areas - is less favorable for snowmobile use and as such there is a reduced chance of adverse overlap between grizzly bear den sites and snowmobile traffic.

Snow is an excellent sound barrier (Blix and Lentfer 1992) and impacts to denning bears would likely be less in deep snow conditions than in shallow snow conditions. It is likely that hibernating bears exposed to meaningless noise, with no negative consequences to the bear, habituate to this type of disturbance (Knight and Gutzweiler 1995). Reynolds et al. (1986) found that some bears, on occasion, appear to respond to noise or disturbance near the den site by waking up and moving around the den. On rare occasions, bears may abandon a den due to some disturbance (Reynolds et al. 1976, Swenson et al. 1997).

For example, den abandonment has been documented in association with industrial activity and direct approach (Reynolds et al. 1986; Schoen et al. 1987; Harding and Nagy 1980; Craighead and Craighead 1972b). Harding and Nagy (1980) found that one grizzly bear abandoned its den after having the den driven over by a seismic vehicle. Swenson et al. (1997) documented 9 percent of brown bears over 194 bear-winters abandoned or changed dens; in 12 of 18 events, human activity was noted at or within 100 meters of the abandoned den; there was no significant difference in brown bear den abandonment in a “protected area” versus areas where there was

military activity and timber harvest. *“Most abandonment occurred early in the denning period, before mid winter. Bears moved up to 30 km before denning again.”* Grizzly bears require strong parental investment and females stay with their young for several years. Abandonment of young is rare, but costly when it occurs. Den abandonment has caused cub mortality in black and brown bears (Linnell et al. 2000). Swenson et al. (1997) documented 60 percent of adult females with cubs of the year that abandoned dens during winter lost at least one cub to mortality, versus only 6 percent cub mortality in females that did not abandon dens. Cub mortality is difficult to document and causes are difficult to ascertain.

On the other hand, other events with seemingly similar levels of disturbance have not led to den abandonment (Reynolds et al. 1986; Mace and Waller 1997; Linnell et al. 2000). In fact, Mace and Waller (1997) conducted work on the Flathead National Forest and reported no abandonment of dens by grizzly bear even though snowmobiles were often seen within 2 km of den sites. Likewise, the Interagency Grizzly Bear Study Team has intensively researched grizzly bear ecology in the Yellowstone Grizzly Bear Ecosystem from the 1970's to present but this research has never documented den abandonment attributed to snowmobiles.

The noise and human activity related to snowmobile use would likely impact grizzly bears most during the early and late denning period, or when snow levels are low and the snowmobile activity is near the den site. However, the early and late denning periods are times when snow conditions would be least conducive to snowmobile activity.

Swenson et al. (1997) speculated that fall hunting, which occurs early in the denning period in Sweden, may contribute to fall disturbance and early den abandonment by European brown bears. Human activities such as hunting, survey work, shooting, fishing and dogs were thought to have a greater impact than industrial activity. If disturbance occurred early during the denning season, a bear would likely have other denning habitat available. Grizzly bears are unlikely to abandon their dens very late into the winter due to the high energetic and fitness costs of doing so (Linnell et al. 2000). Theoretically, as the costs of abandoning a den and re-locating to another den increase, grizzly bears should be expected to tolerate greater levels of activity without abandonment.

Disturbance from snowmobiles may be most consequential shortly before or after den emergence of a female with cubs. Most emerging bears move immediately to a known, reliable spring food source, such as a big game winter range (Reinhart and Tyers 1999). Females with cubs have high energetic needs, and cubs have limited mobility for several weeks after leaving the den, therefore they remain in the den site area for several weeks after emergence from dens (Haroldson et al. 2002; Mace and Waller 1997). Researchers involved in the Delphi assessment of snowmobile impacts (Graves and Reams eds. 2001) indicated higher concerns with emergent females with cubs as they are likely the most sensitive to disturbance (Haroldson et al. 2002). Disturbance levels that cause a female to prematurely leave the den in spring or move from the den area could impair the fitness of the female and safety of the cubs. If cubs attempt to follow their mother, they would likely experience decreased fitness and the family group may be pushed to less suitable habitat. A disturbance would have to be severe for a sow to abandon her cubs (Linnell et al. 2000). In the judgment of the Service, snowmobile-related impacts on post-den emergence females with cubs are more likely to impart serious consequences than any potential impacts to denning grizzly bears. Haroldson et al. (2002) found that the mean week of den

emergence among female bears was the third week of April. However, female den emergence ranged from the third week in March to the fourth week in May. Male bears typically emerged from the first week in February to the fourth week in May, with the mean emergence being the fourth week in March (*Ibid*).

Changing snow conditions in spring could, in part, help reduce the probability grizzly bears being impacted by snowmobiles. At the time of emergence (March-April), snow conditions are changing rapidly. The same conditions that help lead to bear emergence (e.g., water infiltrating the den) (Schoen et al. 1987; Craighead and Craighead 1972a) lead to poor quality snow for snowmobiling. Snow is melting at lower elevations, making access to higher elevations more difficult for snowmobilers. Female grizzly bears with cubs typically emerge later in the season, when these snow and melt conditions are even more prevalent. This is a general observation, with individual circumstances of access and allowable seasons being very important variables.

Effects of Roads in the Action Area

Within the recovery zone on the Forest, there is one subunit, Hilgard #1. This subunit occurs on both the Beaverhead-Deerlodge Forest and the Gallatin Forest. No motorized routes occur within this subunit on the Beaverhead-Deerlodge Forest. Therefore, OMARD and TMARD on the Forest within the recovery zone is zero. Some roads outside of and immediately adjacent to the subunit influence secure habitat on the Forest within the subunit, however, 96 percent of the Forest within the subunit is secure habitat. The Revised Forest Plan does not have any specific proposal to increase roads immediately adjacent to the Hilgard #1 subunit. Because the majority of the portion of the action area that occurs within the recovery zone is within the Lee Metcalf Wilderness and road densities are zero within the portion of the subunit on the Forest and very low road densities occur adjacent to the subunit, displacement or under-use of otherwise suitable habitat by grizzly bears using the area on the Forest within the recovery zone is not expected.

Portions of the action area outside the recovery zone have high levels of activity along roads while other portions have low activity along roads or no roads at all. Adverse effects from access management in some areas of the Forest may be resulting in the displacement of individual grizzly bears, the avoidance of suitable habitat and/or the reduction of habitat to an unsuitable condition. The effects of displacement and under-use of habitat are tempered by local resource availability, resource condition, seasonal use, and the number of grizzly bears using an area. Under-use of habitat in proximity to Forest roads does not necessarily preclude use or form a barrier to dispersal and movement across the landscape.

Habitat loss and modification result from natural and human-caused events. Under-use of otherwise suitable habitat along roads essentially reduces the amount of habitat freely available to grizzly bears. Fire, timber harvest, silviculture treatments, drought, and high levels of human activity can also reduce the amount of suitable habitat, alter temporal or quantitative use of an area, and limit an environment's ability to support a species.

The following are Forest Plan Recreation and Travel Management standards in the Revised Forest Plan that address travel management on the Forest:

- Standard 1: Permanent road construction is not allowed in summer non-motorized allocations or in areas evaluated for wilderness potential.

- Standard 2: Motorized vehicles are not allowed in summer or winter non-motorized allocations except for permitted or administrative use.
- Standard 7: Manage summer non-motorized allocations for either a primitive or semi-primitive non-motorized setting from May 16 thru December 1.
- Standard 8: Manage winter non-motorized allocations for a primitive or semi-primitive non-motorized setting from December 2 through May 15.
- Standard 10: Manage recommended wilderness for primitive or semi-primitive non-motorized settings and protect wilderness character.

The following are Forest Plan Wildlife Goals in the Revised Forest Plan that address travel management on the Forest:

- Wildlife Security: Secure areas and connectivity for ungulates and large carnivores are provided, while recognizing the variety of recreational opportunities.
- Grizzly Bear Security: The Gravelly Landscape is maintained to achieve 60 percent or greater secure area.
- Wildlife Secure Areas and Connectivity: Manage density of open motorized roads and trails by landscape year-round, except fall rifle big game season, to achieve levels at or below the following:

Landscape	Desired Summer Open Motorized Road and Trail Density (miles per square mile)	Existing Condition (miles per square mile)
Madison	0.0	0.0
Gravelly	0.7	0.8
Tobacco Roots	1.3	1.2
Highland	1.9	1.8

- Manage open motorized road and trail density by MTFWP hunting units as of 2006 on National Forest Lands during the fall rifle big game season, to achieve levels at or below the following:

Hunting Unit	Desired Fall Open Motorized Road and Trail Density (10/15-12/1) (miles per square mile)	Existing Condition (miles per square mile)
311	0.0	0.0
320	0.8	0.8
323	0.5	0.7
324	0.4	0.5
327	0.8	0.9
330	0.7	0.7
333	0.9	1.1
340	1.4	1.5
360	0.0	0.0
362	0.0	0.0

The following are Forest Plan Wildlife standards in the Revised Forest Plan that address travel management on the Forest:

- Standard 1: From October 15 to December 1, Hunting Units that exceed the open motorized road and trail density objective will have no net increase in designated open motorized road and trail density mileage.
- Standard 2: landscapes that exceed the open motorized road and trail objective will have no net increase in designated open motorized road and trail mileage.

If a landscape or hunting unit is below the above goals, open road density could increase in that analysis area, however it could not increase beyond the numbers listed in the desired open road and trail columns above. Although the Forest Plan does not preclude additional road construction in these scenarios, total road miles have decreased across the action area. Periodic new road construction does occur, but overall there has been a downward trend in the miles of roads (see Table 8 below).

Table 8. Road construction and decommissioning 2003-2008 on the Forest (U.S. Fish and Wildlife Service 2010).

Year	New Road Construction (Miles)	Decommissioning (miles)		
		System Roads	Unauthorized Roads	Total
2003	.5	1.5	1.5	3
2004	0	.9	9.5	10.4
2005	0	3.5	0	3.5
2006	0	0	0	0
2007	0	0	.5	.5
2008	0	3.0	0	3
Totals	.5	8.9	11.5	20.4

The standards listed in the previous paragraphs are mandatory. The goals listed in the previous paragraphs are not mandatory but are desired conditions towards which to strive over the life of the plan. Site specific travel planning is anticipated to occur at some point in the future with the likelihood of decreased motorized access. For example, since the Revised Forest Plan was signed, the Forest has closed approximately 33 miles within the action area and another 61.4 miles are scheduled for closure under the preferred alternative for the Madison Ranger District travel planning effort. The Madison Ranger District travel planning decision is expected to be made before the end of the year. Other ranger district travel planning efforts would likely close additional roads in the action area, however those planning efforts are several years out. Therefore, implementation of the Revised Forest Plan would likely reduce open motorized routes across the action area and it is reasonable to assume that the level of permanent roads in the action will not substantively increase during the remaining life of the Revised Forest Plan, with some local exceptions. This assumption is based on the Revised Forest Plan direction and the recent history and trends in road building and decommissioning that consistently show fewer permanent roads on the landscape, as discussed in the biological assessment. However, open and total road densities in some areas and continued operation of these roads, as allowed by the Revised Forest Plan, may result in adverse effects to grizzly bears attempting to live in the area.

Temporary roads built for resource extraction such as timber harvest or mining may remain on the landscape for several years and receive a substantive amount of use. Such roads may also cause adverse effects to grizzly bears, such as displacement from key habitats. The Service expects that some level of temporary roading would occur on lands within the action area during the life of the Revised Forest Plan (10-15 years). The Service also anticipates some level of adverse effects to grizzly bears with home ranges impacted by these temporary roads may occur in some situations. Therefore, the existing roads and any new roads constructed in the future, temporary or permanent, may adversely impact grizzly bears' ability to find food resources, breed and raise young, and find shelter.

Effects of Snowmobiles in the Action Area

As displayed in Table 9 below, the Revised Forest Plan established considerable changes in winter motorized access across the action area. The Revised Forest Plan reduces the amount of area open to winter motorized use by 292,350 acres. The dates in which winter motorized use is allowed under the Revised Forest Plan are between December 2 and May 15.

Table 9. Winter Motorized Access (U.S. Forest Service 2010).

Landscape	Total Landscape Acres	Acres Open to Winter Motorized Use Pre-Revised Forest Plan (percent open)	Acres Open to Winter Motorized Use in Revised Forest Plan (percent open)	Reduction in Acres Open to Winter Motorized Use (percent reduction)
Highland Mountains	108,261	103,790 (95.8%)	46,022 (42.5%)	57,768 (55.7%)
Tobacco Roots	187,523	164,604 (87.8%)	83,815 (44.7%)	80,789 (49.1%)
Gravelly	474,610	377,904 (79.6%)	234,576 (49.4%)	143,328 (37.9%)
Madison	127,132	13,162 (10.3%)	2,697 (2.1%)	10,465 (77.8%)
Totals	897,526	659,460 (73.5%)	367,110 (40.1%)	292,350 (44.3%)

As discussed above, the primary concerns with motorized winter recreation with respect to grizzly bears are the potential effects associated with denning, den emergence and spring habitat. Summer and fall habitats are not at issue since snowmobiling would not overlap with these seasons. As mentioned above, the third week of March is when female grizzly bears begin to emerge from their dens. Winter recreation will primarily occur during the grizzly bear denning season. However, the Revised Forest Plan would allow snowmobile use beyond the third week of March throughout the action area. Winter motorized use would be allowed until May 15.

Denning Habitat

Within the action area, the proposed action would result in a net decrease of winter motorized use, decreasing the acres designated as winter motorized by 292,350 acres. Reductions would occur in all four landscapes. In total 530,416 acres would be designated as non-motorized winter use versus 367,110 acres designated as motorized winter use.

The biological assessment (U.S. Forest Service 2010) describes these reductions as occurring at key areas of the landscape. In the Revised Forest Plan, winter motorized access has been

restricted in those portions of the landscape that, for the most part, are high in elevation and maintain snow cover later in the year. Winter motorized recreation has been restricted in those areas that have been recognized as having wilderness character and have been recommended for inclusion in the National Wilderness Preservation System. In the Gravelly Landscape, for example, winter motorized access is restricted in the high peaks of the Snowcrest Mountains Recommended Wilderness and in the high, rugged slopes around Wolverine Basin. These are potential denning sites for grizzly bears. Therefore, reductions in acres open to winter motorized use would increase the amount of potential denning habitat within winter non-motorized use areas.

As discussed in the ‘general effects of snowmobiles on grizzly bears’ section above, the potential for disturbance to denning grizzly bears does exist but is probably low due to the low probability of a direct encounter of a snowmobile to a den and even in that unlikely case, the excellent insulative properties of snow to mitigate the noise. It is more likely that impacts to denning grizzly bears would occur upon den emergence as discussed below. Therefore, although some grizzly bears may be affected during the denning season, the Service believes that the magnitude of impacts during this time would not reach levels that would injure grizzly bears, or be expected to appreciably reduce the reproduction, numbers or distribution of grizzly bears.

Den Emergence

To review, female grizzly bears begin emerging from their dens about the third week of March, with males typically beginning to emerge several weeks earlier (Haroldson et al. 2002). Grizzly bears typically spend a few days to a few weeks at or near the den before moving to other locations to begin feeding. During this time the grizzly bears were observed to be very lethargic and approachable. After leaving the den site grizzly bears usually move to lower elevation habitats such as riparian areas and avalanche chutes for much of their foraging during spring (Mace and Waller 1997). Based on the behavior of grizzly bears in response to motorized use of roads in Mace and Waller’s (1997) study, snowmobile activity after den emergence dates could disturb and/or displace grizzly bears. The greatest probability of interactions at or near dens would obviously be expected where potential denning habitat overlaps with open snowmobile areas and the influence zones around roads or routes. As discussed in more detail below (under *spring habitat*), once grizzly bears move away from den sites and toward spring habitats, there will be very little potential for conflict with snowmobiles.

Snow conditions within the action area are often suitable for snowmobiling to continue well beyond the time when grizzly bears generally begin emerging from their dens. Less temporal and spatial overlap of grizzly bears and snowmobiles would occur under the Revised Forest Plan due to the decrease in winter motorized use areas and overlap of denning habitat as described above. However, under the Revised Forest Plan, winter motorized use could occur until May 15. Therefore, the potential exists for interactions between snowmobiles and grizzly bears that have recently emerged from their dens.

As discussed above in the ‘general effects of snowmobiles on grizzly bears’ section, disturbance from snowmobiles may be most consequential shortly before or after den emergence of a female with cubs. Females with cubs have high energetic needs in the spring, and cubs have limited ability to travel for several weeks after emergence from the den. Disturbance levels that cause a

female to prematurely leave the den in spring or move from the den area could impair the fitness of the female and safety of the cubs. If cubs attempt to follow their mother, they would likely experience decreased fitness and the family group may be pushed to less suitable habitat. Significant disturbance during this time may reach levels that would injure grizzly bears, specifically adult females with cubs.

Spring Habitat

In the YGBE, Haroldson et al. (2002) reported that male grizzly bears begin emerging from their dens as early as the first week of February, with the mean week of emergence being the fourth week in March. Female grizzly bears began emerging from their dens during the third week in March, with the mean week of emergence being the third week of April. Upon emergence from their dens in the spring, grizzly bears typically move to lower elevations where their dietary needs may be met. Typical spring food sources include early greening herbaceous vegetation in low elevations, riparian areas, and in melted-out avalanche chutes. Grizzly bears also feed on dead ungulates from winter kill on winter ranges and in some locations grizzly bears prey on elk calves (usually available after June 1). Females with newly born cubs tend to spend more time in the vicinity of the den (with cubs) after emergence.

The potential for disturbance or displacement of grizzly bears from spring feeding habitat in the action area is influenced by the variability in snowpack and the rate of spring melt. Although snowmobiling would be permitted after until May 15, spring snowmobiling areas and spring grizzly bear habitat are almost mutually exclusive in that the areas that would be suitable for spring snowmobiling (i.e. more snowpack) would not typically overlap with spring grizzly bear habitats (i.e. less snowpack).

Due to the reduction in total acres available to winter motorized use, the Revised Forest Plan would not expand impacts to spring habitat beyond what was occurring under the previous Forest Plan. Also, based on the discussion above, the Service does not expect impacts to spring habitat and foraging grizzly bears to rise to the magnitude that would injure grizzly bears, or be expected to appreciably reduce the reproduction, numbers or distribution of grizzly bears.

Sanitation/Food Storage and Site Development

This section focuses on analysis and discussion of the direct and indirect effects to grizzly bears related to sanitation and food storage issues. Mortality of grizzly bears may occur indirectly through habituation to human presence. Also refer to the ‘habituation and mortality’ subsection in the ‘General Effects of Roads on Grizzly Bears’ section for further discussion on habituation.

General Effects of Sanitation/Food Storage and Habituation

Improperly stored garbage, livestock or pet foods can lure grizzly bears to areas near people and pose a significant risk of habituating bears to human presence and/or conditioning grizzly bears to seek out anthropogenic foods and attractants. Food conditioned grizzly bears enter unsecured garbage receptacles, sheds and other buildings in search of a reward. Accessibility to human related attractants and conditioning to those rewards can lead to management removal of grizzly bears and additionally, mortality of grizzly bears by people defending their life and property.

Incidence of property damage or conflicts associated with human related foods is inversely proportional to the availability of high quality grizzly bear foods found in the wild; during periods of poor natural food production incidences of human-grizzly bear conflicts typically increase. When poor seasonal bear foods exist in part or through the entire nondenning season in the GYE, the incidences of bears causing property damage and obtaining anthropogenic foods increased four fold over average or good years (Gunther et al. 2004). The conflict relationship is magnified when the availability of late season natural foods such as whitebark pine seeds is insufficient to meet the high energy requirements during hyperphagia (Mattson et al. 1992).

Numerous studies in the NCDE elucidate the importance of late-season frugivory, especially globe huckleberries (*Vaccinium globulare*), by grizzly bears (Martinka and Kendall 1986, Weaver et al. 1990). Berry failure due to drought or destruction of plants by fire would force grizzly bears to range more widely than in normal periods of seasonal availability (Blanchard and Knight 1991). Therefore, grizzly bears face an increased risk of encounters with humans and ultimately human-caused mortality during the autumn season. Grizzly bears in some areas that avoided trails with human activity during part of the year changed this avoidance behavior when a favored berry resource came into season (Donelon 2004). Although grizzly bears still had a low tolerance for trails with high human activity, the tendency to approach areas of human activity when nutritional and energy needs are high could put individual bears at an increased risk of immediate conflict or condition them to the presence of people, which could lead to conflicts later in time.

Effects of Sanitation/Food Storage and Habituation in the Action Area

The Forest had few developed sites with the recovery zone, McAtee Cabin, Indian Creek Cow Camp, and Shedhorn Cow Camp. In 2007, the Forest determined that two of these (Indian Creek Cow Camp and Shedhorn Cow Camp) were no longer in use or necessary for the administration of livestock. These sites were removed from the list of developed sites within the PCA reducing the number of developed sites within the recovery zone to one. No plans for additional developed sites are currently planned. As mentioned in the baseline, the Forest has 54 developed sites within the action area outside of the recovery zone. No reductions in developed sites in this portion of the action area are planned. Two additional trailheads may be constructed in the Highland Mountains during the life of the Revised Forest Plan. No additional developed sites are planned in the remaining landscapes. Developed sites can pose risks of unsecured attractants and food, left by campers, hunters, and people using day use sites. Habituated grizzly bears learn to seek out developed sites for food rewards.

The Revised Forest Plan specifically calls for implementing food storage and sanitation orders in areas classified as occupied grizzly bear habitat as a wildlife objective. Forest order No. 2004-D6/D7-031 and other related orders specifically direct attractant management for all occupancy and use of the Madison, Gravelly, and Tobacco Root Landscapes from March 1 through December 1. No similar order is in effect for the Highland Mountains. However, the Highland Mountains is not occupied by grizzly bears at this time. The primary goal of the special order is to minimize grizzly bear-human encounters and provide for user safety and the protection of the grizzly bear. Food storage orders substantially reduce the potential for adverse effects to bears as a result of food conditioning and habituation at developed sites as well as dispersed human use.

No grizzly bear mortalities associated with improper food storage or site conflicts have been reported within the action area (Haroldson 2010 *in litt*). However, at least two grizzly bear/human conflicts have occurred on the Forest related to unnatural foods. These occurred several years ago in 1993 and 1994 (*ibid*). Several other conflicts related to unnatural foods and/or property damage have occurred off of the Forest but adjacent to it either on Gallatin National Forest lands or non-National Forest lands. Improper storage of attractants and foods on lands adjacent to the Forest presents the risk of food conditioning grizzly bears using both the Forest and adjacent lands. Throughout the distribution of grizzly bears, habituation/food conditioning remains a fairly serious risk to individual grizzly bears.

Habituation and food conditioning of grizzly bears is a concern in all grizzly bear populations. The Forest will follow the Conservation Strategy nuisance bear standard for nuisance bear management. These standards are embedded within the Revised Forest Plan and are therefore part of the proposed action. Information in the biological assessment indicates that there have been two grizzly bear conflicts reported and no mortality of bears as a result of food or attractants in the action area. However, as the number of grizzly bears increase and the number of people residing in and visiting the area increase, the number of grizzly bear-human conflicts related to food and attractant storage may increase as well. Therefore, it is reasonable to expect that some risk, albeit low (based on grizzly bear numbers, Forest Plan direction, and history of conflicts in the area), of adverse impacts to grizzly bears exists over the life of the Plan.

Livestock Grazing

General Effects of Livestock Grazing

Effects of livestock grazing on grizzly bears are generally related to depredations of livestock by grizzly bears, disposal of livestock carcasses, storage of human food and stock feed, and grizzly bear habituation, food conditioning and mortality risk associated with these activities.

Depredating bears may become food conditioned resulting in management actions that remove bears from the population. Although grizzly bear conflicts with cattle do exist, the more significant problems have been with sheep (Orme and Williams 1986). The adverse effects of domestic sheep grazing on grizzly bears are well documented (Knight and Judd 1983, Johnson and Griffel 1982). Sheep grazing in occupied grizzly bear habitat poses substantive risks to grizzly bears since bears kill sheep much more readily than other livestock and because sheep are often closely tended by herders typically armed and protective of their flock. In one study in the YGBE, of 24 grizzly bears known to use livestock allotments, 10 were known to kill livestock (Knight and Judd 1983). Of these bears, 7 killed sheep and 5 were trapped and instrumented. All but one instrumented grizzly bear cub that had the opportunity to kill sheep did so. Grizzly bears that kill livestock include a range of ages and both sexes (Johnson and Griffel 1982).

Being an opportunistic feeder, any individual grizzly bear can learn to exploit livestock as an available food source just as easily as they habituate to other human food sources (Johnson and Griffel 1982). Knight and Judd (1983) reported several differences between cattle and sheep conflicts with grizzly bears. They found that all radio-collared grizzly bears known to have come in close contact with sheep killed sheep, but most grizzly bears that encountered cattle did not make kills. They also found that all known cattle kills were carried out by adult bears 7 years or older, while both adults and subadults from 1 to 13 years old killed sheep. Grizzly bears that

killed sheep, usually took multiple sheep over several days. However in each instance when the sheep were moved out of the area the predation ended (Johnson and Griffel 1982).

Livestock carcasses may also attract grizzly bears. Grizzly bears have a strong tendency to return to a carcass for two or more feedings (Johnson and Griffel 1982). Therefore, properly treated or disposed of livestock carcasses would greatly reduce the potential attractants for grizzly bears.

Effects of Livestock Grazing in the Action Area

The Forest has several cattle allotments and a few sheep allotments within the action area. Three active cattle allotments occur within the recovery zone. The remaining allotments occur within the action area outside of the recovery zone. Of the allotments within the action area outside of the recovery zone, seven are sheep allotments, all occurring within the Gravelly Landscape.

One documented grizzly bear mortality has been associated with livestock depredation within the action area (Haroldson 2010 *in litt*). This mortality occurred in the Gravelly Landscape in 1986. One additional conflict grizzly bear/human conflict related to livestock also occurred within the action area. This conflict also occurred within the Gravelly Landscape in 2001 but did not result in the mortality of a grizzly bear. Additional conflicts with grizzly bears related to livestock have occurred off the Forest but near the Forest. The Revised Forest Plan would maintain the existing number and distribution of allotments within the action area and would potentially reduce the number of sheep allotments. The Revised Forest Plan Wildlife Standard #5 states that “sheep allotments within the Gravelly Landscape which become vacant will be closed to sheep grazing or the allotment may be used by an existing Gravelly Landscape sheep permittee with no increase in permitted use.” Therefore, the number of allotments and likely, the number of sheep, will not increase and may decrease under the Revised Plan. However, the potential for conflicts to occur will remain, and may increase on the Forest within the action area as grizzly bear numbers increase.

The Forest will follow the Conservation Strategy nuisance bear standard for nuisance bear management. These standards are embedded within the Revised Forest Plan and are therefore part of the proposed action. As the number of grizzly bears increase in the action area outside of the recovery zone, an increase in the number of grizzly bears subject to potential management removal as a result of grizzly bear-livestock conflicts may occur. Livestock management on the Forest, especially sheep allotments, has the potential to result in adverse impacts to grizzly bears if livestock/grizzly bear conflicts occur. Grizzly bears may become food conditioned/habituated to seek out sheep as prey, which may result in the removal of grizzly bears.

Vegetation Management

General Effects of Vegetation Management

Vegetation Management may impact grizzly bears in the short-term by displacing grizzly bears from important food sources and/or displacing grizzly bears to less secure habitat, if treatment units are located within or near key habitat types. Long-term effects to grizzly bears may result from vegetation alteration, impacting both grizzly bear cover and forage. A decrease in the

amount of cover may result in different effects on grizzly bears and their habitat. If cover is limiting in the project area, either by the amount or distribution, timber harvesting would likely result in negative impacts (Ruediger and Mealy 1978). Reduced cover may increase the visibility of grizzly bears, which may potentially increase their vulnerability to illegal human-caused mortality and/or contribute to displacement from preferred habitats. However, if cover is not limiting in a project area, timber harvesting may have either no effect or a positive effect in those situations where food abundance or distribution is improved. By removing or reducing overstory vegetation through harvesting, slashing and/or burning, grizzly bear food production may be increased (Ruediger and Mealey 1978). This includes foods such as berries and succulent forbs.

In a study on use of harvested stands, Waller (1992) found that use of these stands increased during the berry season, due to some harvested stands having high berry production. If food production or distribution is improved but human activity is not controlled after the completion of harvest activities, negative impacts on grizzly bears may occur due to an increase in the potential for conflicts between humans and grizzly bears (Ruediger and Mealey 1978). Waller (1992) found that of the harvested stands that he studied, those with the highest grizzly bear use had limited access due to closed gates and/or over-grown roads. Grizzly bears within his study area that used harvested stands were found at higher elevations and spent little time in lower elevation stands where harvest was most common. Waller attributed this to human use of those lower, more accessible harvested stands. Waller also found that grizzly bears avoided stands where the vegetation had not recovered enough to provide security cover and preferred to use stands that were 30 to 40 years post-harvest.

Zager (1980) found that differences of shrub responses depended on the type of treatment that occurred post-harvest. Among the key shrub grizzly bear foods on clearcut sites where slash was bulldozer-piled before burning, Zager found a consistent decline in canopy coverage when compared to old burns. This is likely due to the extreme heat created by burning slash piles which may kill rhizomes and root crowns and bulldozer use which may also destroy rhizomes and root crowns. In those areas where slash was either broadcast burned or not treated, key grizzly bear shrub foods were generally found throughout the sites, except on skid roads and other severely disturbed areas. On relatively mesic sites, globe huckleberry, mountain-ash and serviceberry generally increased in cover.

Timber harvest activities that would occur during the grizzly bear denning season are not likely to impact grizzly bears. Snow is an excellent sound barrier (Blix and Lentfer 1992) and impacts to denning bears would likely be less in deep snow situations than in shallow snow conditions. It is likely that hibernating bears exposed to meaningless noise, with no negative consequences to the bear, habituate to this type of disturbance (Knight and Gutzweiler 1995).

Often, temporary roads are constructed in order to access harvest units. The impacts of roads are discussed above in the 'general effects of roads' and the 'effects of roads in the action area' sections above.

Helicopters may also be used in vegetation management projects. Helicopter use in occupied grizzly bear habitat may elicit a response in grizzly bears. Effects may range from a simple awareness of the helicopter, short-term disturbance or flight response or displacement from an

area. In timbered habitats, McLellan and Shackleton (1989) found that an overt avoidance or displacement response required high intensity helicopter activity, such as carrying equipment within 200 meters of a grizzly bear. Helicopter use that is short in duration and low in frequency, would not likely result in significant affects to grizzly bears. Extended use with multiple passes could interfere with the normal behavior patterns of grizzly bears. The effects to grizzly bears of repeated, low altitude flight paths that follow open roads may partially offset the existing under-use of habitat in the immediate vicinity of the roads due to the “avoidance” by the grizzly bears of habitat in close proximity to open roads. In many cases, the effects of helicopter logging that occurs in roaded habitat would have insignificant effects to grizzly bears as long as all roaded areas and roadless habitat effectiveness provide adequate secure habitat for grizzly bears. However, helicopter logging in areas that are not highly roaded could result in adverse effects similar to adverse effects caused by roads.

Effects of Vegetation Management in the Action Area

The Revised Forest Plan would reduce the acres identified as suitable for timber production from 78,730 to 28,189 acres within the action area. Timber production for growth and yield would not occur in the Gravelly Landscape. Site specific project analysis will determine the type and extent of harvest and potential effects to grizzly bears. The amount of areas classified as not suitable for timber production but timber harvest is allowed for other resource benefit increases in the Revised Forest Plan. Every proposed vegetation management project within the action area would consider potential effects to grizzly bears during the site specific project analysis process. Refer to table 10 (next page) for acres suitable for timber production. Based on our history of consultation on vegetation management projects, information in our files, and the analysis under the ‘general effects of vegetation management’ section above, we do not anticipate that vegetation management activities by themselves would result in effects to grizzly bears that would be so significant as to impact breeding, feeding or sheltering.

Activities that occur along with vegetation management activities such as temporary road construction or helicopter use may result in additional effects to grizzly bears. Such effects could range from insignificant to significant. The effects of temporary roads are discussed in the ‘general effects of roads’ and the ‘effects of roads in the action area’ sections above. General effects of helicopter use are discussed above in the ‘general effects of vegetation management’ section. Potential effects that may occur as a result of temporary roads and/or helicopter use associated with vegetation management would be considered in a site-specific analysis.

Table 10. Suitable Timber in the Revised Forest Plan (U.S. Forest Service 2010).

Landscape	Timber Suitability Classification	Acres	Percent of Landscape
Highland Mountains	Suitable for Timber Production	15,535	14
	Not Suitable, Timber Harvest Allowed	53,767	50
	Not Suitable, No Harvest Allowed	38,909	36
Tobacco Roots	Suitable for Timber Production	12,654	7
	Not Suitable, Timber Harvest Allowed	112,533	60
	Not Suitable, No Harvest Allowed	62,291	33
Madison	Suitable for Timber Production	0	0
	Not Suitable, Timber Harvest Allowed	4,433	3
	Not Suitable, No Harvest Allowed	122,435	97
Gravelly	Suitable for Timber Production	0	0
	Not Suitable, Timber Harvest Allowed	223,327	47
	Not Suitable, No Harvest Allowed	247,730	53
TOTAL for action area	Suitable for Timber Production	28,189	3 % of action area
	Not Suitable, Timber Harvest Allowed	394,060	44 % of action area
	Not Suitable, No Harvest Allowed	471,365	53 % of action area

General Effects of Fire Management

Fire management may result in disturbance and displacement impacts to grizzly bears. Fire suppression activities involve the presence of humans and often include the use of motorized equipment. Grizzly bears generally would leave an area on their own in advance of an approaching fire and therefore be out of the area associated with fire suppression activities. However, if suppression activities were to take place prior to an approaching fire, a grizzly bear may be encountered before leaving the area. There may be some effects from disturbance caused by the overall increase in human activity in a particular area. These activities may include increased vehicular traffic, aerial support and fire camps, any of which may encounter a grizzly bear prior to their fleeing the area or while they are in flight. There is a possibility of a direct encounter with a grizzly bear by a person or group of people involved in fire management.

activities. Any direct encounter may result in the displacement of a grizzly bear and potentially result in adverse affects.

Indirect, long-term effects from fire suppression activities may result from opening previously closed roads, constructing new roads or temporary roads, constructing firebreaks or constructing machine lines. These actions may contribute to the open and total road densities which are limited in certain areas to protect grizzly bears or result in effects to grizzly bears similar to effect of roads on grizzly bears. Research has confirmed the adverse impacts of roads on grizzly bears (see ‘effects of roads’ section above).

Wildland fires for resource benefit are typically allowed to burn with some degree of certainty that the fire would go out naturally or could be contained within predefined lines. These types of fires, when allowed to burn, can result in short-term negative effects and/or long-term beneficial effects depending on the vegetation species and fire severity. Some foraging habitat and/or cover may be lost in the short-term. However, natural fire often stimulates the understory and/or increase the vegetative diversity in high quality grizzly bear habitat, benefitting grizzly bears in the long-term.

Fuels treatments could include prescribed fire, mechanical treatment, and/or chemical treatment. Refer to the ‘vegetation management section’ above for potential effects to grizzly bears.

Effects of Fire Management in the Action Area

Wildland fire control efforts and use of prescribed burning would continue under the Revised Forest Plan. The acres available for these activities and locations vary across the action area. Wildland fire may also be used as a management tool for resource benefit.

Any potential effects associated with fire suppression and/or wildland fire for resource benefit would be analyzed in emergency consultation after the suppression activities are complete. Also, a site-specific analysis of potential effects to grizzly bears as a result of fuel treatments would occur prior to implementation of a project. Refer to the ‘vegetation management section’ above for potential acreage such treatments could occur on within the action area as well as potential effects to grizzly bears. As mentioned in the effects of vegetation management above, such treatments by themselves would not likely result in significant impacts to grizzly bears.

Effects Summary

The overwhelming majority of Forest management projects that have potential to adversely impact grizzly bears fall within three categories: motorized access, foods and attractants storage, and livestock grazing. We conclude that the Revised Forest Plan, grizzly bear recovery strategy, and food storage order direction as applied to grizzly bears and their habitats would continue to substantially reduce adverse impacts to grizzly bears from Forest management activities within the action area.

As anticipated in the Recovery Plan, grizzly bears are expanding their range outside of the recovery zone. Grizzly bears are given high priority in Forest management inside the Recovery

Zone; grizzly bears are not the primary management consideration in Forest land management in the action area outside of the recovery zone. Grizzly bears outside the recovery zone probably experience a higher level of adverse impacts due to land management actions than do grizzly bears inside. However, a number of grizzly bears are apparently able to live in habitat on the Forest outside of the recovery zone. As grizzly bear numbers increase and they expand their range, it is possible that the Forest will experience an increase in conflicts involving grizzly bears and people as a result of access management, sanitation/food storage and livestock depredation. This may lead to a grizzly bear being either intentionally or inadvertently killed or removed from the population.

Existing and proposed road densities authorized under the Revised Forest Plan have the potential to adversely affect some grizzly bears in some portions of the action area. However, the Revised Forest Plan will reduce the overall open motorized routes within the action area and secure habitat will be maintained or increased. Areas with higher road densities may lead to the under-use of suitable habitat by grizzly bears. Within the Recovery Zone portion of the action area, OMARD and TMARD are zero. Outside the recovery zone, a linear road density was calculated by Landscape during summer and by Hunting District during the fall. The revised biological assessment (U.S. Forest Service 2010) documents very few roads constructed in the last decade. Inside the recovery zone, OMARD and TMARD are zero and access management within the recovery zone is not likely to result in adverse effects to grizzly bears. Outside of the recovery zone, access management direction would likely result in access management that may significantly impact some grizzly bears' ability to find food resources, breed and raise young, and find shelter. However, we expect that grizzly bears will live outside the recovery zone but likely at lower numbers than inside the recovery zone.

Human access into grizzly bear habitat can lead to the habituation of grizzly bears to humans. Habituation in turn increases the potential for conflicts between people and grizzly bears. Habituated grizzly bears often obtain human food or garbage and become involved in nuisance bear incidences, and/or threaten human life or property. These grizzly bears are considered 'food conditioned' and generally experience high mortality rates as they are eventually destroyed or removed from the population through management actions. Habituated grizzly bears are also more vulnerable to illegal killing because of their increased exposure to people. No grizzly bear mortalities have been reported on the Forest related to improper food storage. The Forest has taken actions to minimize the risk of habituation/food conditioning to grizzly bears through the mandatory food storage order that applies to three of the four Landscapes within the action area. Under the Revised Forest Plan, management of sanitation/food storage in the action area both inside and outside of the recovery zone is likely to continue to reduce the number of management removals of grizzly bears or other mortalities, such as defense of life. However, as grizzly bears increase in numbers and expand within the action area, we cannot rule out the potential risk that grizzly bears may become habituated and food conditioned and be subject to potential management removal at some time during the life of the plan.

Conflicts arising from livestock grazing are recognized as a source of human-caused mortality of grizzly bears. Grizzly bears habituated to livestock as a food source are more likely to be destroyed or removed from the population due to management control and defense of property actions. The Revised Forest Plan would maintain the existing number and distribution of allotments within the action area and would potentially reduce the number of sheep allotments.

One human-caused grizzly bear mortality or management action as a result of conflicts with livestock grazing occurred on the Forest in 1986. Grizzly bear mortalities as a result of conflicts with livestock have occurred on lands adjacent to the Forest. As the grizzly bear numbers increase in the action area outside of the recovery zone, an increase in the number of grizzly bears subject to potential management removal or other mortality as a result of grizzly bear-livestock conflicts may occur.

Although the Forest's management of grizzly bear habitat may result in direct and indirect adverse effects on individual grizzly bears, we do not anticipate that these effects will have appreciable negative impacts on the YGBE grizzly bear population. Grizzly bears have been expanding their range within the action area, and mortalities and conflicts on the Forest are generally rare, and the Revised Forest Plan maintains or improves direction related to grizzly bear habitat found in the past Plan. The majority of the action area is located outside the YGBE recovery zone. The Recovery Plan stated that grizzly bears living within the recovery zone are crucial to recovery goals and hence to delisting. Grizzly bears inside and outside of the recovery zone are listed as threatened under the Act, but only lands inside the recovery zone are considered essential to, and therefore managed primarily for, the recovery and survival of the grizzly bear as a species. In developing the YGBE recovery zone, all areas necessary for the conservation of the grizzly bear were included.

Even though the areas of the Forest outside the recovery zone are not essential to the conservation of the species, the Forest has managed and will continue to manage the lands in such a way that they have allowed grizzly bears to expand into these zones, survive and reproduce. Thus, although access management, sanitation/food storage and livestock grazing may adversely affect some of the individual grizzly bears, more likely those using habitat outside the recovery zone, we anticipate that grizzly bears will continue to be able to inhabit these areas into the future under the Revised Forest Plan. Therefore, we expect Revised Forest management to contribute to the sustained recovery of the YGBE population.

VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

In 2002, Montana Fish, Wildlife and Parks prepared the Grizzly Bear Management Plan for Southwestern Montana 2002-2012 and Final Programmatic Environmental Impact Statement with input from the Montana Grizzly Bear Working Group and other interested parties (Montana Fish, Wildlife and Parks 2002). This document is expected to be a strategy for initiating, implementing and learning and these efforts and resulting recommended programs will likely become part of the State Grizzly Bear Management Plan. The State Grizzly Bear Management Plan will entail developing a set of plans on the scale of Ranger Districts, Conservation Districts or valleys and local strategies would be cooperatively designed (Montana Fish, Wildlife and Parks 2002).

Private lands in and adjacent to the Forest are being developed for residential or business use. The human population in the area has experienced growth during the recent decade and growth is expected to continue. As more people use private land and adjoining federal land for homes, recreation or business, the challenge to accommodate those uses in ways that continue to protect the grizzly bear population increases. The large federal land ownership, large blocks of wilderness within which human access is restricted by regulation and topography, and highly regulated national park back country serve to reduce the impacts of larger residential human populations on grizzly bears. Recreation, livestock grazing and sanitation issues on private land continue to create grizzly bear- human conflicts. However, despite the recent growth of the human population, the grizzly bear population in the ecosystem is increasing as well (Haroldson 2010). Federal land management cannot entirely compensate for such impacts on private land. The Revised Forest Plan will provide habitat for grizzly bears inside and outside the recovery zone, and will contribute to grizzly bear recovery.

VII. CONCLUSION

After reviewing the current status of the grizzly bear, the environmental baseline for the action area, the effects of the action and the cumulative effects, it is the Service's biological opinion that the effects of the Revised Forest Plan is not likely to jeopardize the continued existence of the grizzly bear. No critical habitat has been designated for this species therefore none will be affected. Implementing regulations for section 7 (50 CFR 402) define "jeopardize the continued existence of" as to "engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." Our conclusion that the proposed action is not likely to jeopardize the continued existence of grizzly bears is based primarily on the information presented in the original biological assessment prepared for the proposed project (U.S. Forest Service 2009), the revised biological assessment (U.S. Forest Service 2010), correspondence during the consultation process, information in our files, and informal discussions between the Service, the Forest and other personnel.

The Service concludes that adverse affects to individual grizzly bears may occasionally occur due to the Revised Forest Plan direction for access management, sanitation/food storage and livestock grazing. It is our opinion that the proposed action would not appreciably reduce the likelihood of both the survival and recovery of the grizzly bears. Our rationale for this non-jeopardy conclusion is based on, but not limited to the following factors, as detailed earlier in this biological opinion.

Factors related to the Revised Forest Plan:

It is the Service's opinion that the level of open and total road densities, and security core area within the Hilgard #1 subunit and road densities within the action area outside of the recovery zone, as directed by the Revised Forest Plan, adequately conserves effective grizzly bear habitat and promotes the recovery and survival of the YGBE grizzly bear population. It is our opinion that the Revised Forest Plan direction for access management does not appreciably reduce the likelihood of both the survival and recovery of grizzly bears.

- Inside the recovery zone on the Forest, OMAD and TMAD are zero, with large amounts of core area.

- Additionally, the entire YGBE recovery zone contains large amounts of secure habitat and low total and open road densities in the majority of the subunits. Many large roadless areas occur within the YGBE. Within the YGBE recovery zone, access conditions are very good, the CEM mean secure habitat is 86.2 percent, the mean OMARD is 10.4 percent in Season one (March 1 - July 15) and 10.7 percent in season two (July 16 - November 30) and the mean TMARD is 5.3 percent (ICST 2003).
- High road density facilitates human access into grizzly bear habitats with a reasonable assumption that an increased frequency of human and bear encounters and adverse impacts to grizzly bears would result. Road densities in some portions of the action area outside the recovery zone may result in displacement of some grizzly bears. However, some grizzly bears are able to persist in areas with higher levels of human pressure, as documented by reports of grizzly bears, including females with cubs (indicating home range use), outside of the recovery zone. As discussed in the 'effects of roads in the action area' section, based on the goals of the Revised Forest Plan and decisions that have occurred and are anticipated to occur, the overall open motorized routes within the action area will likely be reduced and secure habitat will likely be maintained or increased.
- Further, the Recovery Plan states that recovery zones include areas large enough and of sufficient habitat quality to support recovered grizzly bear populations, and that although grizzly bears are expected to reside in areas outside the recovery zones, only habitat within the recovery zone is needed for management primarily for grizzly bears. This strategy has resulted in an increasing population (estimated 582 grizzly bears for 2009) and an increasing trend for several years (Haroldson 2010).

It is the Service's opinion that the food storage special order as directed by the Revised Forest Plan within the YGBE recovery zone and the Madison, Gravelly and Tobacco Root Landscapes outside of the recovery zone substantially contributes to the survival and recovery of the grizzly bear population. Lack of a food storage order in the Highland Mountains Landscape may result in grizzly bear-human conflicts and grizzly bear mortalities at some point in the future but would not likely to jeopardize the survival and recovery of the YGBE grizzly bear population. It is important to note that the Highland Mountains Landscape is not occupied by grizzly bears at the time of this consultation. It is within an area that may become occupied at some point during the life of the Revised Forest Plan. We do not anticipate that the level of conflict and grizzly bear mortality that may occur within the action area under the Revised Forest Plan direction, for the life of the Plan, would increase to a level that would appreciably reduce the likelihood of both the survival and recovery of the grizzly bears.

- Although food conditioning may occur on private lands adjacent to the Forest and the potential for adverse impacts to grizzly bears on the Forest does exist, the Forest has functioned fairly effectively under the current food storage special orders and no reported grizzly bear mortalities related to improper food or attractant storage have occurred within the action area on the Forest. Only two documented grizzly bear/human conflicts related to anthropogenic food sources have occurred on the Forest, several years ago in 1993 and 1994.

- The Forest will follow the Conservation Strategy nuisance bear standard for nuisance bear management. These standards are embedded within the Revised Forest Plan and are therefore part of the proposed action.

It is the Service's opinion that livestock grazing as directed under the Revised Forest Plan may result in grizzly bear-human conflicts and grizzly bear mortalities or removals but this will not affect survival and recovery of the YGBE grizzly bear population. We do not anticipate that the level of conflict and/or grizzly bear mortality that may occur under the Revised Forest Plan would increase to a level that would appreciably reduce the likelihood of both the survival and recovery of grizzly bears.

- Only one known incidence of grizzly bear mortality on the Forest is tied to livestock depredation. This situation occurred in 1986. One additional conflict related to livestock occurred in 2001 but did not result in grizzly bear mortality.
- The Revised Forest Plan would maintain or reduce the existing number and distribution of allotments within the action area and would potentially reduce the number of sheep allotments. The Revised Forest Plan Wildlife Standard #5 states that "sheep allotments within the Gravelly Landscape which become vacant will be closed to sheep grazing or the allotment may be used by an existing Gravelly Landscape sheep permittee with no increase in permitted use."
- The Forest will follow the Conservation Strategy nuisance bear standard for nuisance bear management. These standards are embedded within the Revised Forest Plan and are therefore part of the proposed action.

Factors related to the YGBE grizzly bear population:

- A Food Storage Order is in effect throughout the YGBE on National Forest lands and Yellowstone National Park. These agencies have been fairly successfully managing attractants on federal lands under the current food storage order.
- The best available information demonstrates that the YGBE grizzly bear population has expanded its range into areas outside the recovery zone. Female grizzly bears with young have been observed outside of the recovery zone, indicating that a number of females are able to establish home ranges and find the resources needed to survive and reproduce outside the recovery zone despite the lack of mandatory habitat protections.
- The Interagency Grizzly Bear Study Team (IGBST) is responsible for grizzly bear population monitoring in the YGBE. Using the Revised Demographic Recovery Criteria, the total grizzly bear population size for 2009 in the YGBE was 582 (Haroldson 2010). Verified observation of female grizzly bears with young occurred in all 18 BMUs in 2009 and in at least 3 of the last 6 years from 2004 through 2009 (Podruzny 2010).
- In part due to grizzly bear expansion into areas that had previously been unoccupied, the number of grizzly bear-human conflicts has increased. Despite the growth of the human

population and the increase in the number of grizzly bear-human conflicts and grizzly bear mortalities the IGBST 2009 report indicates an increasing trend (Haroldson 2010).

- The YGBE encompasses about 5.9 million acres (9,209 square miles), of which 36 percent (2.1 million acres or 3,315 square miles) is comprised of National Forest designated wilderness lands and 39 percent (2.3 million acres or 3,591 square miles) is comprised of Yellowstone and Grand Teton National Parks. These areas contain the highest quality grizzly bear habitat. Considering these lands only, three-quarters of the YGBE is essentially roadless or free of motorized use (75 percent). These areas likely contribute significantly to reducing the number of human bear encounters and so increase security for grizzly bears. Further, the National Forests in the YGBE contribute additional grizzly bear core areas.
- While the Revised Forest Plan direction may have adverse effects on a low number of individual grizzly bears using the action area, considering the large size of the YGBE recovery zone, land management within the recovery zone, and the status of the grizzly bear population in the YGBE, we do not expect the level of adverse affects to appreciably diminish the numbers, distribution or reproduction of grizzly bears in the YGBE.
- Since the Revised Forest Plan would not appreciably diminish the reproduction, numbers, or distribution of grizzly bears in the YGBE, given the status of the grizzly bear population we conclude that it is not likely to reduce the likelihood of both the survival and/or recovery of the grizzly bear. We conclude that the proposed action would not affect the survival of grizzly bears, nor would it impede recovery.

Recovery zones were established to identify areas necessary for the recovery of a species and are defined as the area in each grizzly bear ecosystem within which the population and habitat criteria for recovery are measured. Areas within the YGBE recovery zone are managed primarily for grizzly bear habitat. The YGBE recovery zone is an area adequate for managing and promoting the recovery and survival of the YGBE grizzly bear population (USFWS 1993). The recovery zone contains large portions of wilderness and national park lands, which are protected from the influence of many types of human uses occurring on lands elsewhere. As anticipated in the Recovery Plan, the YGBE grizzly bear population has responded to these conditions, has stabilized and is increasing, and grizzly bears are expanding their range outside of the recovery zone. Grizzly bears outside the recovery zone probably experience a higher level of adverse impacts due to land management actions than do grizzly bears inside. Considering the large size of the YGBE recovery zone, land management within the recovery zone, and the status of grizzly bears, we do not expect the level of adverse affects to appreciably reduce the likelihood of both the survival and recovery of the grizzly bear.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations pursuant to section 4(d) of the Act, prohibit the take of endangered and threatened species, respectively without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly

impairing behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission that creates the likelihood of injury to listed wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement. This incidental take statement applies to the effects of access management, sanitation/food storage and livestock grazing under the implementation of the Revised Forest Plan.

The measures described below are non-discretionary and must be undertaken by the Forest so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Forest (1) fails to assume and implement the terms and conditions or (2) fails to require an applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Forest must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50CFR 402.14(i)(3)].

Amount or Extent of Take Anticipated

Access Management

Summer/Fall Motorized Use

The Service defines harm of grizzly bears in terms of adverse habitat conditions caused by high road densities. Significant avoidance of habitat by grizzly bears can occur when road density is high. As a result of access management under the Revised Forest Plan, such avoidance of otherwise suitable habitat that may occur in some areas constitutes incidental take of grizzly bears through “harm” as a result of significant habitat alteration that disrupts breeding, feeding and/or sheltering.

Within the YGBE recovery zone on the Forest, there is one subunit, Hilgard #1. A portion of this subunit is also located on the Gallatin National Forest. The overall access management within the entire subunit consists of an OMARD of 25.1, a TMARD of 12.5, and security core at 69.8. On the Forest’s portion of the subunit, OMARD and TMARD are zero within this subunit. The Revised Forest Plan does not propose any new roads within the subunit or adjacent to it. For these reasons, the Service does not anticipate incidental take of grizzly bears as a result of access management within the recovery zone portion of the action area.

High road densities and lack of core or secure areas exist in some areas within the action area outside of the YGBE recovery zone. The Service believes that it is reasonable to assume that the level of permanent roads in areas outside the recovery zone will not substantively increase overall in the next decade; we do expect with some localized increases in some areas, and some

decreases in other areas. This assumption is based on the desired motorized route density as described in the Revised Forest Plan and on recent history and trends in road building and decommissioning that consistently shows fewer permanent roads on the landscape as discussed in the biological assessment. However, some construction of and motorized use of roads would result from site-specific projects such as resource extraction and may increase the likelihood of disturbance and displacement in the analysis area. Although these roads would likely be temporary, they may remain on the landscape for several years and receive a substantive amount of use.

The Revised Forest Plan and related access management outside the recovery zone may result in incidental take of grizzly bears due to displacement of some grizzly bears, specifically female bears, from essential habitat. This displacement is likely to cause some level of impairment of breeding and feeding, especially during the spring period. The take we anticipate would be harassment or harm, through habitat alteration, to a very low number of adult female grizzly bears inhabiting the area, caused by displacement from key habitat areas to levels that result in decreased fitness where reproductive potential may be impaired. In other words, some adult female grizzly bears wary of humans and human-generated disturbance may not breed at their potential frequency or they would fail to complete gestation due to decreased fitness. Significant levels of displacement from key habitats could result in a female bear's failure to obtain adequate food resources, which in turn could result in reduced fitness and either failure to breed or mortality of cubs prior to or after parturition. We do not expect all adult female grizzly bears affected by the proposed action to suffer impairment of breeding, feeding and/or sheltering. We do not expect mortality, injury, or significant impairment of breeding, feeding or sheltering of male or subadult grizzly bears as a result of displacement.

The effects of displacement of female grizzly bears from key habitats are difficult to quantify and may be measurable only as long-term effects on the species' habitat and population levels. We believe that incidental take will occur from the effects of high road densities persisting in some areas of the Forest outside of the recovery zone. However, grizzly bears are individualistic and display a wide variation in their tolerance of and response to human activity and road density. The best scientific and commercial data available at this time are not sufficient to enable the Service to determine a specific amount of incidental take of the grizzly bears due to displacement. The reasons for this difficulty are in part based on the lack of ongoing, intensive grizzly bear research. We lack information related to the following:

- the number of grizzly bears living on the Forest;
- the number of adult female grizzly bears whose home ranges encompass all or portions of any particular subunit or groups of subunits with high road densities;
- the individual response of adult females whose home range encompasses areas with high road densities;
- demographic parameters, such as survivorship and fecundity;
- detection of loss of cubs prior to or after parturition.

The level of incidental take through harm or harassment is also difficult to detect. Failure to breed, or loss of cubs prior to or after parturition are exceedingly difficult to detect, and the reasons for such are exceedingly difficult to discern. According to Service policy, as stated in the Endangered Species Consultation Handbook (March 1998) (Handbook), some detectable

measure of effect should be provided, such as the relative occurrence of the species or a surrogate species in the local community, or amount of habitat used by the species, to serve as a measure for take. Take also may be expressed as a change in habitat characteristics affecting the species (Handbook, p 4-47 to 4-48). In instances where incidental take is difficult to quantify, the Service uses a surrogate measure of take. The number of grizzly bears that use the action area is unknown but grizzly bear observations have been documented for many years. Grizzly bears occur at relatively low numbers across the landscape. Therefore, the Service anticipates some low level of incidental take of female grizzly bears and some cubs would occur in the form of harassment or harm from the displacement effects of road densities. We use the existing levels of access management and the desired motorized route densities described in the Revised Forest Plan as our surrogate measure of incidental take. The existing condition will represent the amount of incidental take. If and when activities occur that meet the Revised Forest Plan's desired condition, the desired condition in the Revised Forest Plan becomes the final surrogate measure of incidental take. Table 11 (next page) displays the surrogate measures of incidental take, with one column displaying the current condition and the other column displaying the desired condition. Furthermore, during the interim, access conditions resulting from activities that move access conditions toward the desired conditions, but do not meet them entirely, represent the surrogate measure of incidental take. In other words, once access conditions are improved by projects, those conditions must be maintained or improved.

Therefore, if permanent increases in linear road density occur and access management conditions decline from the densities described in the surrogate measure above over the life of the plan (10 to 15 years), then the level of incidental take we anticipated in this biological opinion would be exceeded and therefore the level of take exempted would be exceeded. Under CFR 402.16 (1), in this scenario, reinitiation of consultation would be required.

Table 11. Surrogate Measure of Incidental Take Related to Access Management.

Landscape	Existing Condition (miles per square mile)	Desired Summer Open Motorized Road and Trail Density (miles per square mile)
Madison	0.0	0.0
Gravelly	0.8	0.7
Tobacco Roots	1.2	1.3
Highland	1.8	1.9
Hunting Unit	Existing Condition (miles per square mile)	Desired Fall Open Motorized Road and Trail Density (10/15-12/1) (miles per square mile)
311	0.0	0.0
320	0.8	0.8
323	0.7	0.5
324	0.5	0.4
327	0.9	0.8
330	0.7	0.7
333	1.1	0.9
340	1.5	1.4
360	0.0	0.0
362	0.0	0.0

Winter Motorized Use

The Service anticipates that snowmobile use as proposed in the Revised Forest Plan may incidentally result in some low level of incidental take of grizzly bears. Snowmobiling would be restricted on large proportions of potential grizzly bear habitat on the Forest and thousands of acres of such habitat would be legally unavailable to snowmobiles in the broader area where grizzly bears may occur. Where grizzly bears and snowmobiling do generally overlap, there is still some spatial separation. However, the potential of snowmobile use impacting an individual grizzly bear's breeding, feeding, or sheltering to the extent that harm or harassment occurs cannot be eliminated. The incidental take is expected to be in the form of harm or harassment to only individual female grizzly bears and/or cubs caused by premature den emergence or premature displacement from the den site area, resulting in reduced fitness of females and cubs, ultimately resulting in injury and possibly death. Based on naturally earlier den emergence of male bears and females without young, their independence and mobility, the Service does not anticipate the effects of disturbance caused by snowmobiles would result in take of adult male grizzly bears, female grizzly bears without cubs, or subadults.

This opinion documents that the best information available indicates that snowmobile impacts to emergent bears was a higher concern than impacts to denning bears (Graves and Ream 2001). The Service concludes that snowmobile-generated disturbance to grizzly bears in dens during the deep of winter is not likely to rise to the level causing significant impairment of breeding or sheltering to the point of injury or death. In spring, disturbance from snowmobiles to grizzly bears in dens may cause premature den emergence.

However, late season snowmobile use may cause a female grizzly bear with cubs to prematurely leave a den in the spring or cause a recently emerged female with cubs to be prematurely displaced from her den or den site, potentially resulting in decreased fitness of the adult female bear and/or decreased fitness or abandonment of her cubs. If cubs attempt to follow their mother from a den site prior to their gaining some mobility, they may suffer from decreased fitness or death.

The incidental take of female grizzly bears or their cubs may be indicated by:

- a female grizzly bear's premature den emergence (earlier than documented for this ecosystem, based on gender, age and reproductive status) following exposure to snowmobiles;
- the location of one or more cubs abandoned by their mother near or in a den in an area of snowmobile use;
- the location of one or more cubs accompanying a female prior to the normal (earlier than documented for this ecosystem) den emergence period in an area of snowmobile use; or
- a female bear that emerges in poor fitness in early spring (when other bears are in good condition) in an area of snowmobile use.

However, the Service anticipates such incidental take of grizzly bears will be difficult to detect for the following reasons:

- grizzly bears are difficult to detect in the wild;
- grizzly bears are wide-ranging and their denning habitat is remote, largely wilderness and difficult to access;

- grizzly bear den sites cannot be precisely located over large portions of the denning habitat;
- grizzly bear den sites are often not re-used, so even known den sites cannot be monitored over time for indications of early abandonment, injury or mortality;
- close monitoring of den sites may actually increase the risk of abandonment;
- the resorption of or loss of fetuses, or loss of cubs born in inaccessible underground den sites cannot be quantified; and
- decreased fitness, loss of young, and premature den emergence may all be related to a variety of other factors; establishing a causal relationship between snowmobiling and these effects would be difficult.

Discovery of an individual grizzly bear injury or mortality attributed to snowmobiling is very unlikely. The exact number of grizzly bears in the population is unknown, den site locations are generally unknown, and the exact levels, frequency and location of snowmobile use is not known. The number of females with cubs, pregnant females, den emergence dates, and snowmobile use varies each year due to a number of factors, including snow conditions. Human access to the back country during the spring is often limited by weather conditions. All of these variables are difficult to monitor or census. The Service concludes that the level of take of grizzly bears that would result from snowmobile use as directed by the proposed action would be very low based on the best available YGBE grizzly bear population information, the amount of protected and unprotected habitat available on the Forest, the characteristics of most grizzly bear den sites, expert opinion of grizzly bear researchers and the best available information on grizzly bear denning.

As mentioned above, according to Service policy, as stated in the Endangered Species Consultation Handbook (March 1998) (Handbook), some detectable measure of effect should be provided, such as the relative occurrence of the species or a surrogate species in the local community, or amount of habitat used by the species, to serve as a measure for take. Take also may be expressed as a change in habitat characteristics affecting the species (Handbook, p 4-47 to 4-48). In instances where incidental take is difficult to quantify, the Service uses a surrogate measure of take.

The surrogate measures for the number of grizzly bears harmed or harassed as a result of winter motorized use will be quantified using the timeframes and amount of habitat affected when the earliest potential for interactions between snowmobiles and female grizzly bears that have recently emerged from their dens may occur and the amount of acres open to winter motorized access during this timeframe. Spring emergence of females typically ranges from the third week in March to the fourth week in May. Winter motorized use is allowed until May 15. Therefore, the timeframe between the third week in March and the winter use season ending date of May 15 is the timeframe where the potential exists for interactions between snowmobiles and recently emerged female grizzly bears and represents the first surrogate measure of incidental take. Approximately 75,086 total acres will be open to snowmobiling during this timeframe. These acres represent our second surrogate measure of the incidental take that we anticipate as a result of the proposed action

If snowmobiling continues beyond the May 15 closure date provided in the first surrogate measure in the paragraph above or if the total acres open to snowmobiling during and after the

third week in March exceeds the acres provided in the second surrogate measure in the paragraph above, then the level of incidental take we anticipated in this biological opinion for winter motorized use would be exceeded and therefore the level of take exempted would be exceeded. Under CFR 402.16 (1), in any scenario, reinitiation of consultation would be required.

Sanitation/Food Storage

The Revised Forest Plan specifically calls for implementing food storage and sanitation orders in areas classified as occupied grizzly bear habitat as a wildlife objective. Forest order No. 2004-D6/D7-031 and other related orders specifically direct attractant management for all occupancy and use of the Madison, Gravelly, and Tobacco Root Landscapes from March 1 through December 1. No similar order is in effect for the Highland Mountains Landscape. However, the Highland Mountains Landscape is not occupied by grizzly bears at this time. The primary goal of the special orders is to minimize grizzly bear-human encounters and provide for user safety and the protection of the grizzly bear. These food storage orders substantially reduce the potential for adverse effects to bears as a result of food conditioning and habituation.

No grizzly bear mortalities associated with improper food storage have been recorded on the Forest within the action area (Haroldson 2010 *in litt*). However, at least two grizzly bear/human conflicts have occurred on the Forest related to anthropogenic foods. These occurred several years ago in 1993 and 1994 (*ibid*). Several other conflicts related to unnatural foods and/or property damage have occurred off of the Forest but adjacent to it either on the Gallatin National Forest lands or non-National Forest lands.

As the number of grizzly bears increase and the number of people residing in and visiting the area increase, the Service assumes that the number of grizzly bear-human conflicts related to food and attractant storage will increase as well. The food storage order is mandatory within the majority of the action area and is likely significant in reducing human-bears conflicts. However, it is reasonable to expect that the order will not be adequate in every circumstance, and to expect some level of noncompliance by some visitors.

Therefore some risk of habituation/food conditioning of grizzly bears remains over the life of the Revised Plan. The potential remains for the incidental take of grizzly bears in the form of harm through uses of the Forest where grizzly bears may become habituated to people and food conditioned to anthropogenic foods. Such habituation/food conditioning results in the modification and significant impairment of natural feeding behavior. This impairment is significant in that it ultimately results in the removal or death of grizzly bears due to necessary management removal or defense of life or property. Thus, the potential for incidental take of grizzly bears through habituation and food conditioning will remain.

The Forest will follow the Conservation Strategy nuisance bear standard for nuisance bear management. These standards are embedded within the Revised Forest Plan and are therefore part of the proposed action.

Incidental take such as habituation and/or modification of natural feeding behavior is difficult to quantify or detect. As explained earlier, in such cases the Service uses a surrogate measure of take. For this analysis, we will measure the amount of incidental take by using the number of

anticipated grizzly bear management removals related to sanitation/food storage during the life of the Revised Forest Plan. We anticipate that no more than one grizzly bear will be removed from the action area for management purposes related to sanitation/food storage. Therefore, should more than one grizzly bear be killed or removed in the action area for the life of the Revised Forest Plan because it has become habituated in relation to sanitation/food storage, incidental take will be exceeded and the Forest must reinitiate consultation with the Service. Additionally, should the level of incidental take associated with sanitation/food storage reach, but not exceed, the anticipated incidental take level, the Forest should informally consult with the Service regarding the adequacy of existing mechanisms to minimize potential take.

Livestock Grazing

One documented grizzly bear mortality has been associated with livestock depredation within the action area (Haroldson 2010 *in litt*). This mortality occurred in the Gravelly Landscape in 1986. One additional conflict grizzly bear/human conflict related to livestock also occurred within the action area. This conflict also occurred within the Gravelly Landscape in 2001 but did not result in the mortality of a grizzly bear. Additional conflicts with grizzly bears related to livestock have occurred off the Forest but near the Forest. The Revised Forest Plan would maintain the existing number and distribution of allotments within the action area and would potentially reduce the number of sheep allotments. The Revised Forest Plan Wildlife Standard #5 states that “sheep allotments within the Gravelly Landscape which become vacant will be closed to sheep grazing or the allotment may be used by an existing Gravelly Landscape sheep permittee with no increase in permitted use.” Therefore, we do not expect the potential for livestock-grizzly bear conflicts to increase on the Forest due to the Revised Forest Plan within the action area.

Livestock grazing, especially sheep, will continue to pose risks as grizzly bear numbers increase in these areas. The permitted sheep grazing may indirectly result in incidental take of grizzly bears because bears are prone to prey on sheep. Grizzly bears easily become habituated or food conditioned to prey on sheep and tend to continue such behavior; these bears are removed or killed in management actions or through defense of life or property.

The Service anticipates take in the form of harm to grizzly bears as a consequence of livestock grazing and the associated livestock management operation in habitats commonly used by grizzly bears. The habitat modification of adding a significant, anthropogenic food source that results in the death or injury of bears can itself be considered “take” in the form of harm. The likely depredation of some of the permitted sheep represents an impairment of natural feeding behavior that will in some cases ultimately lead to management removal or death of grizzly bears.

The level of “take” in the form of harm is difficult to detect and quantify. Therefore, as explained earlier, in such cases the Service uses surrogate measures to gauge the level of “take”. In this case, we anticipate that the level of incidental take resulting from the proposed action in the form of harm is proportional to the number of grizzly bears that are killed within the action area as a result of sheep grazing. We base this on the fact that both the level of take through harm and grizzly bear mortalities will correlate to the level of bear use and permitted grazing use within the action area. Specifically, the Service believes this level of take in the form of harm is proportional to the management actions for nuisance bear control in compliance with the

Interagency Grizzly Bear Guidelines (IGBC 1986) or from defense of life or property, when the permitted grazing or associated activities are reasonably believed to have contributed to the injury or death of the grizzly bear (e.g., direct connection to grazing, such as the management of bear depredating livestock, or indirect connection to grazing, such as a bear illegally killed while feeding on a livestock carcass, etc.). Although we are including some cases of illegal mortality of grizzly bears within our surrogate used to quantify incidental take, the illegal killing or injury of grizzly bears (including trapping or shooting by private citizens) constitutes a separate action that is not exempted by the special regulations nor this biological opinion.

For this analysis, we will measure the amount of incidental take by using the number of anticipated grizzly bear management removals or other mortalities related to livestock during the life of the Revised Forest Plan. Based on the history of conflicts and management related to livestock grazing on the Forest and the expanding grizzly bear population, we anticipate that no more than two grizzly bears will be removed from or killed in the action area during the life of the Plan (10 to 15 years), related to permitted grazing or associated activities authorized under the Revised Forest Plan that are reasonably believed to have contributed to the injury or death of the grizzly bear. Therefore, should more than two grizzly bears be killed or removed as a result of management action related to livestock grazing within the action area during the life of the Revised Forest Plan, incidental take will be exceeded and the Forest must reinitiate consultation with the Service. Additionally, should the level of incidental take associated with the Revised Forest Plan reach, but not exceed, the anticipated incidental take level, the Forest should informally consult with the Service regarding the adequacy of existing mechanisms to minimize potential take.

Effect of the take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. The Revised Forest Plan would implement several measures that would sufficiently minimize impacts to grizzly bears. Critical habitat has not been designated for the grizzly bear; therefore none would be affected.

Reasonable and prudent measures

Biological opinions provide reasonable and prudent measures that are expected to reduce the amount of incidental take. Reasonable and prudent measures are those measures necessary and appropriate to minimize incidental take resulting from proposed actions. Reasonable and prudent measures are nondiscretionary and must be implemented by the agency in order for the exemption in section 7(o)(2) to apply. The Service has determined that the Revised Forest Plan, with its incorporated objectives, goals and standards, adequately reduces the potential for and minimizes the effect of any incidental take that may result. Therefore, no reasonable and prudent measures are necessary

Terms and conditions

As explained above, the Revised Forest Plan will reduce the potential for or minimize the effect incidental take. No additional reasonable and prudent measures are necessary, therefore no terms and conditions are needed with the exception of the reporting requirements.

Reporting requirements

To demonstrate that the Revised Forest Plan is adequately reducing the potential for and minimized the effect of any incidental take that may result, the Forest shall:

1. The Forest shall continue to maintain an up-to-date record of location and length of new permanent and temporary roads constructed and roads decommissioned on the Forest. The Forest shall also maintain an up-to-date record of linear road densities by Landscape and Hunting Units. The Forest shall complete a report with this information and submit it to the Service's Montana Field Office by March 1 of each year for the preceding calendar year.
2. The Forest shall maintain an up-to-date record of the amount of acres open to winter motorized use and the timeframe such acres were used. This information shall be submitted to the Service's Montana Field Office in written form annually by March 1 for the preceding calendar year and can be combined with reporting requirement number 1 above.
3. The Forest shall notify the Service's Montana Field Office, within 72 hours of any grizzly bear-human conflict resulting from improper storage of food or attractants, livestock depredation by grizzly bears, and/or the management removal of human-caused death of a grizzly bear.
4. The Forest shall notify the Service's Montana Field Office if a change in the status of sheep grazing on the Forest is being considered.
5. The Forest shall maintain an up-to-date record of grizzly bear-human conflict and/or the management removal of a grizzly bear resulting from improper storage of food or attractants or livestock depredation. This information shall be submitted to the Service's Montana Field Office in written form annually by March 1 for the preceding calendar year and can be combined with reporting requirement number 1 above.

Closing statement

The Service is unable to precisely quantify the number of grizzly bears that will be incidentally taken as a result of the Revised Forest Plan. We use the existing levels of access management and the desired motorized route densities described in the Revised Forest Plan as our surrogate measure of incidental take related to road densities. We use the timeframe that winter motorized use is allowed beyond typical spring female grizzly bear emergence occurs and the acres open to winter motorized use during this timeframe as our surrogate measure of incidental take related to winter motorized use. We also anticipate that no more than one grizzly bear will be removed from the action area related to sanitation/food storage and no more than two grizzly bears will be removed from the action area related to livestock grazing for the life of the Forest Plan (10 to 15 years). We determined that the Revised Forest Plan, with its incorporated objectives, goals and standards, adequately reduces the potential for and minimizes the effect of any incidental take that may result. Therefore, reasonable and prudent measures, with their implementing terms and conditions, were not provided. However, reporting requirements were provided in order to

demonstrate that the Revised Forest Plan is adequately reducing the potential for and minimizing the effect of any incidental take that may result. If, during the course of the action, the Service believes that the level of take occurring exceeds that anticipated in this incidental take statement, such incidental take represents new information requiring reinitiation of consultation and review of the incidental take statement. The federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Sections 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility for the species.

1. Participate in ongoing interagency efforts to identify, map and manage linkage habitats essential to grizzly bear movement between ecosystems. Much of the Forest may be an important link to the Northern Continental Divide ecosystem. Please contact the Service's grizzly bear recovery coordinator at (406) 243-4903 or Montana Fish, Wildlife and Parks for information.
2. Continue to manage access on the Forest to achieve lower road densities. By managing motorized access, several grizzly bear management objectives could be met including: 1) minimize human interaction and potential grizzly bear mortality; 2) minimize displacement from important habitats; 3) minimize habituation to humans; and 4) provide relatively secure habitat where energetic requirements can be met (Interagency Grizzly Bear Committee 1998). Additionally, lower road densities would also benefit other wildlife and public resources. Lower road densities may result in lower maintenance costs that free up funding for other resource needs.
3. Consider expanding the food storage order to a Forest-wide food storage order. Management of garbage, food and livestock feed storage to prevent access to bears would benefit grizzly bears as well as black bears and other carnivores. Human/carnivore interactions would also be reduced leading to a public safety benefit.
4. Grizzly bears concentrate in certain areas during specific time periods to take advantage of concentrated food sources or because the area provides a high seasonal food value due to diversity in vegetation and plant phenology (e.g., important spring for fall range). Where grizzly bear use is known or likely to occur and where practicable, delay disturbing activities during the spring in spring habitats to minimize displacement of grizzly bears.

REINITIATION NOTICE

This concludes consultation on the effects of the Revised Forest Plan on grizzly bears. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The incidental take statement is based on the objectives, goals, and standards in the Revised Forest Plan as well as the effects analysis of this biological opinion. To ensure protection for a species for which surrogate measures are used to gauge the level of take due to activities related to the Revised Forest Plan activities, reinitiation may be required if it is demonstrated that the Revised Forest Plan is not adequately reducing the potential for and minimizing the effect of any incidental take that may result. Determination of reinitiation of consultation pursuant to the Act will depend upon the nature and extent of noncompliance with the implementation of the Revised Forest Plan and may result in loss of take exemption from the prohibitions of section 9 of the Act.

Thank you for your continued assistance in the conservation of endangered, threatened, and proposed species. If you have any questions or comments on this biological opinion, please contact Anne Vandehey, Katrina Dixon or me at (406) 449-5225.

Sincerely,

A handwritten signature in dark ink, appearing to read "R. Mark Wilson". The signature is fluid and cursive, with the first name "R." and last name "Wilson" clearly distinguishable.

R. Mark Wilson
Field Supervisor

LITERATURE CITED

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