United States Department of the Interior

Fish and Wildlife Service

Ecological Services
Montana Field Office
585 Shepard Way, Suite 1
Helena, Montana 59601-6287
Phone: (406) 449-5225, Fax: (406) 449-5339

In Reply refer to:
File: M19 Helena National Forest
Terrestrial species: 06E11000-2016-F-0132 Divide Travel HNF
Aquatic species: 06E11000-2015-F-0403 Divide Travel HNF

February 29, 2016

William Avey, Forest Supervisor
Helena National Forest
2880 Skyway Drive
Helena, Montana 59602

Dear Mr. Avey:

We are responding to your request for U.S. Fish and Wildlife Service (Service) consultation on the proposed Divide Travel Plan (Travel Plan), pursuant to Section 7 of the Endangered Species Act of 1973. Effects of the proposed action were reviewed in regards to federally listed threatened and endangered species. The Helena National Forest (Forest) determined the proposed actions "may affect likely to adversely affect" threatened grizzly bear (*Ursus arctos horribilis*), "may affect, not likely to adversely affect" threatened Canada lynx (*Lynx canadensis*) or designated critical habitat for Canada lynx, and "may affect likely to adversely affect" threatened bull trout (*Salvelinus confluentus*). The Service has reviewed the biological assessments for these species and additional information received during consultation from the Forest.

The attached biological opinion on the effects of the proposed action to the listed grizzly bear is based on the biological assessment prepared by Brent Costain, Wildlife Biologist on the Helena Ranger District of the Forest and additional information received during the consultation process. The attached biological opinion on the effects of the proposed action to the listed bull trout is based on the biological assessment prepared by Archie Harper, Fish Biologist on the Helena Ranger District of the Forest and additional information received during the consultation process. The biological opinions were 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.

<u>Informal Consultation</u>
The proposed Travel Plan is located within six lynx analysis units (LAUs) where lynx may occur, including di-01, di-02, di-03, di-04, di-05, and di-06. The Travel Plan would result in a reduction of the miles of open road by 156 miles. The Divide Travel Plan does not propose new

construction, improvement, or maintenance of any roads in the action area. It does propose construction of two sections of motorized trail, totaling about one mile, which would follow existing user-made tracks and would not involve alteration of vegetation useful to lynx. Thus, any potential effects lynx habitat, including snowshoe hare habitat and denning habitat would be discountable. The Travel Plan would slightly decrease the net mileage of active snowmobile trails by about 10 miles total. It would also increase the area that is off-limits to snowmobile riding from around 34,750 acres to more than 70,500 acres. Effects of snowmobile use and snow compaction to lynx are expected to be insignificant. All applicable standards and guidelines of the Northern Rockies Lynx Management Direction would be met. In summary, potential effects to lynx as a result of the Divide Travel Plan are expected to be discountable and/or insignificant.

The proposed Divide Travel Plan is located within Unit 3 of designated critical habitat. The Travel Plan does not propose to alter forest vegetation. Thus, PCE1a (snowshoe hare habitat) would not be affected by the proposed action. The Travel Plan would influence winter snow conditions as described in PCE1b by allowing snow-compacting activity. However, the miles of snowmobile routes would be reduced by about 10 miles and areas closed to all snowmobile use would increase by about 35,000 acres over the existing condition. Thus, effects to PCE1b would be reduced from what currently exists in the baseline and would be insignificant. The Divide Travel Plan would not directly affect PCE1c but may indirectly affect this element by maintaining open roads that allow firewood cutters to remove snags and wood debris. However, opportunities for firewood cutting would be reduced from the existing condition by closing roads and reducing the allowable off-road driving corridor from 300 feet to a maximum of 70 feet. Also, it is expected that the amount potentially removed would be insignificant compared to the amount of woody debris available in the action area. As noted in the biological assessment, PCE1c is not currently a limiting factor for lynx. Effects to PCE1c would be insignificant. Matrix habitat (PCE1d) would not be directly affected because the Travel Plan does not propose to alter vegetation or other habitat components. Road densities would be reduced in matrix habitat. In summary, effects to lynx critical habitat would be insignificant and/or discountable and all affected critical habitat would remain functional and would continue to serve the intended conservation role for lynx.

The Service has reviewed the biological assessment and concurs with the determinations that the proposed action is not likely to adversely affect the threatened Canada lynx or designated critical habitat for Canada lynx. Therefore, pursuant to 50 C.F.R. § 402.13 (a), formal consultation on this species and critical habitat is not required. The Service bases its concurrence on the information and analysis in the biological assessment prepared by Brent Costain, Wildlife Biologist, additional information received during the consultation process, and information in our files. This project should be re-analyzed if new information reveals effects of the action that may affect listed species or designated or proposed critical habitat (1) in a manner or to an extent not considered in this letter, (2) if the action is subsequently modified in a manner that causes an effect to a listed species or designated or proposed critical habitat that was not considered in this letter, and (3) if a new species is listed or critical habitat is designated that may be affected by this project.

Thank you for your continued assistance in the conservation of endangered, threatened, and proposed species. If you have questions or comments related to this consultation on Grizzly bear, Canada lynx and/or critical habitat for Canada lynx, please contact Katrina Dixon at (406) 449-5225, ext 222. For questions or comments related to this consultation on bull trout or its designated critical habitat, please contact Tom Olenicki at (406) 449-5225, ext 213.

Sincerely,

Jodi L. Bush
Field Supervisor

enclosure

cc: AES, R-6, MS 60120 (Attn: Doug Laye)
Montana Department of Fish, Wildlife, and Parks, Helena, MT (Attn: Director)
File: 7759 Biological Opinions - 2016

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

BIOLOGICAL OPINION

on the

Effects of the Divide Travel Plan on Grizzly Bears

Agency:	U.S. Department of Agriculture Helena National Forest Lincoln Ranger District Lincoln, Montana
Consultation Conducted by:	U.S. Fish and Wildlife Service Montana Field Office Helena, Montana
Date Issued:	February 29, 2016

Table of Contents

I. INTRODUCTION

This biological opinion was prepared by the U.S. Fish and Wildlife Service (Service) and analyzes the effects of Divide Travel Plan (Travel Plan) on grizzly bears (*Ursus arctos horribilis*) that occur on the Helena National Forest (Forest) within the action area. Formal consultation was initiated on July 31, 2015; the date the Service received the biological assessment for terrestrial wildlife species (U.S. Forest Service 2015) for the proposed action.

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

The Service received a request for consultation on July 31, 2015 with the receipt of the biological assessment for the proposed action. The biological assessment determined that the proposed action may affect, and is likely to adversely affect grizzly bears and may affect, but is not likely to adversely affect Canada lynx and designated critical habitat for Canada lynx. On December 10, 2015 we received an email with updates to some of the route calculations based on the final Travel Plan decision. Several tables were updated from the July 31, 2015 biological assessment. This information was used in the biological opinion and is cited as part of the biological assessment. We received additional information during the consultation process through January 29, 2016.

Concurrence with the effects analysis and determination for Canada lynx and lynx critical habitat is addressed in the cover letter above. This biological opinion addresses the effects of the proposed action on grizzly bears.

II. DESCRIPTION OF THE PROPOSED ACTION

The proposed Divide Travel Plan establishes motorized and non-motorized access management direction for most of the Divide Landscape portion of the Forest. This proposed action does not address the implementation of the Travel Plan. Separate site-specific decisions and actions will be proposed in the future as the Travel Plan is implemented. Below is a summary of the proposed action. Refer to the biological assessment for additional information on the proposed action (U.S. Forest Service 2015, pages 20-23).

- The Travel Plan intends to reduce the network of Forest System open roads by 144 miles, leaving a total of 271 miles of Forest, County, State, and private roads open to public wheeled vehicles;
- How the 144 miles of road closures would be achieved is not specified in the Travel Plan. Decisions as to closure methods will come as a series of separate decisions in the future as the Travel Plan is implemented;
- Motorized trails will increase from 35 to 52 miles, with most of the increment coming from the conversion of roads to trails;
- Fall road and motorized trail closures designed to provide big game security during the hunting season will begin on September 1 rather than on October 15 as in the past;
- Off-route driving for camping will be allowed up to 70 feet on either side of open routes (with the exception of sensitive areas) rather than the 300 feet previously allowed;
- Off-road driving for other purposes (firewood gathering, picnicking, parking) would be limited to 35 feet off the road;
- Snowmobile trails will decrease slightly from 418 miles to 403 miles; and
- The extent of areas *closed* to cross-country snowmobile riding will increase from around 34,755 acres to 70,520 acres.

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 Celsius (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 (NCE) 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. In March of 2010, the Yellowstone grizzly population was once again listed as a threatened population under the Endangered Species Act (75 FR 14496, March 26, 2010).

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, 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, hunter 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.

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.

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.

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 un-fragmented 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 killed. Historically, as human settlements, developments, and roads increased in grizzly bear habitat, grizzly bear populations became fragmented. If fragmented population segments become smaller and/or isolated, they are more vulnerable to extinction, especially when human-caused mortality pressures continue. 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. Proctor et al. (2012) compiled and analyzed all known genetic and movement data for grizzly bears in ten different study areas. They assessed the current state of genetic fragmentation within and between these study areas, and also used genetic assignment testing and movement data from radio-collared animals to compile what is known about current levels of male and female movement. Although there are differences in heterozygosity values among study areas and recovery zones, there have been no detectable consequences on grizzly bear morphology, physiology, ecology, or biology related to these differences in genetic diversity as evidenced by normal litter size, little evidence of disease, an equal sex ratio, and physical characteristics such as body size and weight (Schwartz et al. 2006; Kasworm et al. 2008).

Grizzly bears have low reproductive rates (Bunnel and Tait 1981, *In* Proctor et al. 2004), long generational times (i.e., ten years), and are slow to disperse across landscapes (Proctor et al. 2004). Thus, there can be a lag time between fragmentation and resulting changes in genetic diversity. The genetic data collected by Proctor et al. (2012) reflect fragmentation occurring on the landscape in the recent past (i.e. last 30-60 years) and may not reflect current, improved levels of connectivity and recent movement of grizzly bears between some areas. In other words, current grizzly bear populations may not be as isolated as the genetic data of this study suggest. Therefore, it is useful to supplement these genetic data with movement data to get a complete picture of current population connectivity.

Connectivity is examined in both a genetic (requires males only) and demographic (requires females) framework. Male movements can enhance genetic diversity and reduce genetic fragmentation (Miller and Waits 2003; Proctor et al. 2012), while female movements into small populations are necessary to enhance growth rate (Procter et al. 2012). This concept is relevant to grizzly bear recovery in the NCE, SE, and CYE recovery zones, all of which contain small populations that are demographically and genetically isolated to varying degrees. Maintaining and increasing movements by females (i.e., demographic rescue) from Canadian populations into the small U.S. grizzly bear populations (NCE, SE, and CYE) is critical to the long-term conservation of these populations. This could be accomplished via natural movements or translocating animals.

In general, Proctor et al. (2012) found males move more frequently and over longer distances than females. This result is expected based on what we know about female home range size and the dispersal process. Females usually establish home ranges that (1) overlap with their mother's and (2) are smaller than male home ranges (Waser and Jones 1983; Schwartz et al. 2003). In doing so, individual females generally disperse over much shorter distances than male grizzly bears (McLellan and Hovey 2001; Proctor et al. 2004).

Proctor et al. (2012) examined known habitat use by grizzly bears in intervening habitats between Service-identified recovery zones. This habitat use is relevant to understanding how and where grizzly bears in different ecosystems may be linked in the near future. Proctor et al. (2012) found four males and one female using habitat between the Selkirk and Purcell Mountains in Canada, although there was no evidence indicating any migration between these two mountain ranges. One female grizzly bear with a cub is known to regularly use habitat between the NCDE and CYE. Prior to dropping her collar in 2006, she and her offspring spent most of their summer in the Salish Mountains of Montana less than 2 miles east of the edge of the CYE while denning within the boundaries of the NCDE recovery zone (Kasworm et al. 2010). Mace and Roberts (2011; 2012) documented the distribution of grizzly bears in and adjacent to the NCDE recovery zone based on a compilation of telemetry data, mortality data, and DNA detections and found that a number of both male and female grizzly bears are occupying habitat a substantial distance from the recovery zone boundary, including areas to the south, east, and west of the recovery zone.

Successful reproduction is required for genetic or demographic rescue to occur. High mortality risk seems to be associated with migrant bears (Proctor et al. 2012). These data are helpful when considering how to most effectively manage and conserve the remaining grizzly bear populations in the lower 48 States. For example, these data emphasize the importance of maintaining demographic connectivity with Canadian populations and the small populations of the NCE, SE, and CYE, while highlighting the importance of recovering these small populations so that they can provide genetic and demographic rescue for the Bitterroot Ecosystem. Of relevance, the NCDE appears to be well connected to Canadian populations genetically and its large population size means female movements from Canada into the NCDE are not absolutely required for demographic health to be maintained, although such female movements are beneficial. Similarly, the YGBE has a large enough population size that demographic rescue is not required. In 2003, Miller and Waits suggested that one to two male migrants every ten years (i.e., genetic rescue) were adequate to maintain current levels of genetic diversity in the YGBE grizzly bear population.

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.

<u>Status of grizzly bears in the NCDE</u>

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.

Grizzly bear recovery zones are subdivided into smaller units to facilitate both the assessment of projects and recovery objectives. Twenty-three bear management units (BMU) were formally delineated throughout the NCDE. BMU 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.

The Recovery Plan defines a recovered grizzly bear population as one that can sustain the existing level of known and unknown human-caused mortality that exists in the ecosystem and that is well distributed throughout the recovery zone. Demographic recovery criteria outlined for the NCDE recovery zone include:

- Observation of 22 females with cubs of the year (unduplicated sightings), 10 in Glacier National Park and 12 outside the park, over a 6-year average both inside the recovery area and within a 10 mile area immediately surrounding the recovery zone, excluding Canada;
- Of the 23 BMUs, 21 occupied by females with young from a running 6-year sum of verified observations, and with no two adjacent BMUs unoccupied;
- Known, human-caused mortality not to exceed 4 percent of the current population estimate;
- No more than 30 percent of the known, human-caused mortality shall be females;
- The mortality limits cannot be exceeded in more than 2 consecutive years for recovery to be achieved; and
- Recovery in the NCDE cannot be achieved without occupancy of the Mission Mountains portion of the NCDE.

Mortality of grizzly bears within a 10-mile area outside the recovery zone boundary is counted towards recovery zone statistics. This is a conservative accounting for grizzly bears making their range primarily in the recovery zone, but it includes bears whose range overlaps the recovery zone line. The criteria on total and female mortality also account for unknown, unreported mortality.

Two population studies were designed with the objective to more reliably estimate the number of grizzly bears inhabiting the NCDE. In 1998, the U.S. Geological Survey (USGS) DNA-based mark-recapture study in the greater Glacier area collected information from 1998 through 2000. In 2004, the USGS initiated a more 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 (Kendall et al. 2009). 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.

Also in 2004, Montana Fish, Wildlife and Parks initiated a NCDE grizzly bear trend monitoring project (Mace and Roberts 2012). The purpose of this program is to estimate population trend by monitoring the survival and reproductive rates of radio-instrumented female grizzly bears. Results indicate a positive population trend of three percent annually, indicative of an increasing grizzly bear population in the NCDE (Mace et al. 2012).

With the recent DNA-based population estimate, the methodology to estimate minimum population size outlined in the 1993 recovery plan became 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 ongoing, 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. We now have the Montana Fish, Wildlife and Parks grizzly bear trend monitoring information, which indicates an annual population growth of 3 percent since 2004 (Mace et al. 2012). Using the same data used to estimate trend, Mace et al. (2012) calculated dependent cub survival to be 0.612 (95% CI = 0.300–0.818); yearling survival to be 0.682 (95% CI = 0.258–0.898); subadult female survival to be 0.852 (95% CI = 0.628–0.951); and adult female survival to be 0.952 (95% CI = 0.892–0.980). These survival rates and Mace et al.'s (2012) estimate of trend indicate mortality was not only within sustainable limits between 2004 and 2009, but actually accounted for an increasing population. Therefore, the best available science indicates the population has not declined since 2004.

We continue to use the 1993 Recovery Plan criteria for estimating sustainable mortality limits, applying the conservative 4 percent total mortality limit and the 30 percent female mortality limit. However, we now apply the criteria to the current population estimate of 998 grizzly bears from the method described on page 17 of the draft NCDE Conservation Strategy (U.S. Fish and Wildlife Service et al. 2013). As of 2014, the 6-year average of known human-caused total mortalities in the NCDE was 22.3 (Servheen *in litt*. 2015). 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 39.9 per year. The 6-year average of known human-caused female mortalities in the NCDE is 9.2, also below the sustainable mortality level of no more than 12 per year. Table 1 displays the known human-caused mortality for the NCDE from 2009 through 2014. This is an interim application of the DNA-based population estimate and projection of population growth of 998 grizzly bears using the methods in the 1993 recovery plan to determine the sustainable mortality limits for the NCDE.

Table 1. Known Human-Caused Mortality, NCDE, 2009-2014 (Servheen *in litt.* 2015).

Year	All Bears	All Female Bears
2009	20	7
2010	21	5
2011	30	13
2012	18	4
2013	26	12
2014	19	14
Total	134	55
6-year Average	*22.3/year	**9.2/year

*Meets recovery plan criteria limit of 39.9 bears per year.
**Meets recovery plan criteria limit of 12 female bears per year.

Other information regarding the overall status of the NCDE grizzly bear population is also available. The USGS study (Kendall et al. 2009) indicated that in 2004: (1) Female grizzly bears were present in all 23 BMUs; (2) The number and distribution of female grizzly bears indicated good reproductive potential; (3) The occupied range of NCDE grizzly bears now extends 2.6 million acres beyond the 1993 recovery zone; (4) The genetic health of NCDE grizzly bears is good, with diversity approaching levels seen in undisturbed populations in Canada and Alaska; (5) The genetic structure of the NCDE population suggests there has been population growth between 1976 and 2004; (6) Human development is just beginning to inhibit interbreeding between bears living north and south of the U.S. Highway 2 corridor, west of the Continental Divide.

Other research informs our assessment of the status of the NCDE grizzly bear population. During 1987 to 1996, research in the Swan Mountains indicated a tenuous finite rate of increase of 0.977 for grizzly bears in the study area related to high female mortality (Mace and Waller 1998). The authors concluded the population was probably stable based on multiple lines of evidence, including vital rates, density and occupancy of grizzly bears in the multiple-use zone (Forest Service lands). Density estimates were high, exceeding those of several density estimates published for grizzly bear populations in Canada. Of note is that annual mortality rates for bears utilizing roaded rural (private lands and adjacent roaded areas) and wilderness areas was 21 and 15 times higher, respectively, than for bears using only multiple-use lands (Forest Service lands; Ibid.). Mortalities in the wilderness areas resulted from "mistaken identity" during the big game hunting season and human defense of life. In rural areas, mortalities resulted from malicious killing and the management removal of habituated or food-conditioned bears (Ibid.).

Recent data (U.S. Fish and Wildlife Service 2010, U.S. Fish and Wildlife Service 2013) also indicate that the majority of human-caused mortalities in the NCDE since 1999 were management removals of nuisance or habituated grizzly bears and illegal killings. The majority of these mortalities occurred on private lands, demonstrating a higher incidence of grizzly bear mortality associated with areas on and in proximity to private lands and associated development than on multiple-use Forest lands.

Grizzly bear location and distribution information are also valuable in assessing the status of grizzly bears. A mapping effort in 2002 (U.S. Forest Service et al. 2002) used 5 years of location data to map the area outside the recovery zone where grizzly bears may occur. The resulting distribution of known grizzly bear presence extends to the west, south, and east of the recovery zone. Although information is limited and not statistically analyzed, grizzly bear occurrences are being increasingly documented outside the recovery zone line suggesting that the grizzly bear population in the NCDE is expanding. For example, in 2008 occurrences of grizzly bears were further from the recovery zone boundaries than in past years, and outside the 2002 distribution line. Grizzly bears have recently been documented in areas of Montana south and west of the 2002 distribution line including areas near Avon, Elliston, Drummond, Bearmouth, Butte, Anaconda, Phillipsburg, Rattlesnake Wilderness, Ninemile Valley, Lolo Pass, Rock Creek Drainage, Noxon, Heron, and Trout Creek (Jamie Jonkel, Montana Fish, Wildlife and Parks, pers. comm., 2011). They have also been documented as far east as east of Simms and Shelby, and southeast as far as Wolf Creek (Madel 2008). Most of these documented grizzly bears have been occurrences by males. Due to the broad distribution of grizzly bear locations and known grizzly bear distribution within the recovery zone, this expansion is likely due to increased grizzly bear numbers in some portions of the recovery zone.

The NCDE-wide grizzly bear population estimate is valuable in assessing the status of the population, gauging the use of Recovery Plan minimum population estimates, and assessing the impacts of current levels of human-caused mortality. The total population estimate of 998 grizzly bears, gives us insight into the conservative nature of the 1993 Recovery Plan criteria. Trend information from the Montana Fish, Wildlife and Parks efforts indicates a three percent annual increase in population since 2004 (Mace et al. 2012). Future data will continue to be used to assess population growth or decline.

All status evidence indicates the strength of this population, including current distribution of grizzly bears within and outside the recovery zone, a total population estimate of 765 grizzly bears in the NCDE for the year 2004, the three percent positive rate of growth, and the current population estimate of 998 grizzly bears. Kendall et al. (2009) found that the recent decrease in genetic differentiation and the expanded distribution of grizzly bears in the NCDE are consistent with population growth. The results of the study suggest that the NCDE grizzly bear population is doing better than previously thought (*Ibid*.). The number and wide distribution of female grizzly bears detected during the study (Kendall et al. 2009), along with reported numbers and locations of recent sightings and conflicts, (Mace and Roberts 2012, 2013, 2014), also suggest an increasing number of grizzly bears in the NCDE. In addition, the NCDE grizzly bear population is contiguous with grizzly bears in Canada, which results in high genetic diversity (Proctor et al. 2012). Based on the best available information, the Service concludes that the status of the NCDE grizzly bear population is nearing recovery.

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 Bureau of Land Management. 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.

Based on verified sightings of females with cubs of the year during 2014 and using the Chao2 method, it was determined that the model averaged number of females with cubs of the year was 62 (Haroldson et al. 2015). Using this number, the estimated Yellowstone grizzly bear population size for 2014 is 655 (*Ibid*.).

Using the revised recovery criteria, it was determined that independent female, independent male, and dependent young mortality limits were all met in 2014 (Haroldson and Frey 2015). The independent female, independent male, and dependent young mortality limits were also all met in 2013 (Haroldson and Frey 2014). Independent female mortality and dependent young mortality limits were both met in 2012 and independent male mortality was exceeded (Haroldson and Frey 2013). 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 for independent females and dependent young were met in each of the last three years and the independent male mortality threshold was not exceeded in 2013 or 2014 the revised demographic recovery criteria are met for independent females, dependent young, and independent males.

The YGBE grizzly bear population has increased from estimates as low as 136 individuals when listed in 1975 to approximately 655 animals as of 2014 (Haroldson et al. 2015). This population had been increasing since the mid-1990s and was increasing at 4 to 7 percent per year (U.S. Fish and Wildlife Service 2007). A slowing of population growth began in the early 2000s, primarily due to a decline in cub and yearling survival (van Manen et al. 2015). The population growth rate for the recent period is stable to slightly increasing (IGBST 2012). According to van Manen et al. (2015) this slowing of population growth may be the result of an increase in grizzly bear density (rather than a decline in food resources), possibly indicating the population is nearing carrying capacity. 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. .

The Service determined that the YGBE supports a grizzly bear population with 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. Therefore, based on the best scientific and commercial information available, the Service delisted the Yellowstone grizzly bear DPS, effective April 30, 2007. 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 vacated the final rule designating the Yellowstone DPS and removing the Yellowstone grizzly bear DPS from the list of threatened species and remanded the rule back to the Service. In accordance with the court order, in March of 2010, the Yellowstone grizzly population was once again listed as a threatened population under the Endangered Species Act (75 FR 14496, March 26, 2010).

Status of grizzly bears in the CYE and SE

The CYE in northwestern Montana and northeastern Idaho has over 1,900 square miles of forested and mountainous habitat occupied by grizzly bears. After known mortality was subtracted, a minimum of 41 grizzly bears were identified in the Cabinet-Yaak recovery zone during 2009-2014 based on captures, genetic information, mortality, and sightings of unique individuals (Kasworm 2015 *in litt.*). 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 most recent data indicate that population status is below recovery goals in the CYE for number of unduplicated females and the distribution of females with young in bear management subunits (Kasworm 2015 *in litt.*). The preliminary mortality levels for both total and female bears for 2009-2014 were below the calculated limit (*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. With the small sample sizes available to calculate population trend, Kasworm et al. (2014) determined a 50 percent probability that the population was declining. However, data from the last six years suggest recent positive population growth rates.

In response to several petitions, the Service previously determined that grizzly bears in the CYE warranted a change to endangered status. However, for several years, this population's status has been improving. The population trend has now changed from declining to stable. The U.S. Forest Service has established regulatory mechanisms for motorized access management and attractant storage and researchers have documented some movement between the Cabinet-Yaak and other populations in Canada. Together, these improvements have reduced the threats to this population. Until the Record of Decision for motorized access management is more fully implemented and we have several more years of a positive population trend, we remain cautious in our interpretation. We conclude that the Cabinet-Yaak ecosystem population continues to face several threats, and retain this population’s threatened status, but we no longer find that the population is warranted for uplisting to endangered status (79 FR 72488).

The SE 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).

The most recent data indicate that population status is below recovery goals in the SE for number of unduplicated females and the distribution of females with young in bear management subunits (Kasworm 2015 *in litt.*). The preliminary mortality levels for total bears and female bears were in excess of calculated limit during 2009-2014 (Ibid.).

In response to petitions, we previously determined that grizzly bears within the Selkirk ecosystem warranted a change to endangered status but reclassification was precluded by higher priority listing actions. However, improvements to habitat and the institutionalization of those improvements in National Forest Land Management Plans, as well as new information about population size have significantly reduced threats to this population from habitat destruction, and improved the adequacy of regulatory mechanisms. Population estimates indicate that the population is approaching recovery goals of 90 bears, and levels of human-caused mortality have been low in recent years. Additionally, food storage orders have been implemented and some movement between the Selkirk Mountains and other populations in Canada has been documented. However, until there are significant improvements to regulatory mechanisms in Canada, full implementation of motorized access management by the U.S. Forest Service, and improved population connectivity, we remain cautious in our interpretation. We conclude that the Selkirk ecosystem population continues to face several threats and will retain this population’s threatened status, but we no longer find that the population is warranted for uplisting to endangered status (79 FR 72488).

<u>Status of the Selway-Bitterroot and North Cascades Ecosystems</u>

Grizzly bear recovery efforts in the Selway-Bitterroot Ecosystem (SEL) and North Cascades Ecosystem (NCE) are in the planning stages.

The NCE of north central Washington (9,500 square miles [24,605 km2]) is estimated to contain less than 20 grizzly bears (Almack et al. 1993). No population estimates were available in 1993, although grizzly bear tracks were verified (USFWS 1993). The nearest population of grizzly bears is immediately north in Canada with an estimated 23 individuals but populations to the east and west of the Cascades in Canada are considered extirpated (North Cascades Grizzly Bear Recovery Team 2004).

Grizzly bears were extirpated from the SEL decades ago. The SEL of east central Idaho and western Montana (5,600 square miles [14,504 km2]) did not support a grizzly bear population in 1993, nor are grizzly bears known to be present at this time (USFWS 1996; 2000; 65 FR 69624, November 17, 2000); however, sufficient suitable habitat exists to warrant recovery efforts (USFWS 1993, Miller and Waits 2003). 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).

Conservation Needs of the Species

In 1993, the Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993) outlined a strategy to recover grizzly bears built on the concept of recovery zones. Recovery zones were established to identify areas necessary for the recovery of the 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 recovery zones are to be managed to conserve grizzly bear habitat and managed primarily for grizzly bear habitat. The recovery zones are areas adequate for managing and promoting the recovery and survival of these grizzly bear populations (USFWS 1993). The recovery zones contain large portions of federal lands, including wilderness and national park lands, which are protected from the influence of many types of human uses occurring on lands elsewhere. All federal lands within recovery zones, including multiple use lands, are managed with grizzly bear recovery as a primary factor, in accordance with the Interagency Grizzly Bear Guidelines (U.S. Forest Service 1986). As anticipated in the Recovery Plan, the YGBE and NCDE grizzly bear populations have responded favorably to these conditions, have stabilized, and are increasing and/or are at or near recovered levels. In addition, grizzly bear distribution has been expanding and continues to expand in areas outside of the recovery zones, as evidenced by the verified records of grizzly bears on or near portions of the Forest (Mace and Roberts 2014; van Manen et al. 2015).

Grizzly bears outside the recovery zones probably experience a higher level of adverse impacts due to land management actions than do grizzly bears inside. The recovery plan outlined that such areas would not be managed primarily to provide or conserve grizzly bear habitat. Thus, we expect grizzly bears will occur at lower densities outside the recovery zones than within the recovery zones as a result of suboptimal habitat conditions including higher road densities, fewer areas secure from motorized access, and more human presence and activity. The recovery plan anticipated that grizzly bears can and will exist outside recovery zone lines in many areas, but that the grizzly bears residing within the recovery zone were crucial to recovery goals and hence delisting. While land management direction outside of recovery zones may have adverse effects on some of the individual grizzly bears using those areas area now and into the future, land management within the recovery zones will continue to favor the needs of grizzly bears.

In 2007, the Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area (Interagency Conservation Strategy Team 2007) was released to guide management and monitoring of the YGBE grizzly bear population and its habitat upon recovery and delisting. The Yellowstone Conservation Strategy identified a Primary Conservation Area (PCA), which is the same area as the YGBE recovery zone as identified in the 1993 Recovery Plan.

Within this strategy, management direction is described for both the PCA and adjacent areas within the greater Yellowstone area (GYA). The habitat standards identified in the Yellowstone Conservation Strategy would be maintained at identified levels inside the PCA. In addition, several other habitat factors would be monitored and evaluated. Habitat standards and habitat criteria monitoring focus on areas within the PCA. The goal is to maintain or improve habitat conditions existing as of 1998, as measured within each subunit within the PCA. The Yellowstone Conservation Strategy states that state grizzly bear management plans, forest plans, and other appropriate planning documents will provide specific management direction for the adjacent areas outside the PCA.

Recently, federal, state, and tribal agencies managing grizzly bears in the NCDE collaborated on the development of an interagency draft Conservation Strategy for NCDE Grizzly Bears (U.S. Fish and Wildlife Service et al. 2013). The draft NCDE Conservation Strategy identifies a PCA, which is basically the area now known as the recovery zone. It also identifies three additional management zones (Zone 1, Zone 2, and Zone 3) outside the PCA, each with varying levels of habitat protections depending on their relative importance to the NCDE grizzly bear population. The strategy's objective is to maintain a recovered grizzly bear population in the NCDE area sufficient to maintain a healthy population in biologically suitable habitats within areas identified as the PCA and Zone 1.

The PCA would be managed as a source area where the objective is continual occupancy by grizzly bears and maintenance of habitat conditions that are compatible with a stable to increasing grizzly bear population. The most conservative habitat protections would apply to the PCA. Management Zone 1 is delineated around the PCA, similar to the 10-mile buffer concept described in the Recovery Plan. Demographic recovery criteria would apply in Zone 1. The objective in Zone 1 is continual occupancy by grizzly bears but at expected lower densities than inside the PCA. Habitat protections would focus on managing motorized route densities to be compatible with a stable to increasing grizzly bear population. Attractant storage rules would also be implemented. The PCA and Zone 1 together would be the area within which NCDE grizzly bear population data are collected and sustainable mortality limits will apply.

The objective in Management Zone 2 is to maintain existing resource management and recreational opportunities and allow agencies to respond to demonstrated conflicts. The strategy indicates that grizzly bear occupancy within Zone 2 is not necessary to maintain a recovered status for the NCDE but it would be beneficial to other ecosystems if grizzly bears were able to occupy the zone in low densities. Because both male and female grizzly bears are already known to occur on occasion in portions of Zone 2 without any protections specifically in place for grizzly bears, maintaining a healthy population in the PCA and Zone 1, while reducing the potential for conflicts between grizzly bears and people in Zone 2 are goals of the strategy. The strategy indicates that the objective in Zone 2 is not necessarily continual occupancy but instead, to have a few males (or females) move through this area into other ecosystems, therefore less rigorous habitat protections are appropriate. The strategy indicates that public lands in Zone 2 will be managed to provide the opportunity for grizzly bears, particularly males which are more likely to disperse long distances, to move between the NCDE and adjacent ecosystems (i.e., the greater YGBE or the Bitterroot ecosystem) under the current direction in USFS and BLM Resource Management Plans. Here, the management emphasis will be on conflict prevention and response. Attractant storage rules would be implemented on most Federal and State lands.

Management Zone 3 of the draft NCDE Conservation Strategy primarily consists of areas where grizzly bears do not have enough suitable habitat for long-term survival and occupancy. Grizzly bear occupancy will not be actively discouraged and management emphasis will be on conflict response.

Recently in 2013, the Service proposed a draft revised supplement to the 1993 Recovery Plan (U.S. Fish and Wildlife Service 2013a). The supplement would revise the demographic recovery criteria for the Yellowstone ecosystem. Included within this draft revised supplement, a monitoring area is designated, within which all demographic criteria would be assessed. The areas within which mortalities are counted against the mortality limits for independent females and males and dependent young would be revised to be the same area where population size is estimated. Grizzly bear mortalities would no longer count against sustainable mortality limits in areas outside of this monitoring area. Conversely, grizzly bears observed outside of this monitoring area would not count toward the estimates of population size. Mortalities outside of the monitoring area would continue to be recorded and reported. Also, grizzly bear occupancy would not be actively discouraged outside of the monitoring area but management emphasis would be on conflict response.

We note that the documents listed above that have been developed since the 1993 Recovery Plan are draft or in various stages of implementation. However, at this time, the Service holds that the strategies described in these documents, and updates, reflect the best available science on grizzly bear recovery.

Analysis of the Species/Critical Habitat Likely to be Affected

The biological assessment determined that the Travel Plan would likely adversely affect individual grizzly bears. Therefore, formal consultation with the Service was initiated and this biological opinion has been written to determine whether or not activities associated with this action are likely to jeopardize the continued existence of grizzly bears. 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.

Other Listed Species

In addition to grizzly bears, other federally listed terrestrial species that may be present in the project area include the threatened Canada lynx and designated Canada lynx critical habitat. Both are discussed in the cover letter attached to this biological opinion.

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 C.F.R. § 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.

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 include the entire area influenced by the Travel Plan as analyzed using elk herd units in place of BMUs which do not occur outside of the recovery zones. The overall action area includes six units based on elk herd units (these are roughly the size of an average female grizzly bear home range). This includes most of the Divide Landscape of the Helena Ranger District and an additional 1.5 mile extension beyond the Forest boundary. The action area excludes the Clancy-Unionville area in the southeastern part of the Divide Landscape and the upper Little Prickly Pear watershed at the northern tip of the Divide Landscape because these areas have been covered by earlier travel planning efforts. The action area includes private and state lands within the Forest boundaries. The entire action area is outside of the NCDE recovery zone. Refer to the biological assessment for a more detailed discussion of the baseline condition related to grizzly bears (U.S. Forest Service 2015).

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 NCDE recovery zone. For many years, the Forest has been conducting effects analyses under the assumption that grizzly bears may be present on the Divide Landscape of the Forest. The status of the grizzly bear population in the NCDE, including grizzly bears on the Forest, was covered previously in "Status of grizzly bears in the NCDE" section. Grizzly bear numbers have been increasing and the trend estimate is positive. For a more detailed discussion on grizzly bears using the action area, refer to the biological assessment (U.S. Forest Service 2015, pages 35-37).

Factors Affecting Species Environment within the Action Area

For consideration of the environmental baseline for this action, we consider the existing direction and conditions related to access management within the action area. These conditions are summarized in Table 2 below and discussed in more detail in the biological assessment (U.S. Forest Service 2015, pages 24-35).

Road densities have also been calculated for the action area. The overall linear open route density for the action area is 1.68 miles per square mile. The action area was further divided into six units based on elk herd units that are roughly the size of an average female grizzly bear home range. Linear open route densities range from 1.68 to 2.94 miles per square mile in these smaller units within the action area.

Table 2. Miles of roads and trails open to public wheeled vehicle use in the action area (U.S. Forest Service 2015).

Open Route Classification	Existing Route Miles
Roads Open Yearlong	286
Roads Open Seasonally	31
County Roads within Forest Boundary	19
Private Roads within Forest Boundary	75
U.S. Highway 12 within Forest Boundary	4
Authorized Motorized Trails	19
Non-System Motorized Trails/4 wheel drive tracks	16
Total Open Roads	**415**
Total Open Motorized Trails	**35**
TOTAL OPEN MOTORIZED ROUTES	**450**

Core area parameters used to measure blocks of non-motorized areas larger than 2,500 acres with all boundaries 0.3 miles from motorized routes open during the non-denning period are not intended to be applied outside the recovery zone. However, the biological assessment displays such calculations for the action area as a means of displaying conditions in the action area. The action area supports four areas that would meet these criteria (larger than 2,500 acres, 0.3 miles from open motorized routes). These four non-motorized areas represent about 24 percent of the action area. Grizzly bears have been reported in two of the areas (Black Mountain-Deadman Creek and Electric Peak Roadless area. Observations have also come from smaller non-motorized habitat patches that are less than 2,500 acres. The biological assessment describes that when the non-motorized habitat was measured outside of a 300 foot buffer on either side of a motorized route (.06 mile buffer), the number of 2,500 acre patches of non-motorized habitat increases appreciably. The action area currently supports 17 such areas, ranging in size from 2,690 acres to 29,730 acres, and totals 106,135 acres. The action area likely does not have enough secure habitat to provide for a core grizzly bear population but does provide habitat enclaves for grizzly bears moving through and likely a small resident population (U.S. Forest Service 2015).

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 C.F.R. § 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 action.

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 as affected by road densities. Research has confirmed adverse impacts of roads on grizzly bears (Mace et al. 1996, Mace et al. 1999). Negative impacts associated with roads and excessive road densities influence 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;
- Habitat loss, modification, and fragmentation due to roads and road construction, including vegetative and topographic disturbances;
- Changes in grizzly bear behavior, especially habituation to humans, due to ongoing contact with roads and human activities conducted along roads; and
- Direct mortality from road kills, legal and illegal harvest, and other factors resulting from increased human-bear encounters.

The Interagency Grizzly Bear Committee (IGBC) Taskforce provided standardized definitions for roads and standardized methods to measure road densities and define analysis areas within the recovery zones as a result of grizzly bear research information on open and total road densities and grizzly bear core areas (IGBC 1998). The Service considers the management of roads in the recovery zones 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 within the recovery zones.

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' response to 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 impacting grizzly bears to the extent that they continue to avoid roaded habitat.

All factors contributing to direct links between roads and displacement from habitat have not been quantified. 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 significantly limited, 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 underuse of areas near 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.

Conversely, grizzly bears can 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).

Grizzly bears face direct mortality risks on public land relatively infrequently in the NCDE. Management action due to human food habituation does occur. However, on Forest Service administered lands, grizzly bear mortalities more often resulted from mistaken identity during legal hunting season, illegal or malicious killing, or automobile and train collisions (K. Ake 2011 *in litt.*). Glacier National Park received an average of 1.9 million visitors a year from 2000 through 2010 with concentrated use in developed areas and dispersed in the backcountry (National Park Service 2011). Between 2000 and 2010, only 9 grizzly bear mortalities were attributed to human-causes in Glacier Park (K. Ake 2011 *in litt.*). Four of these were related to accidental automobile and train collisions, three were related to management removals, one was related to research capture, and one was related to mistaken identification while hunting. In comparison, in 2010 alone, seven grizzly bears were removed from private lands within the NCDE because of human causes related to management removal (4), automobile collision (1), illegal shooting (1), and unknown causes (1). Approximately 114 human-caused mortalities occurred on private land from 2000 to 2010, the majority involving management removals related habituation of food attractants, garbage, and/or livestock.

Ake et al. (1998) summarized human-caused grizzly bear mortality locations for the period 1984 to 1996. An estimate of the amount of time grizzly bears spent in rural, roaded, and backcountry area (Mace and Waller 1998) was then compared with mortality locations. Although grizzly bears spent less than 5 percent of time in rural settings, 56 percent of human-caused grizzly bear mortality occurred in rural roaded areas. Grizzly bear mortality data collected since 1998 support the premise of increased risk to grizzly bears in rural roaded areas. In the NCDE, mortalities associated with roaded rural (mostly private) areas exceeded the sum of mortalities from Forest Service roaded areas and areas away from roads.

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.

Effects of the Divide Travel Plan on Grizzly Bears in the Action Area

Implementation of the Travel Plan will impact grizzly bears that may occur outside of the recovery zone. Grizzly bears have been and will continue to be impacted to varying degrees as a result of existing roads and trails that will remain on the Forest, new road and trail construction, and use of these roads and trails. Compared to the existing access conditions in the action area, the proposed action would reduce the total miles of open motorized routes. Some notable changes from the current condition are the proposed decline in open roads and the increase in the motorized trail system. Most new motorized trails would be created by making currently open roads available only to vehicles less than 50 inches wide (ATVs and motor bikes). Thus, while there is an increase in motorized trails, the effects to grizzly bears would be similar to the existing condition. Table 3 summarizes the motorized access changes that will occur as a result of the proposed action. Refer to the biological assessment and updated information for specific actions that are proposed that will result in these changes (U.S. Forest Service 2015). The paragraphs below analyze the effects of such changes.

Table 3. Changes to the Access Condition as Proposed by the Divide Travel Plan (U.S. Forest Service 2015, updated information).

Route Classification	Existing Route Miles	Final Travel Plan Route Miles
Roads Open Yearlong	286	170↓
Roads Open Seasonally	31	3
County Roads within Forest Boundary	19	19
Private Roads within Forest Boundary	75	75
U.S. Highway 12 within Forest Boundary	4	4
Authorized Motorized Trails	19	52↑
Non-System Motorized Trails/4 wheel drive tracks	16	0↓
Total Open Roads	**415**	**271↓**
Total Open Motorized Trails	**35**	**52↑**
TOTAL OPEN MOTORIZED ROUTES	**450**	**323↓**

In general, linear open route densities outside the recovery zone are typically higher than inside recovery zones due to their proximity to human population centers, varied ownerships, and a long history of various human uses. The proposed Travel Plan would reduce the amount of miles of open routes from 450 miles to 323 miles, resulting in a linear open route density of 1.34 miles per square mile for the action area. Although a decline in linear open route density across the action area would occur, the distribution of roads and their impacts would continue to be unevenly dispersed. Portions of the action area have high levels of activity along roads while other portions have low activity along roads or no roads at all. To analyze this further, the Forest describes linear open route densities within small elk herd units. The action area was divided into six units ranging in size from about 35,350 acres to 87,020 acres. These units are roughly the size of an average female grizzly bear home range. These units extend 1.5 miles beyond the boundary of the Forest onto non-Forest land. Table 4 displays the existing linear open route densities and the proposed linear open route densities under the Travel Plan for these units. The table further displays linear open route densities for just the portions of the units within the Forest boundary. This shows that many of the routes that are used in the linear open route density calculation for the entire unit occur off the Forest. However, it also displays that linear open route densities will decrease under the proposed Travel Plan within all six units.

Table 4. Linear Open Route Density by Elk Herd Units within the Actin Area (U.S. Forest Service 2015, updated information).

Elk Herd Unit	Total Unit Acres	Unit Acres within the Forest Boundary	Linear Open Route Density* for Entire Unit		Linear Open Route Density* for area within Forest Boundary	
			Existing	Proposed	Existing	Proposed
Little Prickly Pear – Ophir Creek	87,022	59,311	2.58	2.22	2.25	1.72
Greenhorn Mountain	56,314	21,693	2.94	2.45	2.32	1.06
Spotted Dog-Little Blackfoot	82,314	63,561	2.18	2.00	1.37	1.14
Jericho Mountain	35,345	29,364	2.33	2.13	1.91	1.67
Black Mountain - Brooklyn Bridge	53,840	35,874	1.68	1.67	1.03	1.02
Quartz Creek	36,733	23,036	2.13	2.07	1.13	1.04

*Linear open route density is displayed as miles per square mile

The Forest also analyzed the effects to large non-motorized blocks of habitat. Core area parameters used to measure blocks of non-motorized areas larger than 2,500 acres with all boundaries 0.3 miles from motorized routes open during the non-denning period are not intended to be applied outside the recovery zone. However, the biological assessment displays such calculations (areas larger than 2,500 acres and 0.3 miles from open motorized routes) for the action area as a means of displaying conditions and effects in the action area. The existing condition in the action area supports four areas that would meet these criteria. With the Travel Plan in place two additional areas would meet the criteria while the other four would increase to varying degrees. Such habitat would increase by approximately 24,977 acres across the action area. Refer to Table 5 for details.

As described in the baseline section above, several large blocks (greater than 2,500 acres) of unroaded habitat that are known to be used by grizzly bears are closer than 0.3 mile from open roads. Non-motorized habitat this close to routes does not provide as much isolated habitat as the areas further from routes. Nevertheless, they do allow for a considerable amount of grizzly bear activity with little chance of encountering a human and/or being displaced by nearby motorized use. Due to the consolidation of routes, the total number of these modified non-motorized blocks would decrease from 17 to 15. However, the total acreage of these areas would increase from 106,135 to 125,839 acres, improving the habitat conditions for grizzly bear use once Travel Plan implementation is complete.

Table 5. Acres of Large Non-motorized Blocks of Habitat in the Action Area (U.S. Forest Service 2015, updated information).

Area Identification/Location	Existing Acres	Final Travel Plan Acres
Black Mountain – Deadman Creek	10,010	11,322
Austin Creek-Sweeney Creek	Less than 2,500	3,942
Electric Peak Roadless Area	21,345	32,307
Treasure Mountain	Less than 2,500	
Jericho Mountain Roadless Area	4,485	9,696
Lazyman Gulch Roadless Area	6,905	10,455
TOTAL ACRES	**42,745**	**67,722**
% of action area in non-motorized blocks greater than 2,500 acres and .3 miles from open routes	**24%**	**44%**

Overall, the Travel Plan would decrease the linear open route densities and increase the amount of secure habitat in the elk herd units throughout the action area, thus increasing secure habitat for grizzly bears as well and improving habitat conditions for grizzly bears. While an improvement in access conditions will occur under the Travel Plan, some areas of high linear open route densities will still occur in localized areas. Thus, adverse effects from the proposed Travel Plan may occur and result in the displacement of some individual grizzly bears, the avoidance of suitable habitat, and/or the reduction of habitat to an unsuitable condition in some portions of the action area. Under-use of otherwise suitable habitat along roads essentially reduces the amount of habitat freely available to grizzly bears. 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 by grizzly bears does not necessarily preclude use or form a barrier to dispersal and movement across the landscape.

Male grizzly bears have larger home ranges than females, and males and subadults are independent, more mobile, and do not have the same energetic needs as adult females. While displacement may affect behavioral patterns of males and subadults, such as feeding or sheltering, we do not anticipate such effects to be significant to subadult or male grizzly bears.

Displacement effects have more significant impacts on adult female grizzly bears than males or subadults because adult females have higher energetic needs to sustain fitness prior to and during gestation and lactation and when rearing cubs. As such, adult females can less afford the additional energy expended to find high quality foods and shelter if displaced, especially during the early spring or late summer to fall hyperphagia season. During some years, due to poor climatic conditions and resulting food scarcity and/or high levels of forest management activity or recreational activity, displacement effects from areas with high road densities could be more frequent and intense. Some adult females may be displaced from key habitats and under certain conditions they may be displaced to levels that impair their normal ability to readily find food resources needed to sustain fitness necessary for breeding and producing cubs, and find shelter. We do not expect that all adult females exposed to disturbances from roads and road densities would suffer significant effects, nor would the effects persist throughout an individual female's life span. We expect that effects would vary substantially depending upon the wariness of the individual bear, the size of and habitat quality within her home range, the number of other grizzly bears using the particular area, climate conditions, annual food resources, and the nature, intensity, and duration of human activity during any particular year. All of these are factors that may affect options available to adult females if displaced. Further, conditions the following year may be considerably different.

Additional non-motorized trails would be designated and/or constructed under the proposed Travel Plan as part of a designated non-motorized trail system for mountain biking, hiking, and horseback riding. Non-motorized trails will increase slightly, from a total of 47 miles to 61 miles. While some new non-motorized trail construction would occur, most increases in hiking trails would result from the conversion of previously open roads to non-motorized trails. The potential for these non-motorized activities to result in disturbance effects does exist. In most situations, such impacts would likely be short-term and would range from no response from a grizzly bear to a grizzly bear temporary fleeing the area. Grizzly bears may adapt to consistent, predictable activity and may notice the activity but not flee from the activity (Jope 1985). This is more likely on trails with regular use. On non-motorized trails that receive low amounts of human use, human activity may result in a grizzly bear temporarily fleeing from the disturbance, expending extra amounts of energy (McClellan and Shackleton 1989). Due to varying skill levels and speed of travel of mountain bikers, they are less likely to travel in close groups and maintain verbal contact with other riders, resulting in minimizing the amount of noise and reducing the potential for early detection and avoidance by grizzly bears. Thus, mountain biking may elicit greater flight response from grizzly bears than other non-motorized use due to the higher potential for sudden encounters. While grizzly bears may experience some disturbance effects as a result of the non-motorized trail system proposed under the Travel Plan, due to the amount of human use and the type of activities on these trails, we expects such effects will be insignificant.

In addition to designating the motorized and non-motorized roads and trails, the proposed Travel Plan also addresses motorized travel off route for camping and other purposes. The Travel Plan will change from allowing driving directly to a campsite within 300 feet of an open route to only allow off-route driving for camping for up to 70 feet on either side of an open route (with the exception of sensitive areas such as wetland or riparian sites). Also, off-road driving for other purposes, such as firewood gathering, picnicking, and parking, will be limited to 35 feet off the road. While allowing motorized travel off a route would be allowed throughout the action area, the varying topography and forest cover adjacent to motorized routes would limit this off route travel in many areas. The greatest use would likely occur in areas with more open and gentler terrain. The potential for disturbance to individual grizzly bears would not likely be significant because any of this off-route use would be along open routes that are typically avoided by grizzly bears or grizzly bears are accustomed to motorized use. We expect any effects would be insignificant and/or discountable related to such off-route use.

Finally, the biological assessment addresses snowmobile use in the action area. The Travel Plan will double the area closed to off-trail snowmobile riding from about 34,755 acres to about 70,520 acres. Much of the new closure area is in mid to high elevation habitat devoid of motorized routes. Also under the Travel Plan, the total miles of snowmobile trail would decrease slightly, from 418 miles to 403 miles. Within these changes, some shifts in use would occur with some trails closing and some new routes designated.

Grizzly bear denning has not been documented in the action area, although it may be occurring. Any areas suspected of grizzly bear denning are in areas that are off-limits to all snowmobiling. None of the changes would affect areas likely to serve as grizzly bear den sites in the future. Given the low numbers of grizzly bears that likely use the action area and the even lower likelihood that grizzly bears are denning in the action area, effects to grizzly bears are extremely unlikely to occur as a result of snowmobiling.

Effects Summary

Some areas will have no motorized activity while other areas will receive heavy motorized use. However, the likelihood for disturbance and displacement due to access management would decrease from the existing condition as a result of implementation of the Travel Plan since the linear open route densities would decrease. The proposed Travel Plan would reduce the amount of miles of open routes from 450 miles to 323 miles, resulting in a linear open route density of 1.34 miles per square mile for the action area. While an improvement in access conditions will occur, some areas of high linear road densities will still occur in localized areas. Areas with high road densities may lead to the under-use of suitable habitat by grizzly bears and may significantly impact some grizzly bears' ability to find food resources, breed and raise young, and find shelter. Based on this, the proposed Travel Plan would have the potential to adversely affect some individual grizzly bears. However, grizzly bears are evidently tolerating existing levels of road densities in some areas.

The proposed action would increase the miles of designated non-motorized trails for hiking, horseback riding, and mountain biking. Non-motorized trail are not expected to result in significant or adverse effects. In addition, the Travel Plan will reduce the number of miles of snowmobile routes and increase the amount of area closed to snowmobiles. Grizzly bear denning has not been documented in the action area and the likelihood that denning is occurring is very low. Thus, effects to grizzly bears from snowmobiling are extremely unlikely to occur.

Although the proposed Travel Plan may result in adverse effects to some individual grizzly bears, we do not anticipate that these effects will have appreciable negative impacts on the NCDE grizzly bear population. The action area is located completely outside the 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 required, and therefore managed primarily for, the recovery and survival of the grizzly bear as a species. In developing the NCDE 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 necessary for the conservation of the species, the Forest has managed the lands in such a way that they have allowed grizzly bears to expand into these areas.

Grizzly bears outside of recovery zones probably experience a higher level of adverse impacts due to land management actions than do grizzly bears inside. However, grizzly bears are able to live in habitat on the Forest outside of the recovery zones despite lack of mandated habitat protections or direction specific to grizzly bear management. As grizzly bear numbers increase on the Forest and expand their range, it is possible that the Forest will experience an increase in conflicts involving grizzly bears and human use of the Forest. The proposed Travel Plan will reduce linear open route densities outside of the recovery zone, thus improving the access conditions over the existing condition. Although individual grizzly bears may be adversely affected at times related to the proposed Travel plan and associated access management, we anticipate that grizzly bears will continue to occur within the action area into the future. We conclude that the Travel Plan minimizes the potential for adverse impacts to grizzly bears from within the action area when compared to the baseline condition.

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 2006, Montana Fish, Wildlife and Parks prepared the Grizzly Bear Management Plan for Western Montana (Montana Fish, Wildlife and Parks 2006). In December of 2013, Montana Fish, Wildlife and Parks completed a new Grizzly Bear Management Plan for Southwestern Montana (Montana Fish, Wildlife and Parks 2013). These documents were prepared to manage and enhance grizzly bear populations. The long-term goal of the Grizzly Bear Management Plans is to allow the populations in western and southwestern Montana to reconnect by occupying currently unoccupied habitats. Montana Fish, Wildlife and Parks anticipates that successful implementation of the plans, along with adequate local involvement, would allow this to occur. One purpose of the plans is to minimize the potential for human-grizzly bear conflicts. In doing this, Montana Fish, Wildlife and Parks will attempt to minimize the number of grizzly bears removed from the population as a result of conflicts with people.

Private land occurs within and adjacent to the Forest. No large-scale activities are currently proposed for private or state lands in or adjacent to the action area. Activities on non-federal lands that have occurred in the past and are likely to continue into the future include but are not limited to: subdivision and house construction, mining, recreation, business, logging, and livestock grazing. Such activities can have disturbance effects to grizzly bears as well as result in effects to grizzly bear habitat such as cover and foraging habitat. These effects could range from insignificant to significant. In addition, human population growth could also result in additional grizzly bear attractants and further increase the potential for grizzly bear-human conflicts. Food and attractant storage issues on private land can create grizzly bear-human conflicts by providing attractants to grizzly bears. Once grizzly bears become habituated and a nuisance, they are typically removed. As more people use non-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 Montana Fish, Wildlife and Parks bear specialist program is expected to continue to work with landowners in the action area to proactively reduce risks to grizzly bears on private and public lands. Bear specialists provide information and assistance to landowners related to ways to store, fence, or otherwise secure food and attractants from grizzly bears, and respond to reports of conflicts and assist the landowner with nuisance black and grizzly bears. In cooperation with other agencies, this program has made notable strides toward an informed public and reduced the availability of attractants to grizzly bears on private and public lands. Such benefits to grizzly bears are expected to continue.

Also, large federal land ownership, including some large blocks of secure habitat within which human access is restricted by regulation and topography, serve to reduce the impacts of larger residential human populations on grizzly bears. However, federal land management cannot entirely compensate for such impacts on private land. Nevertheless, despite the recent growth of the human population the grizzly bear population in the ecosystem appears, by all reasonable measures, to be increasing as well.

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 opinion that the effects of the proposed Travel Plan on grizzly bears are 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 C.F.R. § 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 is based on but not limited to the information presented in the 2015 biological assessment (U.S. Forest Service 2015), correspondence during this consultation process, information in our files, and informal discussions between the Service and the Forest.

The proposed Travel Plan direction may result in adverse effects to individual grizzly bears as a result of access management direction. Based on the best available scientific information reviewed in this consultation, such adverse effects will not negatively impact the recovery of the NCDE grizzly bear population. It is our opinion that the proposed action would not appreciably reduce the likelihood of both the survival and recovery of grizzly bears. Below we summarize key factors of our rationale for our non-jeopardy conclusion as detailed and analyzed in this biological opinion.

Factors related to the proposed Travel Plan:

- The proposed Travel Plan would reduce the amount of miles of open routes from 450 miles to 323 miles, resulting in a linear open route density of 1.34 miles per square mile, reducing the potential for negative grizzly bear/human interactions, increasing the opportunity for transient bears to move through the landscape, and improving the opportunity for resident grizzly bears to find suitable habitat free from human disturbance.

- Non-motorized habitat blocks greater than 2,500 acres and 0.3 mile from open motorized routes (equivalent to core areas in the NCDE recovery zone) would increase in number from four blocks to six blocks and increase in total acreage from 42,745 acres to 67,722 acres, covering approximately 44 percent of the action area.

- Large non-motorized habitat blocks greater than 2,500 acres measured 300 feet from open routes would cover 81 percent of the action area, increasing from 106,135 acres to 125,839 acres.

- While access conditions will improve in the action area, some areas of high linear road densities still occur in localized areas. Thus, some areas would continue to have a degraded baseline and access management within the action area may result in some level of adverse effects to individual grizzly bears.

- 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. High road densities in some parts of the action area may result in displacement of some female grizzly bears from key habitat at some time over the life of the Travel Plan. 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, outside of the recovery zone. Grizzly bears are present in portions of the action area despite no specific access management standards for grizzly bears.

- While some areas across the action area would continue to generate negative impacts to grizzly bears, given the proposed reduction in the road and trail system, the Divide Travel Plan would comply with the NCDE draft Grizzly Bear Conservation Strategy direction to manage Forest lands in the grizzly bear distribution zone (management zone 2) to lessen the potential for grizzly bear/human conflicts and to provide opportunity for grizzly bears to disperse through the landscape between the NCDE and other wildland areas while maintaining existing resource management and recreation opportunity (U.S. Forest Service 2015). The broadly dispersed road closures proposed under the Travel Plan, including a number in key grizzly bear habitat areas, will improve prospects for linkage in the Divide Landscape.

Although we expect some individual grizzly bears may be adversely affected within the action area over the life of the Travel Plan, the survival and recovery of the NCDE grizzly bear population would not be negatively affected.

Factors related to the NCDE grizzly bear population:

- Kendall et al. (2009) produced a final total NCDE grizzly bear population estimate of 765 grizzly bears for 2004 (Ibid.), more than double the recovery plan estimate for that year.

- Kendall et al. (2009) also indicated that in 2004 (http://www.nrmsc.usgs.gov):

    1) Female grizzly bears were present in all 23 BMUs.
    2) The number and distribution of female grizzly bears indicated good reproductive potential.
    3) The occupied range of NCDE grizzly bears now extends 2.6 million acres beyond the 1993 recovery zone.
    4) The genetic health of NCDE grizzly bears is good, with diversity approaching levels seen in undisturbed populations in Canada and Alaska.
    5) The genetic structure of the NCDE population suggests there has been population growth between 1976 and 2004.
    6) Human development is just beginning to inhibit interbreeding between bears living north and south of the U.S. Highway 2 corridor, west of the Continental Divide.

- Montana Fish, Wildlife and Parks research conducted between 2004 and 2011 indicates a positive trend for NCDE grizzly bears (Mace and Roberts 2012). The research indicates an annual growth of three percent since 2004 (Mace and Roberts 2011).

- Using the 2004 population estimate and the percent annual growth, the current population estimate, as displayed in the Draft NCDE Conservation Strategy, is 998 grizzly bears (U.S. Fish and Wildlife Service et al. 2013).

- The NCDE grizzly bear population currently meets all the demographic recovery criteria, including number of BMUs occupied by family groups and sustainable human-caused mortality levels for both total and female grizzly bears.

- The NCDE grizzly bear population is increasing, explaining the expansion of its range into areas outside the recovery zone. The USGS found that grizzly bears inhabit 2.6 million acres 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 find the resources needed to establish home ranges and survive and reproduce outside the recovery zone, despite the lack of specific habitat protections. In part due to grizzly bear expansion into areas that had previously been unoccupied, the number of grizzly bear-human conflicts has generally increased. However, much of the recent grizzly bear mortality is primarily associated with conflicts arising from attractants on private lands rather than conflicts on public lands.

- The NCDE Food Storage Order is in effect throughout the NCDE recovery zone and several areas outside of the recovery zone on National Forest lands and Glacier National Park. These agencies have been successful at managing attractants on federal lands under the current NCDE food storage order.

- Montana Fish, Wildlife and Parks' bear specialist program is expected to continue to work with the public to reduce risks to grizzly bears on private and public lands. In cooperation with other agencies, this program has made notable strides toward an informed public and reduced the availability of attractants to grizzly bears on private and public lands.

- The NCDE encompasses 5.7 million acres, of which 1.7 million acres is wilderness and 962,000 acres is Glacier National Park, which contains highest quality grizzly bear habitat. Considering these lands only, nearly half of the NCDE is essentially roadless or free of motorized use (47 percent). Further, the Flathead National Forest, which makes up 40 percent of the NCDE recovery zone, currently contributes approximately 1.5 million acres of additional grizzly bear core area. The four other National Forests in the NCDE also provide additional substantial core areas. Considering core area and all other lands, the NCDE recovery zone encompasses a total of over 9,500 square miles.

- The majority of the NCDE is managed by the National Forest and National Park Service, whose access management outside of wilderness areas or otherwise protected area is directly based on IGBC Guidelines. The current access management conditions on Federal lands across the ecosystem have contributed to the recovery of grizzly bears in the NCDE.

- Despite the growth of the human population and the increase in the number of grizzly bear-human conflicts and grizzly bear mortalities, the preponderance of evidence suggests an increasing number of grizzly bears in the NCDE recovery zone: a total population estimate of 998 grizzly bears U.S. Fish and Wildlife Service et al. 2013), an estimated positive population trend of three percent annually (Mace and Roberts 2011) and the current distribution of grizzly bears (Mace and Roberts 2012). Based on the best available information, the Service concludes that the status of the NCDE grizzly bear population is robust and nearing 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. The NCDE recovery zone is adequate for managing and promoting the recovery and survival of these grizzly bear populations (U.S. Fish and Wildlife Service 1993). Areas within the recovery zones are managed to provide and conserve grizzly bear habitat. 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. Multiple use lands are managed with grizzly bear recovery as a primary factor. As anticipated in the Recovery Plan, the NCDE grizzly bear population has responded to these conditions, has stabilized and is increasing, and is at or near recovered levels. In addition, the grizzly bears have been expanding and continue to expand their existing range outside of the recovery zones, as evidenced by the verified records of grizzly bears on or near portions of the action area.

The Divide Travel Plan action area is located completely outside of the recovery zone. Grizzly bears outside the recovery zone likely experience a higher level of adverse impacts due to land management actions than do grizzly bears inside. As anticipated in the recovery plan, we expect more grizzly bears will inhabit the Forest in the future. We expect grizzly bears will occur outside of the recovery zone at lower densities than within the recovery zone as a result of suboptimal habitat conditions, which include higher road densities, fewer areas secure from motorized access, and more human presence. While adverse effects may occur on some of the individual grizzly bears using the action area now and into the future, considering the large size of the NCDE recovery zone, favorable land management within the recovery zone, and the robust status of this grizzly bear population, adverse effects on grizzly bears as a result of the proposed Travel Plan would not have negative effects on the status of the NCDE grizzly bear population. This population is robust, the recovery zone is large, and management within the recovery zone favors the needs of grizzly bears. These results signal successful federal land management related to grizzly bear recovery under the strategy detailed in the 1993 Recovery Plan. Therefore, we conclude that the distribution, reproduction, or numbers of grizzly bears in the NCDE are not likely to be reduced.

Because the proposed Travel Plan would not reduce the reproduction, numbers, or distribution of grizzly bears in the NCDE, and considering the status of the NCDE grizzly bear population, we conclude that the level of adverse effects is not reasonably expected to reduce appreciably the likelihood of both the survival and recovery of grizzly bears.

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.

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 [50 C.F.R. § 402.14(i)(3)].

Amount or Extent of Take Anticipated

High road densities and lack of core or secure areas exist across many areas within the action area. A moving windows analysis of road densities has not been completed for the action area. However, using the best information on the effects of roads and road densities on grizzly bears, we conclude high linear open motorized route densities in portions of the action area are likely to result in a level of adverse effects to some individual female grizzly bears, primarily those that attempt to establish and maintain home ranges in the action area. Adverse effects may result from displacement of grizzly bears from essential habitat. Displacement may result in significant under-use of key habitat when high linear open route densities exist on the landscape. The Service maintains that such under-use of otherwise suitable habitat within a grizzly bear’s home range may constitute incidental take of grizzly bears through “harm” as a result of significant habitat alteration that impairs breeding, feeding, and/or sheltering.

Based on research detailed earlier in this biological opinion, the Service has defined harm of grizzly bears in terms of adverse habitat conditions caused by high motorized road densities, which may displace individual female grizzly bears from key habitat to the extent that significant under-use of habitat by grizzly bears may occur. The Service maintains that such under-use of key habitats could result in a female bear’s failure to obtain adequate food resources and reduce fitness, impairing its normal reproductive potential. In other words, infrequently and in site-specific circumstances, an adult female grizzly bear wary of humans and human-generated disturbance may not breed at its potential frequency or may fail to complete gestation due to decreased fitness.

As detailed in this biological opinion, we anticipate that access management as proposed under the Travel Plan would affect only a very few adult females over the life of the Travel Plan because grizzly bears occur at low densities even in the recovery zones, are lower still outside the recovery zone, and numbers of females are expected to increase slowly over time. If subadult females move into areas of the action area seeking to establish home ranges, they would be exposed to levels of roading that would factor in to home range selection, and that level of roading would not likely significantly increase. Therefore, the take we anticipate would be harm to only a very low number of female grizzly bears that may inhabit the action area. We expect harm would be caused by significant under-use of key habitat in areas affected by high road densities to levels that result in decreased fitness and impaired reproductive potential. We do not expect all adult female grizzly bears affected by high road densities to suffer impairment of breeding, feeding, and/or sheltering, nor would we expect any female to experience permanent effects (lasting more than one reproductive cycle). Variables such as annual climate and resulting habitat and food resource conditions, the level of roading, and the number of grizzly bears using an area may change over time and are all factors influencing the displacement within a home range.

We do not anticipate any take of subadult or male grizzly bears. Male grizzly bears have larger home ranges than females, and males and subadults are more mobile and do not have the same energetic needs as adult females. We also do not anticipate take of grizzly bears that are transient (moving through areas outside of home range use). Such individuals are highly mobile and not restricted to finding food and shelter within a home range. Thus, while displacement may affect behavioral patterns such as feeding or sheltering, we do not anticipate such effects would cause injury to transient, subadult, or male grizzly bears.

The effects of high road densities on individual female grizzly bears are difficult to quantify in the short term 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 portions of the action area. 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 amount of take is difficult to quantify for the following reasons:

1) The amount of take would depend on the number of adult female grizzly bears impacted by high road densities. We lack specific information on the precise number of adult female grizzly bears that have home ranges encompassing all or portions of the action area.
2) Individual grizzly bears would react differently to the disturbance. Not all adult female bears that are exposed to disturbances from high road densities would be adversely impacted to the point of take. Low numbers of grizzly bears would likely decrease intra-specific competition for habitat, allowing more options for individuals to move within home ranges, in many cases.
3) Some individual female grizzly bears that initially may be sensitive to disturbances may over time adjust to the routine disturbances generated by human activity over time.

Therefore, determining the precise amount of incidental take, as defined by impaired reproductive potential (as affected by feeding and sheltering), is difficult. The amount of take would be also difficult to detect for the following reasons:

1) Grizzly bears are not easily detected or observed in the wild.
2) Reproductive rates of female grizzly bears vary naturally due to environmental and physiological causes.
3) A reduction in "normal" reproductive success is not discernable in the wild.
4) The reasons a grizzly bear fails to breed and/or failure to complete gestation are not discernable in the wild.

We do not expect all adult female grizzly bears affected by displacement from roads or roaded habitat to suffer impairment of breeding, feeding and/or sheltering, nor would we expect such impairment to continue for many years. Females would likely adjust their use of habitat if they encountered adverse conditions for long periods of time. Therefore we anticipate a relatively low level of incidental take of female grizzly bears.

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 bears have been recently documented. For reasons explained above, the Service anticipates that incidental take of adult female grizzly bears would be very low and occur only infrequently in the form of harm related to the displacement effects of high road densities and use of these roads.

We use the existing levels of access management and the levels of access management proposed under the Travel Plan as our **surrogate measure of incidental take**. If and when activities occur that decrease existing linear open route densities to the levels proposed in the Travel Plan, these new levels become the final measure of incidental take we anticipate related to the Travel Plan.

In other words, the amount of incidental take we anticipate is first measured by the existing access condition and we expect the amount will decrease over time to the levels proposed by the Travel Plan. Therefore, during the interim, the linear open route densities resulting from activities that decrease motorized route density and move access conditions toward the proposed Travel Plan conditions but do not meet them entirely, would represent the surrogate measure of incidental take. More specifically, once access conditions are improved by projects, those conditions must be maintained or improved, or the amount of take we anticipate over time would be exceeded.

The existing and proposed levels of roading are displayed in Table 6 below and represent the surrogate measure to limit the take we anticipate from the proposed Travel Plan. In Table 6, one column displays the existing linear open route densities and the other column displays the proposed linear open route densities. Earlier in this biological opinion, the effects section displayed these route densities by elk herd unit and provided linear open route density for both the entire elk herd unit and for the area of the elk herd unit within the Forest boundary. Since the Forest has no authority over actions on non-Forest land within the elk herd units and linear open route densities could change as a result of non-Forest actions, for the purposes of this incidental take statement we have used the linear open route density for the portions of the elk herd unit within the Forest boundary as the surrogate measure of incidental take.

We do not anticipate that motorized access management in all areas of the action area would result in incidental take. For example, some areas within the elk herd units have no motorized use or have a relatively low amount of motorized routes. Other areas within elk herd units may exhibit a high amount of motorized routes and we anticipate that the likelihood of incidental take of female grizzly bears would be highest in these areas if females occupy them.

In summary, if over the life of the Divide Travel Plan permanent increases in linear open route density depart from conditions we describe here and in Table 6, then the level of incidental take we anticipate in our surrogate measures of incidental take 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 6. Surrogate Measure of Incidental Take Related to Linear Open Route Density by Elk Herd Units within the Actin Area

Elk Herd Unit	Existing Linear Open Route Density* for area within Forest Boundary	Proposed Linear Open Route Density* for area within Forest Boundary
Little Prickly Pear – Ophir Creek	2.25	1.72
Greenhorn Mountain	2.32	1.06
Spotted Dog-Little Blackfoot	1.37	1.14
Jericho Mountain	1.91	1.67
Black Mountain -Brooklyn Bridge	1.03	1.02
Quartz Creek	1.13	1.04

*Linear open route density is displayed as miles per square mile

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 amount of incidental take described above is low. The entire action area occurs outside of the recovery zone. As detailed in this opinion, and according to the 1993 recovery plan (U.S. Fish and Wildlife Service 1993), lands outside of the recovery zones are not considered biologically necessary to recovery of the species. Further, considering the grizzly bear recovery strategies (U.S. Fish and Wildlife Service et al. 2013; U.S. Fish and Wildlife Service 1993) and the size, status, and distribution of the NCDE grizzly bear population, incidental take of grizzly bears in the action area would not affect the recovery of the NCDE grizzly bear population.

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 believes that the measures displayed in the proposed Travel Plan minimize adverse effects to grizzly bears. The following reasonable and prudent measure is necessary and appropriate to minimize the impacts of incidental take resulting from the proposed action:

1. Reduce the potential for displacement of grizzly bears within the action area

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Forest must comply with the following terms and conditions that implement the reasonable and prudent measure described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary:

To implement Reasonable and Prudent Measure #1:

1. The Forest shall follow access management direction within the proposed action.

2. The Forest shall assure that restricted roads are effectively restricted and are not being used by wheeled motorized vehicles upon route closure.

3. The Forest shall assure that closed routes used for administrative purposes are gated to the public and use is limited to Forest personnel, permittees, or contractors.

Reporting Requirements

4. To demonstrate that the Divide Travel Plan is adequately reducing the potential for and minimizing the effect of any incidental take that may result, the Forest shall complete a report with the information listed below and submit it to the Service's Montana Field Office by June 1 of each year for the preceding calendar year. The report shall include:

    a. Location and length of routes constructed, restricted, and decommissioned within the action area.
    b. The status of these routes (i.e. open or restricted) and presence of signage, barrier or closure device, if applicable, shall also be described.
    c. Linear open route density by elk herd unit for the area within the Forest boundary.

Closing statement

The Service is unable to precisely quantify the number of grizzly bears that will be incidentally taken as a result of the Divide Travel Plan. Therefore, we use a surrogate measure for the amount of take we anticipate and provide, in the incidental take statement, specific measures of the incidental take we anticipate. We use the existing levels of access management and the levels proposed under the Travel Plan as our surrogate measure of the incidental take that we anticipate as a result of the Travel Plan.

Reasonable and prudent measures, with their implementing terms and conditions, are typically designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, 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. 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. 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 action outlined in your July 31, 2015 request for consultation on the effects of the Divide Travel Plan on grizzly bears. As provided in 50 C.F.R. § 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.

LITERATURE CITED

Ake, K., D. Carney, P. Dolan, D. Godtel, J. Gore, R. Harris, R. Mace, M. Madel, C. Servheen, A. Soukkala, A. Vandehey, J. Waller, and T. Wittinger. 1998. Rationale and choices made in the review and development of an access direction proposal for the NCDE grizzly bear ecosystem. 16 pp. plus appendices.

Aune, K. A., and W. Kasworm. 1989. Final report: East front grizzly studies. Montana Dep. of Fish, Wildl. and Parks, Helena. 332pp.

Aune, K. A., and T. Stivers. 1982. Rocky Mountain front grizzly bear monitoring and investigation. Montana Dep. Fish, Wildl. and Parks, Helena. 143pp.

Bader, M. 2000. Spatial needs of grizzly bears in the U.S. Northern Rockies. Alliance for the Wild Rockies special report no. 10. Missoula, Montana. 28pp.

Benn, B. and S. Herrero. 2002. Grizzly bear mortality and human access in Banff and Yoho National Parks, 1971-98. Ursus 13:213-221.

Craighead, F.C. Jr. 1976. Grizzly bear ranges and movement as determined by radio-tracking. Pages 97-109 *in* M.R. Pelton, J.W. Lentfer, and G.E. Folk, Jr., eds. *in* Bears — their biology and management. IUCN Publ. New Series 40.

Craighead, F.C., Jr., and J.J. Craighead. 1972a. Data on grizzly bear denning activities and behavior obtained by using wildlife telemetry. Pages 94-106 *in* S. Herrero, ed. Bears - their biology and management. IUCN Publ. New Series 23.

Craighead, F.C., Jr., and J.J. Craighead. 1972b. Grizzly bear prehibernation and denning activities as determined by radio-tracking. Wildlife Monographs 32. 35 pp.

Craighead, J.J., J.S. Sumner, and J.A. Mitchell. 1995. The grizzly bears of Yellowstone: their ecology in the Yellowstone ecosystem, 1959-1992. Island Press, Washington, DC. 535 pp.

Craighead J.J., J.S. Sumner and G.B. Skaggs. 1982. A definitive system for analysis of grizzly bear habitat and other wilderness resources. West. Wildlands Inst. Found., Monogr. No.1., Univ. Montana, Missoula. 279pp.

Dood, A. R., R. D. Brannon, and R. D. Mace. 1986. Final programmatic environmental impact statement, the grizzly bear in northwestern Montana. Montana Dep. of Fish, Wildl. and Parks, Helena. 279pp.

Egbert, A.L. and A.W. Stokes. 1976. The social behavior of brown bears on an Alaskan salmon stream. Pages 41-56 *in* M.R. Pelton, J.W. Lentfer, and G.E. Folk, Jr. eds. Bears — their biology and management. IUCN Publ. New Series 40.

Gibeau, M.L, A.P. Clevenger, S. Herrero and J. Wierzchowski. 2002. Grizzly bear response to human development and activities in the Bow River Watershed, Alberta, Canada. Biological Conservation 103;227-236.

Gibeau, M. and S. Stevens. 2005. Grizzly bear response to human use. Final Report of the Eastern Slopes Grizzly Bear Project, Chapter 11, pg 182-192.

Glenn, L.P., J.W. Letfer, J.B. Faro, and L.H. Miller. 1976. Reproductive biology of female brown bears (Ursus arctos), McNeil River, Alaska. Pages 381-390 *in* M.R. Pelton, J.W. Lentfer, and G.E. Folk, Jr. eds. *in* Bears — their biology and management. IUCN Publ. New Series 40.

Greer, K.R. 1985. Montana statewide grizzly bear mortalities, 1983-84. Montana Dep. Fish, Wildl., and Parks, Helena. 51pp.

Haroldson, M.A. and K. Frey 2015. Estimating sustainability of annual grizzly bear mortalities. Pages 26-30 *in* F.T van Manen, M.A. Haroldson, and S.C. Soileau, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2014. U.S. Geological Survey, Bozeman, Montana.

Haroldson, M.A. and K. Frey 2014. Estimating sustainability of annual grizzly bear mortalities. Pages 27-31 *in* F.T van Manen, M.A. Haroldson, K. West, and S.C. Soileau, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2013. U.S. Geological Survey, Bozeman, Montana.

Haroldson, M.A. and K. Frey. 2013. Estimating sustainability of annual grizzly bear mortalities. Pages 24-30 *in* F.T. van Manen, M.A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2012. U.S. Geological Survey, Bozeman, Montana.

Haroldson, M.A., F.T. van Manen, D. Bjornlie. 2015. Estimating number of females with cubs. Pages 11-20 *in* F.T van Manen, M.A. Haroldson, and S.C. Soileau, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2014. U.S. Geological Survey, Bozeman, Montana.

Herrero, S. 1978. A comparison of some features of the evolution ecology, and behavior of black and grizzly/brown bears. Carnivore 1:7-17.

Hornocker, M.G. 1962. Population characteristics and social and reproductive behavior of the grizzly bear in Yellowstone National Park. M.S. Thesis. University of Montana, Missoula. 94 pp.

Interagency Conservation Strategy Team (ICST). 2007. Final conservation strategy for the grizzly bear in the greater Yellowstone area. ICST. 86pp.

Interagency Grizzly Bear Committee. 1986. Interagency grizzly bear guidelines. Interagency Grizzy Bear Committee, Missoula, Montana 106pp.

Interagency Grizzly Bear Committee. 1987. Grizzly bear compendium. Natl. Wildl. Fed., Washington D.C. 540pp.

Interagency Grizzly Bear Committee. 1994. Interagency Grizzly Bear Committee - Taskforce report: grizzly bear/motorized access management. U.S.D.A. Forest Service, Missoula, Montana 7pp.

Interagency Grizzly Bear Committee. 1998. Revised interagency grizzly bear taskforce report: grizzly bear/motorized access management. U.S.D.A. Forest Service, Missoula, Montana 6pp.

Jonkel, C.J. and I. McT. Cowan. 1971. The black bear in the spruce-fir forest. Wildlife Monograph 27. 57 pp.

Jonkel, J. 2008. Unpublished presentation to the NCDE subcommittee. November 5. Helena, Montana.

Jope, K.L.M. 1985. Habituation of grizzly bears to people: a hypothesis. International Conference on Bear Research and Management. 5:322-327.

Kasworm, W. F., and T. L. Manley. 1990. Road and trail influences on grizzly bears and black bears in northwest Montana. Int. Conf. Bear Res. and Manage. 8:79-84.

Kasworm, W. F., T. G. Radandt. J.E. Teisberg, M. Proctor, and C. Servheen. 2014. Cabinet-Yaak grizzly bear recovery area 2013 research and monitoring progress report. U.S. Fish and Wildlife Service, Missoula, Montana. 110 pp.

Kasworm, W., T. Radandt, J. Teisberg, M. Proctor, and C. Servheen. 2010. Cabinet-Yaak grizzly bear recovery area 2009 research and monitoring progress report. U.S. Fish and Wildlife Service. 90 pp.

Kasworm, W. F., H. Carriles, T. G. Radandt and C. Servheen. 2008. Cabinet-Yaak grizzly bear recovery area 2007 research and monitoring progress report. U.S. Fish and Wildlife Service, Missoula, Montana.

Kendall, K.C., J.B. Stetz, J. Boulanger, A.C. Macleod_D. Paetkau,, and G.C.White. 2009. Demography and genetic structure of a recovering grizzly bear population. Journal of Wildlife Management. 73(1):3-17.

Kistchinskii, A.A. 1972. Life history of the brown bear (Ursus arctos L.) In northeast Siberia. Pages 67-73 *in* S. Herrero ed. in Bears — their biology and management. IUCN Publication New Series 23.

Knight, R., B. M. Blanchard, and K. Kendall. 1981. Yellowstone grizzly bear investigations: annual report of grizzly bears. 1980. U.S.D.I. Natl. Park Serv. Interagency Grizzly Bear Study Team, Bozeman, Montana 55pp.

Mace, R. and L. Roberts. 2014. Northern Continental Divide Ecosystem grizzly bear population monitoring annual report, 2013. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mace, R. and L. Roberts. 2013. Northern Continental Divide Ecosystem grizzly bear monitoring team annual report, 2012. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mace, R. and L. Roberts. 2012. Northern Continental Divide Ecosystem grizzly bear monitoring team annual report, 2011. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mace, R. and L. Roberts. 2011. Northern Continental Divide Ecosystem grizzly bear monitoring team annual report, 2009-2010. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mace, R., K. Aune, W. Kasworm, R. Klaver, and J. Claar. 1987. Incidence of human conflicts by research grizzly bears. Wildl. Soc. Bull. 15:170-173.

Mace, R, and T. L. Manley. 1993. South Fork Flathead River grizzly bear project: progress rep. for 1992. Montana Dep. of Fish, Wildl. and Parks, Helena. 32pp.

Mace, R. and J.S. Waller. 1998. Demography and population trend of grizzly bears in the Swan Mountains, Montana. Conservation Biol. 12(5): 1005-1016.

Mace, R., J. S. Waller, T. L. Manley, L. J. Lyon, and H. Zuuring. 1996. Relationships among grizzly bears, roads and habitat on the Swan Mountains, Montana. Journal of Applied Ecology. 33: 1395-1404.

Mace, R., J.S. Waller, T.L. Manley, K. Ake, and W.T. Wittinger. 1999. Landscape evaluation of grizzly bear habitat in western Montana. Conservation Biol. 13(2): 367-377.

Mace, R. D., D. W. Carney, T. Chilton-Radandt, S. A. Courville, M. A. Haroldson, R. B. Harris, J. Jonkel, B. McLellan, M. Madel, T. L. Manley, C. C. Schwartz, C. Servheen, G. Stenhouse, J. S. Waller, E. Wenum. 2012. Grizzly bear population vital rates and trend in the Northern Continental Divide Ecosystem, Montana. Journal of Wildlife Management 76:119-128.

Madel, M. 2008. Unpublished presentation to the NCDE subcommittee. November 5. Helena, Montana.

Mattson, D. J. 1993. Background and proposed standards for managing grizzly bear habitat security in the Yellowstone ecosystem. Unpubl. Univer. of Idaho, Moscow. 17pp.

Mattson, D. J. ,B. M. Blanchard, and R. R. Knight. 1992. Yellowstone grizzly bear mortality, human habituation, and whitebark pine seed crops. J. Wildl. Manage. 56:432-442.

Mattson, D. J. and R.R. Knight. 1991. Effects of access on human-caused mortality of Yellowstone grizzly bears. U.S.D.I. Natl. Park Serv. Interagency Grizzly Bear Study Team Report 1991b, Bozeman, Montana 13pp.

Mattson, D. J., R.R. Knight, and B.M. Blanchard. 1987. The effects of developments and primary roads on grizzly bear habitat use in Yellowstone National Park, Wyoming. Int. Conf. Bear Res. and Manage. 8:57-64.

McLellan, B. N. 1989a. Effects of resource extraction industries on behavior and population dynamics of grizzly bears in the Flathead drainage, British Columbia and Montana. Ph.D. Thesis, Univ. British Columbia, Vancouver. 116pp.

McLellan, B. N. 1989b. Dynamics of a grizzly bear population during a period of industrial resource extraction. II. Mortality rates and causes of death. Can. J. Zool. 67:1861-1864.

McLellan, B.N. and F.W. Hovey. 2001. Natal dispersal of grizzly bears. Can. J. Zool. 79: 838-844.

McLellan, B. N., and R. D. Mace. 1985. Behavior of grizzly bears in response to roads, seismic activity, and people. Preliminary Rep., Can. Border Grizzly Proj., Cranbrook, B.C. 53pp.

McLellan, B. N., and D. M. Shackleton. 1988. Grizzly bears and resource-extraction industries: effects of roads on behavior, habitat use and demography. J. Applied Ecol. 25:451-460.

Montana Fish, Wildlife and Parks. 2006. Grizzly bear management plan for western Montana, final programmatic environmental impact statement 2006-2016. Montana Fish, Wildlife and Parks, Helena, Montana.

Montana Fish, Wildlife and Parks. 2013. Grizzly bear management plan for southwestern Montana 2013, final programmatic environmental impact statement. Montana Fish, Wildlife and Parks, Helena, Montana.

Mueller, C., S. Herrero, and M.L. Gibeau. 2004. Distribution of subadult grizzly bears in relation to human development in the Bow River Watershed, Alberta. Ursus 15(1):35-47.

Mundy, K.R.D. and D.R. Flook. 1973. Background for managing grizzly bears in the national parks of Canada. Canada Wildlife Service, Report Series No. 22. 35pp.

National Park Service. 2011. National Park Service Public Use Statistics Office, National Park Service, Department of the Interior. Accessed April 8, 2011. http://www.nature.nps.gov/stats/viewReport.cfm

Palmisciano, D. 1986. Grizzly mortality update. Montana Dep. of Fish, Wildl., and Parks, Bozeman. 2pp.

Pearson, A.M. 1972. Population characteristics of the northern interior grizzly in the Yukon Territory, Canada. Pages 32-35 *in* S. Herrero, ed. Bears — Their biology and management. IUCN Publ. New Series 23.

Proctor, M. F., D. Paetkau, B. N. McLellan, G. B. Stenhouse, K. C. Kendall, R. D. Mace, W. F. Kasworm, C. Servheen, C. L. Lausen, M. L. Gibeau, W. L. Wakkinen, M. A. Haroldson, G. Mowat, C. D. Apps, L. M. Ciarniello, R. M. R. Barclay, M. S. Boyce, C. C. Swartz, C. Strobeck. 2012. Population fragmentation and inter-ecosystem movements of grizzly bears in western Canada and the northern United States. Wildlife Monographs 180:1-46.

Proctor, M. F., B. N. McLellan, C. Strobeck, and R. M. R. Barclay. 2004. Gender-specific dispersal distances of grizzly bears estimated by genetic analysis. Canadian Journal of Zoology 1108-1118.

Rogers, L.L. and S.M. Rogers. 1976. Parasites of bears: a review. Pages 411-430 *in* M.R. Pelton, J.W. Lentfer, and G.E. Folk eds. Bears — their biology and management. IUCN Publ. New Series 40.

Russell, R.H., J.W. Nolan, N.G. Woody, G. Anderson, and A.M. Pearson. 1978. A study of the grizzly bear (*Ursus arctos*) in Jasper National Park. Canada Wildlife Service, Edmonton. 95 pp.

Schwartz, C.C., M.A. Haroldson, G.C. White, R.B. Harris, S. Cherry, K.A. Keating, D. Moody, C. Servheen. 2006. Temporal, spatial, and environmental influences on the demographics of grizzly bears in the Greater Yellowstone Ecosystem. Wildlife Monographs 161: 1–68.

Schwartz, C.C., K.A. Keating, H.V. Reynolds, V.G. Barnes, R.A. Sellers, J.E. Swenson, S.D. Miller, B.N. McLellan, J. Keay, R. McCann, M. Gibeau, W.F. Wakkinen, R.D. Mace, W. Kasworm, R. Smith, and S. Herrero. 2003. Reproductive maturation and senescence in the female brown bear. Ursus. 14(2): 109 - 119.

Servheen, C. 1981. Grizzly bear ecology and management in the Mission Mountains, Montana Ph.D. Diss., Univ. Montana, Missoula. 139pp.

Servheen, C. 1986. Habitat research needs for grizzly bear recovery. Pages 14-18 in: B.P. Contreras and K. E. Evans, eds. Proc. Grizzly Bear Habitat Symposium. U.S.D.A. For. Serv. Intermountain Res. Stat., Ogden, Utah, Gen. Tech. Rep. Int-207.

Tyers, D. Unpublished 2006. Draft New World Mine rehabilitation and bears in the Cooke City Basin. Gardiner, Montana. 42pp.

U.S. Fish and Wildlife Service. 1993. Grizzly bear recovery plan. U.S.D.I. Fish and Wildl. Serv., Missoula, Montana. 181pp.

U.S. Fish and Wildlife Service. 2000. Grizzly Bear Recovery in the Bitterroot ecosystem - final environmental impact statement. U.S.D.I Fish and Wildl, Serv., Missoula, Montana. 766 pp.

U.S. Fish and Wildlife Service. 2007. News release – successful recovery efforts bring Yellowstone grizzly bears off the endangered list. U.S. Fish and Wildlife Service, Washington, DC. 3pp.

U.S. Fish and Wildlife Service. 2010. NCDE human-caused mortality issues – updated December 2010. Unpublished report. U.S. Fish and Wildlife Service Grizzly Bear Recovery. Missoula, Montana.

U.S. Fish and Wildlife Service. 2013. NCDE human-caused mortality issues – updated November 2012. Unpublished report. U.S. Fish and Wildlife Service Grizzly Bear Recovery. Missoula, Montana.

U.S. Fish and Wildlife Service. 2013a. Grizzly bear recovery plan, draft revised supplement: revised demographic recovery criteria for the Yellowstone Ecosystem. U.S. Fish and Wildlife Service, Missoula, Montana.

U.S. Fish and Wildlife Service, U.S. Forest Service, Montana Fish, Wildlife & Parks, National Park Service, U.S. Geological Survey Biological Resources Division, Bureau of Land Management, Montana Department of Natural Resources, Confederated Salish and Kootenai Tribes, and Blackfeet Nation. 2013. DRAFT NCDE grizzly bear conservation strategy. April 2013.

U.S. Forest Service. 1986. Helena National Forest Plan. U.S.D.A. Forest Serv., Helena National Forest, Helena, Montana.

U.S. Forest Service. 1994a. Biological Assessment - Flathead LRMP amendment #19. U.S. Department of Agriculture, Forest Service, Flathead National Forest, Kalispell, Montana. 35pp.

U.S. Forest Service. 1994b. Environmental Assessment - Flathead LRMP amendment #19: objectives and standards for grizzly bear management and timber production. U.S. Department of Agriculture, Forest Service, Flathead National Forest, Kalispell, Montana. 392pp.

U.S. Forest Service. 2015. Biological assessment for terrestrial wildlife species, Divide travel plan, including supplemental information received during consultation. Helena Ranger District, Helena National Forest. U.S.D.A. Forest Serv., Helena National Forest, Helena, Montana.

U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Geological Survey, Montana Fish, Wildlife and Parks, Wyoming Game and Fish, Idaho Fish and Game, Blackfeet Tribe, Confederated Salish and Kootenai Tribe, and Washington Department of Fish. 2002. Grizzly bear distribution draft line September 2002. Maps were digitized and reproduced it in a GIS format by the U.S. Forest Service, Regional Office, Missoula, Montana.

van Manen, F.T., M.A. Haroldson, and S.C. Soileau, editors. 2015. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2014. U.S. Geological Survey, Bozeman, Montana.

Waller, J.S. and C. Servheen. 2005. Effects of transportation infrastructure on grizzly bears in northwestern Montana. Journal of Wildlife Management 69(3):985-1000.

Waser, P.M. and W.T. Jones. 1983. Natal philopatry among solitary mammals. The Quarterly Rev. of Biol. 58: (355-390).

Yonge, S.R. 2001. The ecology of grizzly bears and black bears in the Cooke City, Montana area. M.S. Thesis, Montana State University, Bozeman, Montana.

Zager, P. E. 1980. The influence of logging and wildfire on grizzly bear habitat in northwestern Montana. Ph.D. Diss., Univ. of Montana, Missoula. 131pp

Endangered Species Act - Section 7 Consultation

BIOLOGICAL OPINION

on

Effects to Bull Trout from the Divide Travel Plan

Helena National Forest

2016

Agency:	U.S. Forest Service Helena National Forest Helena Ranger District
Consultation Conducted by: Montana Field Office	U.S. Fish and Wildlife Service
Date Issued:	February 29, 2016

Table of Contents

I. Introduction

This biological opinion addresses project related effects to the threatened bull trout (*Salvelinus confluentus*) in accordance with the Endangered Species Act (Act) of 1973 as amended (16 U.S.C. 1531 et seq.). The U.S. Fish and Wildlife Service (Service) based this opinion on our review of the biological assessment (BA) prepared for the Divide Travel Plan Project by the Helena National Forest (Forest), additional information provided during consultation, and information in our files.

Section 7(b)(3)(A) of the Act requires that the Secretary of Interior issue biological opinions on federal agency actions that may 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 jeopardize the continued existence of listed species or result in an adverse modification of any designated critical habitat.

This biological opinion addresses only impacts to the federally listed bull trout within the action area and does not address the overall environmental acceptability of the proposed action.

Consultation History: In 1998, the Service issued the *Biological Opinion for the Effects to Bull Trout from the Continued Implementation of Land and Resource Management Plans and Resource Management Plans (LRMPs) as Amended by the Interim Strategies for Managing Fish Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana and portions of Nevada (INFISH) and the Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho and portions of California* (LRMP biological opinion, PACFISH/INFISH, U.S. Fish and Wildlife Service 1998a). The biological opinion analyzed Forest Service and Bureau of Land Management (BLM) LRMPs, as modified by PACFISH and INFISH, for the Columbia and Klamath River bull trout Interim Recovery Units/DPSs (IRU). The LRMP biological opinion also analyzed seven additional commitments to the proposed action and concluded that successful implementation of the additional commitments agreed to by the Forest Service and BLM will sufficiently modify the proposed action to a degree where it is not likely to jeopardize bull trout in the Columbia River and Klamath River DPSs.

The 1998 LRMP biological opinion concluded that the indefinite extension of INFISH aquatic conservation strategies would delay the recovery of bull trout and increase the risk that key population segments would be irretrievably lost by maintaining a fragmented network of degraded habitats where bull trout presently exist (U.S. Fish and Wildlife Service 1998a). The LRMP lacked a comprehensive management strategy and timeframe to protect and restore bull trout watersheds. As a result, effects of past and then-current land management activities would maintain most managed watersheds in an at-risk or non- functional condition for bull trout.

Roads often contribute to degraded baseline conditions in watersheds containing bull trout. They have been, and continue to be a primary source of sediment impacts to developed watersheds (Furniss et al. 1991). Lee et al. (1997) found a pattern of decreasing strong populations of bull trout with increasing road density. The LRMP biological opinion requires the Forest Service and BLM to minimize and reduce effects of roads (see U.S. Fish and Wildlife Service 1998a RF-1 through RF-5). However, the LRMP biological opinion only addresses the impacts of roads in general and does not address site-specific impacts.

In 2005, the National Travel Management Rule (U.S. Forest Service 2005) required national forests and grasslands to formally designate roads, trails, and areas open to motorized vehicles. The 2005 travel rule also prohibits motor vehicle use off designated system routes and areas. To assist with the decision-making process under the 2005 rule, the Forest completed a coarse-scale analysis of the road network in 2015 (U.S. Forest Service 2015). The Divide Travel Plan provides an administrative decision determining roads, trails and areas that would be open for wheeled and over-snow motorized vehicle use in the Divide Travel Plan area of the Forest.

The Service received a preliminary biological assessment on effects to bull trout from the Divide Travel Plan and a request for formal consultation from the Forest on July 27, 2015. On December 17, the Service received final revisions to the Divide Travel Plan and results of the previous summers sampling efforts updating the occurrence of bull trout in the project area. The biological assessment analyzes the impacts to bull trout from the proposed designated system of roads and trails open to motorized use during summer and winter. The Service received a revised letter requesting formal consultation on December 28, 2015.

II. Description of the Proposed Action

Action Area: The action area is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02). It is based upon the geographic extent of the physical, chemical, and biological effects to land, air, and waters resulting from the proposed action, including direct and indirect effects. For bull trout, 5th or 6th field Hydrologic Unit Code (HUC) watersheds are the recommended analysis scale (U.S. Fish and Wildlife Service 1998). Consistent with this recommended scale of analysis, watershed baseline conditions (e.g. U.S. Forest Service 2000, U.S. Forest Service 2010) and the Conservation Strategy for Bull Trout on USFS lands in Western Montana (U.S. Forest Service 2013) occur at the 6th field sub-watershed scale.

Decisions under the Divide Travel Plan would occur on Forest lands within a portion of the Helena Ranger District of the Forest. The planning area encompasses all or part of twenty-six 6th field HUC's. Five HUC's were excluded from analysis because the planning area only overlaps small amounts of these sub-watersheds where no streams and/or roads will be would be affected. Six HUC's located east of the continental divide were also excluded from analysis because they are outside the Columbia Headwaters Recovery Unit, and do not affect bull trout or its critical habitat. The BA and this biological opinion address effects to bull trout from the proposed action for the remaining 15 HUC's. These HUCs make up the action area for bull trout and bull trout critical habitat for the Proposed Action.

Proposed Actions: The Proposed Action (Revised Alternative 5) is an administrative decision that does not include any ground disturbing or physical changes to the transportation system. It addresses both summer and winter travel in the Divide Travel Plan area. Changes related to open route/area designations and restrictions would occur from regulations shown on the 2006 Helena National Forest Travel Plan Map. The following summary of proposed actions was taken from the amendment to the biological assessment incorporating changes to Alternative 5 as originally proposed. The Propose Action will:

a. Simplify the current Forest visitor travel restriction codes by reducing the number of seasonal route restrictions from seventeen to two (i.e. open 5/16-10/14 or 5/16-8/31).

b. Designate 170 miles of National Forest System Road (NFSR) open to highway legal vehicles from the current 415 miles. Of the 170 miles roads open to highway legal vehicles, three (3) miles would be designated open seasonally from 5/16-10/14.

c. Designate 53 miles of National Forest System Trails (NFST) open to vehicles 50” or less in width (e.g. ATVs/OHVs) from the current 20 miles. Most all of the increased miles would be existing routes converted to trails open to ATVs (50” or less wide). About 12 miles would be open year-round; 36 miles would be seasonally open 5/16-8/31; and five miles would be seasonally open 5/16-10/14. This involves redesign of existing routes and additions of short connecting routes to provide increased loop opportunities.

d. Close all unauthorized user created motorized trails from the current 16 miles to 0 miles.

e. Designate 86,600 acres opened to motorized over-snow vehicles (12/2-5/15) from the current 122,844 acres. Appendix A of the BA shows Alternative 5 changes to existing condition including proposed motorized over-snow travel areas (light green), and areas restricted to over-snow motorized use (dark green).

f. Restrict areas open to motorized over-snow travel areas from 12/2 to 5/15 instead of 12/2-10/14 or year-round under current conditions.

g. Designate 183 miles of roads open exclusively for motorized over-snow use from the current 69 miles. (Note: The additional miles are derived from existing roads within areas open to over-snow vehicle use. Allowing over-snow vehicles on those existing closed routes makes them consistent with the current over-snow motorized use designation either side of the road prism, while remaining closed year-long to wheeled motorized vehicles.)

h. Limit parking up to 30 feet from a designated route, and motor vehicle use/parking associated with dispersed camping would be limited up to 70 feet from the edge of a designated route as long as: (1) no new permanent routes are created, (2) no damage to live trees and shrubs, no rutting of soils, and no damage to streambanks occurs, (3) travel off-route does not cross streams, (4) travel off-route does not traverse wet or riparian areas, and (5) travel to dispersed campsites comes no closer than 30 feet of a stream or other body of water.

III. Analytical Framework for the Jeopardy and Adverse Modification Determinations

Jeopardy Determination: In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which evaluates the bull trout’s range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the bull trout in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the bull trout; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the bull trout; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities reasonably certain to occur in the action area on the bull trout. In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the bull trout's current status, taken together with cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the bull trout in the wild.

Recovery Units (RUs) for the bull trout were defined in the final Recovery Plan for the Coterminus United States Population of [the] Bull Trout (U.S. Fish and Wildlife Service 2015). Pursuant to Service policy, when a proposed Federal action impairs or precludes the capacity of a RU from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, the biological opinion describes how the proposed action affects not only the capability of the RU, but the relationship of the RU to both the survival and recovery of the listed species as a whole.

The jeopardy analysis for the bull trout in this biological opinion considers the relationship of the action area and affected core areas (discussed below under the Status of the Species section) to the RU and the relationship of the RU to both the survival and recovery of the bull trout as a whole as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Within the above context, the Service also considers how the effects of the proposed Federal action and any cumulative effects impact bull trout local and core area populations in determining the aggregate effect to the RU(s). Generally, if the effects of a proposed Federal action, taken together with cumulative effects, are likely to impair the viability of a core area population(s) such an effect is likely to impair the survival and recovery function assigned to a RU(s) and may represent jeopardy to the species (70 CFR 56258).

Adverse Modification Determination: The adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat for the bull trout in terms of primary constituent elements (PCEs); the factors responsible for that condition and the intended recovery function of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how those effects are likely to influence the recovery role of affected critical habitat units or subunits; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how those effects are likely to influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on bull trout critical habitat are evaluated in the context of the range-wide condition of the critical habitat, together with any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the bull trout.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of bull trout critical habitat, especially in terms of maintaining and/or restoring habitat conditions that are necessary to support viable core area populations, and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

IV. Status of the Species and Critical Habitat

This section provides information about the bull trout's life history, habitat preferences, geographic distribution, population trends, threats, and conservation needs. This includes description of the effects of past human activities and natural events that have led to the current status of the bull trout. This information provides the background for analyses in later sections of the biological opinion.

A. Status of the Species

A.1 Listing Status

The coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (U.S. Fish and Wildlife Service 1999, 64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon; the Jarbidge River in Nevada; the Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Bond 1992; Brewin and Brewin 1997; Cavender 1978; Howell and Buchanan 1992; Leary and Allendorf 1997; U.S. Fish and Wildlife Service 1999, 64 FR 58910).

The final listing rule for the United States coterminous population of the bull trout discusses the consolidation of five DPSs into one listed taxon and the application of the jeopardy standard under section 7 of the Endangered Species Act (Act) relative to this species, and established five interim recovery units for each of these DPSs for the purposes of Consultation and Recovery (U.S. Fish and Wildlife Service 1999, 64 FR 58930).

Six draft recovery units were identified based on new information (U.S. Fish and Wildlife Service 2010, 75 FR 63898) that confirmed they were needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity. The final bull trout recovery plan (U.S. Fish and Wildlife Service 2015) formalized these six recovery units. The final recovery units replace the previous five interim recovery units and will be used in the application of the jeopardy standard for Section 7 consultation procedures.

A.2 Reasons for Listing and Emerging Threats

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (U.S. Fish and Wildlife Service 1999, 64 FR 58910). Poaching and incidental mortality of bull trout during other targeted fisheries are additional threats. Since the time of coterminous listing of the species (U.S. Fish and Wildlife Service 1999, 64 FR 58910) and designation of its critical habitat (U.S. Fish and Wildlife Service 2004, 69 FR 59996; U.S. Fish and Wildlife Service 2005, 70 FR 56212; 2010, 75 FR 63898) a great deal of new information has been collected on the status of bull trout. The Service's Science Team Report (Whitesel et al 2004), the bull trout core areas templates (U.S. Fish and Wildlife Service 2005a, 2009), Conservation Status Assessment (U.S. Fish and Wildlife Service 2005b), and 5-year Review (U.S. Fish and Wildlife Service 2008, 2015) have provided additional information about threats and status. The final recovery plan lists many other documents and meetings that compiled information about the status of bull trout (U.S. Fish and Wildlife Service 2015). As did the prior 5-year review (2008), the current draft final 5-year status review maintains the listing status as threatened based on the information compiled in the final bull trout recovery plan (U.S. Fish and Wildlife Service 2015) and the recovery unit implementation plans (U.S. Fish and Wildlife Service 2015a-f)

When first listed, the status of bull trout and its threats were reported by the Service at subpopulation scales. In 2002 and 2004, the draft recovery plans (U.S. Fish and Wildlife Service 2002, 2004a, 2004b) included detailed information on threats at the recovery unit scale (i.e. similar to subbasin or regional watersheds), thus incorporating the metapopulation concept with core areas and local populations. In the 5- year Review, the Service established threats categories (i.e. dams, forest management, grazing, agricultural practices, transportation networks, mining, development and urbanization, fisheries management, small populations, limited habitat, and wild fire) (U.S. Fish and Wildlife Service 2008, U.S. Fish and Wildlife Service 2015).

Currently, in the final recovery plan, threats are described at a recovery unit scale that typically incorporates multiple watersheds, and describes threats for 109 core areas, local populations, forage/migration/overwintering areas, and includes research needs areas (U.S. Fish and Wildlife Service 2015).

The final recovery plan (U.S. Fish and Wildlife Service 2015) and associated recovery unit implementation plans (RUIPs) (U.S. Fish and Wildlife Service 2015a-f) further identified primary threats affecting bull trout as historical habitat loss and fragmentation, interaction with nonnative species, and fish passage.

The 2015 draft 5-year status review references the final recovery plan and the recovery unit implementation plans and incorporates by reference the threats described therein (U.S. Fish and Wildlife Service 2015). The review maintains that the threats have not been removed and thus the listing status should remain as "threatened" (U.S. Fish and Wildlife Service 2015).

Emerging Threats: Climate change was not addressed as a known threat when bull trout was listed. The 2015 bull trout recovery plan and RUIPs summarize the threat of climate change and acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time due to anthropogenic climate change effects, and use of best available information will ensure future conservation efforts that offer the greatest long-term benefit to sustain bull trout and their required coldwater habitats (U.S. Fish and Wildlife Service 2015, U.S. Fish and Wildlife Service 2015a-f). Mote et al. (2014) summarized climate change effects to include rising air temperature, changes in the timing of streamflow related to changing snowmelt, increases in extreme precipitation events, lower summer stream flows, and other changes. A warming trend in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, reduce summer stream flows, and increase summer water temperatures (Poff et al. 2002, Nelson and Palmer 2007, Koopman et al. 2009). Lower flows as a result of smaller snowpack could reduce habitat, which might adversely affect bull trout reproduction and survival. Warmer water temperatures could lead to physiological stress and could also benefit nonnative fishes that prey on or compete with bull trout. Increases in the number and size of forest fires could also result from climate change (Westerling et al. 2006) and could adversely affect watershed function by resulting in faster runoff, lower base flows during the summer and fall, and increased sedimentation rates. Lower flows also may result in increased groundwater withdrawal for agricultural purposes and resultant reduced water availability in certain stream reaches occupied by bull trout (U.S. Fish and Wildlife Service 2015c). Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Battin et al. 2007; Rieman et al. 2007). Climate change is expected to reduce the extent of cold water habitat (Isaak et al. 2015), and increase competition with other fish species (lake trout, brown trout, brook trout, and northern pike) for resources in remaining suitable habitat. Several authors project that brook trout, a fish species that competes for resources with and predates on the bull trout, will continue increasing their range in several areas (an upward shift in elevation) due to the effects from climate change (Wenger et al. 2011, Isaak et al. 2010, 2014, Peterson et al. 2013).

A.3 Life History and Population Dynamics

Distribution: The historical range of bull trout includes major river basins in the Pacific Northwest at about 41 to 60 degrees North latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978; Bond 1992). To the west, the bull trout's range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992). Bull trout occur in portions of the Columbia River and tributaries within the basin, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south-central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and Montana and in the MacKenzie River system in Alberta and British Columbia, Canada (Cavender 1978; Brewin and Brewin 1997).

Reproductive Biology: The iteroparous reproductive strategy (fishes that spawn multiple times, and therefore require safe two-way passage upstream and downstream) of bull trout has important repercussions for the management of this species. Bull trout require passage both upstream and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous salmonids (fishes that spawn once and then die, and require only one-way passage upstream). Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a safe downstream passage route. Additionally, in some core areas, bull trout that migrate to marine waters must pass both upstream and downstream through areas with net fisheries at river mouths. This can increase the likelihood of mortality to bull trout during these spawning and foraging migrations.

Growth varies depending upon life-history strategy. Resident adults range from 6 to 12 inches total length, and migratory adults commonly reach 24 inches or more (Goetz 1989; Pratt 1985). The largest verified bull trout is a 32-pound specimen caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982).

Bull trout typically spawn from August through November during periods of increasing flows and decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989; Pratt 1992; Rieman and McIntyre 1996). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992). After hatching, fry remain in the substrate, and time from egg deposition to emergence may surpass 220 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992; Ratliff and Howell 1992).

Early life stages of fish, specifically the developing embryo, require the highest inter-gravel dissolved oxygen (IGDO) levels, and are the most sensitive life stage to reduced oxygen levels. The oxygen demand of embryos depends on temperature and on stage of development, with the greatest IGDO required just prior to hatching.

A literature review conducted by the Washington Department of Ecology (WDOE 2002) indicates that adverse effects of lower oxygen concentrations on embryo survival are magnified as temperatures increase above optimal (for incubation). Normal oxygen levels seen in rivers used by bull trout during spawning ranged from 8 to 12 mg/L (in the gravel), with corresponding instream levels of 10 to 11.5 mg/L (Stewart et al. 2007). In addition, IGDO concentrations, water velocities in the water column, and especially the intergravel flow rate, are interrelated variables that affect the survival of incubating embryos (ODEQ 1995). Due to a long incubation period of 220+ days, bull trout are particularly sensitive to adequate IGDO levels. An IGDO level below 8 mg/L is likely to result in mortality of eggs, embryos, and fry.

Population Structure: Bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs (Goetz 1989). Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989; Goetz 1989), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005; McPhail and Baxter 1996; WDFW et al. 1997). Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. They are iteroparous (they spawn more than once in a lifetime). Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989; Leathe and Graham 1982; Pratt 1992; Rieman and McIntyre 1996).

Bull trout are naturally migratory, which allows them to capitalize on temporally abundant food resources and larger downstream habitats. Resident forms may develop where barriers (either natural or manmade) occur or where foraging, migrating, or overwintering habitats for migratory fish are minimized (Brenkman and Corbett 2005; Goetz et al. 2004). For example, multiple life history forms (e.g., resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002). Parts of this river system have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem Snake River. Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits to migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999; MBTSG 1998; Rieman and McIntyre 1993). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger size fish with higher fecundity is lost (Rieman and McIntyre 1993).

Whitesel et al. (2004) noted that although there are multiple resources that contribute to the subject, Spruell et al. (2003) best summarized genetic information on bull trout population structure. Spruell et al. (2003) analyzed 1,847 bull trout from 65 sampling locations, four located in three coastal drainages (Klamath, Queets, and Skagit Rivers), one in the Saskatchewan River drainage (Belly River), and 60 scattered throughout the Columbia River Basin. They concluded that there is a consistent pattern among genetic studies of bull trout, regardless of whether examining allozymes, mitochondrial DNA, or most recently microsatellite loci. Typically, the genetic pattern shows relatively little genetic variation within populations, but substantial divergence among populations. Microsatellite loci analysis supports the existence of at least three major genetically differentiated groups (or evolutionary lineages) of bull trout (Spruell et al. 2003). They were characterized as:

1. “Coastal”, including the Deschutes River and all of the Columbia River drainage downstream, as well as most coastal streams in Washington, Oregon, and British Columbia. A compelling case also exists that the Klamath Basin represents a unique evolutionary lineage within the coastal group.

2. “Snake River”, which also included the John Day, Umatilla, and Walla Walla rivers. Despite close proximity of the John Day and Deschutes Rivers, a striking level of divergence between bull trout in these two systems was observed.

3. “Upper Columbia River” which includes the entire basin in Montana and northern Idaho. A tentative assignment was made by Spruell et al. (2003) of the Saskatchewan River drainage populations (east of the continental divide), grouping them with the upper Columbia River group.

Spruell et al. (2003) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Spruell et al. (2003) and the biogeographic analysis of Haas and McPhail (2001). Both Taylor et al. (1999) and Spruell et al. (2003) concluded that the

Deschutes River represented the most upstream limit of the coastal lineage in the Columbia River Basin.

More recently, the U.S. Fish and Wildlife Service identified additional genetic units within the coastal and interior lineages (Ardren et al. 2011). Based on a recommendation in the U.S. Fish and Wildlife Service's 5-year review of the species' status (U.S. Fish and Wildlife Service 2008), the U.S. Fish and Wildlife Service reanalyzed the 27 recovery units identified in the 2002 draft bull trout recovery plan (U.S. Fish and Wildlife Service 2002) by utilizing, in part, information from previous genetic studies and new information from additional analysis (Ardren et al. 2011). In this examination, the U.S. Fish and Wildlife Service applied relevant factors from the joint U.S. Fish and Wildlife Service and NMFS Distinct Population Segment (DPS) policy (U.S. Fish and Wildlife Service 1996) and subsequently identified six draft recovery units that contain assemblages of core areas that retain genetic and ecological integrity across the range of bull trout in the coterminous United States. These six draft recovery units were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (U.S. Fish and Wildlife Service 2010). The six draft recovery units identified for bull trout in the coterminous United States include: Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake. These six draft recovery units are described and identified in the final bull trout recovery plan (U.S. Fish and Wildlife Service 2015) and RUIPs (U.S. Fish and Wildlife Service 2015a-f).

Population Dynamics: Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989; Burkey 1995).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Rieman and McIntyre 1993; Dunham and Rieman 1999, Rieman and Dunham 2000). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations; local populations are for the most part independent and represent discrete reproductive units; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman and Dunham 2000). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Rieman and Clayton 1997; Dunham and Rieman 1999; Spruell et al. 1999; Rieman and Dunham 2000).

Human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring (e.g., a balance between local extirpations and recolonizations) across the range of the bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000). Research does, however, provide genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River Basin of Idaho (Whiteley et al. 2003), while Whitesel et al. identifies that bull trout fit the metapopulation theory in several ways (Whitesel et al, 2004).

Habitat Characteristics: The habitat requirements of bull trout are often generally expressed as the four "Cs": cold, clean, complex, and connected habitat. Cold stream temperatures, clean water quality that is relatively free of sediment and contaminants, complex channel characteristics (including abundant large wood and undercut banks), and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout throughout all hierarchical levels.

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993). Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and migratory corridors (Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Howell and Buchanan 1992; Pratt 1992; Rich 1996; Rieman and McIntyre 1993; Rieman and McIntyre 1995; Sedell and Everest 1991; Watson and Hillman 1997). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear and that these specific characteristics are not necessarily present throughout these watersheds. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993), bull trout should not be expected to simultaneously occupy all available habitats.

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout (Rieman and McIntyre 1993). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants. However, it is important to note that the genetic structuring of bull trout indicates there is limited gene flow among bull trout populations, which may encourage local adaptation within individual populations, and that reestablishment of extirpated populations may take a long time (Rieman and McIntyre 1993; Spruell et al. 1999). Migration also allows bull trout to access more abundant or larger prey, which facilitates growth and reproduction. Additional benefits of migration and its relationship to foraging are discussed below under "Diet."

Cold water temperatures play an important role in determining bull trout habitat quality, as these fish are primarily found in colder streams, and spawning habitats are generally characterized by temperatures that drop below 9 °C in the fall (Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1993).

Thermal requirements for bull trout appear to differ at different life stages. Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993). Optimum incubation temperatures for bull trout eggs range from 2 °C to 6 °C whereas optimum water temperatures for rearing range from about 6 °C to 10 °C (Buchanan and Gregory 1997; Goetz 1989). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a plunge pool, 8 °C to 9 °C, within a temperature gradient of 8 °C to 15 °C. In a landscape study relating bull trout distribution to maximum water temperatures, Dunham et al. (2003) found that the probability of juvenile bull trout occurrence does not become high (i.e., greater than 0.75) until maximum temperatures decline to 11 °C to 12 °C.

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Buchanan and Gregory 1997; Fraley and Shepard 1989; Rieman and McIntyre 1993; Rieman and McIntyre 1995). Availability and proximity of cold water patches and food productivity can influence bull trout ability to survive in warmer rivers (Myrick 2002).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Pratt 1992; Rich 1996; Sedell and Everest 1991; Sexauer and James 1997; Thomas 1992; Watson and Hillman 1997). Maintaining bull trout habitat requires natural stability of stream channels and maintenance of natural flow patterns (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989; Pratt 1992; Pratt and Huston 1993). Pratt (1992) indicated that increases in fine sediment reduce egg survival and emergence.

Diet: Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Fish growth depends on the quantity and quality of food that is eaten, and as fish grow their foraging strategy changes as their food changes, in quantity, size, or other characteristics (Quinn 2005). Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987; Donald and Alger 1993; Goetz 1989). Subadult and adult migratory bull trout generally feed on various fish species (Donald and Alger 1993; Fraley and Shepard 1989; Leathe and Graham 1982). Bull trout of all sizes other than fry have been found to eat fish half their length (Beauchamp and VanTassell 2001). In nearshore marine areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) (Goetz et al. 2004; WDFW et al. 1997).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies and their environment. Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources. For example, in the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (WDFW et al. 1997). Anadromous bull trout also use marine waters as migration corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005; Goetz et al. 2004).

A.4 Conservation Status and Needs

The 2015 recovery plan for bull trout established the primary strategy for recovery of bull trout in the coterminous United States: (1) conserve bull trout so that they are geographically widespread across representative habitats and demographically stable in six recovery units; (2) effectively manage and ameliorate the primary threats in each of six recovery units at the core area scale such that bull trout are not likely to become endangered in the foreseeable future; (3) build upon the numerous and ongoing conservation actions implemented on behalf of bull trout since their listing in 1999, and improve our understanding of how various threat factors potentially affect the species; (4) use that information to work cooperatively with our partners to design, fund, prioritize, and implement effective conservation actions in those areas that offer the greatest long-term benefit to sustain bull trout and where recovery can be achieved; and (5) apply adaptive management principles to implementing the bull trout recovery program to account for new information (U.S. Fish and Wildlife Service 2015).

Information presented in prior draft recovery plans published in 2002 and 2004 (U.S. Fish and Wildlife Service 2002, 2004, 2004a) have served to identify recovery actions across the range of the species and to provide a framework for implementing numerous recovery actions by our partner agencies, local working groups, and others with an interest in bull trout conservation.

The 2015 recovery plan (U.S. Fish and Wildlife Service 2015) integrates new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, etc., and integrates and updates previous bull trout recovery planning efforts across the range of the single DPS listed under the Act.

The Service has developed a recovery approach that: (1) focuses on the identification of and effective management of known and remaining threat factors to bull trout in each core area; (2) acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time; and (3) identifies and focuses recovery actions in those areas where success is likely to meet our goal of ensuring the certainty of conservation of genetic diversity, life history features, and broad geographical representation of remaining bull trout populations so that the protections of the Act are no longer necessary (U.S. Fish and Wildlife Service 2015).

To implement the recovery strategy, the 2015 recovery plan establishes four categories of recovery actions for each of the six Recovery Units (U.S. Fish and Wildlife Service 2015):

1. Protect, restore, and maintain suitable habitat conditions for bull trout.

2. Minimize demographic threats to bull trout by restoring connectivity or populations where appropriate to promote diverse life history strategies and conserve genetic diversity.

3. Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.

4. Work with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks, and considering the effects of climate change

Bull trout recovery is based on a geographical hierarchical approach. Bull trout are listed as a single DPS within the five-state area of the coterminous United States. The single DPS is subdivided into six biologically-based recover units: (1) Coastal Recovery Unit; (2) Klamath Recovery Unit; (3) Mid-Columbia Recovery Unit; (4) Upper Snake Recovery Unit; (5) Columbia Headwaters Recovery Unit; and (6) Saint Mary Recovery Unit (U.S. Fish and Wildlife Service 2015). A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is sufficiently large to withstand stochastic events); and redundancy (ensuring a sufficient number of populations to withstand catastrophic events) (U.S. Fish and Wildlife Service 2015).

Each of the six recovery units contain multiple bull trout core areas, 116 total, which are non-overlapping watershed-based polygons, and each core area includes one or more local populations. Currently there are 109 occupied core areas, which comprise 611 local populations (U.S. Fish and Wildlife Service 2015). There are also six core areas where bull trout historically occurred but are now extirpated, and one research needs area where bull trout were known to occur historically, but their current presence and use of the area are uncertain (U.S. Fish and Wildlife Service 2015).Core areas can be further described as complex or simple (U.S. Fish and Wildlife Service 2015). Complex core areas contain multiple local bull trout populations, are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawning and rearing habitat and foraging, migration, and overwintering habitats (FMO). Simple core areas are those that contain one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genetic or life history adaptations.

A local population is a group of bull trout that spawn within a particular stream or portion of a stream system (U.S. Fish and Wildlife Service 2015). A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries. Gene flow may occur between local populations (e.g., those within a core population), but is assumed to be infrequent compared with that among individuals within a local population.

A.5 Population Units

The final recovery plan (U.S. Fish and Wildlife Service 2015) designates six bull trout recovery units as described above. These units replace the 5 interim recovery units previously identified (U.S. Fish and Wildlife Service 1999). The Service will address the conservation of these final recovery units in our section 7(a)(2) analysis for proposed Federal actions. The recovery plan (U.S. Fish and Wildlife Service 2015), identified threats and factors affecting the bull trout within these units. A detailed description of recovery implementation for each recovery unit is provided in separate recovery unit implementation plans (RUIPs)(U.S. Fish and Wildlife Service 2015a-f), which identify conservation actions and recommendations needed for each core area, forage/ migration/ overwinter (FMO) areas, historical core areas, and research needs areas. Each of the following recovery units (below) is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions.

Coastal Recovery Unit: The coastal recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (U.S. Fish and Wildlife Service 2015a). The Coastal Recovery Unit is located within western Oregon and Washington. The Coastal Recovery Unit is divided into three regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River Regions. This recovery unit contains 20 core areas comprising 84 local populations and a single potential local population in the historic Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011, and identified four historically occupied core areas that could be re-established (U.S. Fish and Wildlife Service 2015; U.S. Fish and Wildlife Service 2015a). Core areas within Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This recovery unit also contains ten shared FMO habitats which are outside core areas and allows for the continued natural population dynamics in which the core areas have evolved (U.S. Fish and Wildlife Service 2015a). There are four core areas within the Coastal Recovery Unit that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River (U.S. Fish and Wildlife Service 2015). These are the most stable and abundant bull trout populations in the recovery unit. The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, loss of functioning estuarine and nearshore marine habitats, development and related impacts (e.g., flood control, floodplain disconnection, bank armoring, channel straightening, loss of instream habitat complexity), agriculture (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation, livestock grazing), fish passage (e.g., dams, culverts, instream flows) residential development, urbanization, forest management practices (e.g., timber harvest and associated road building activities), connectivity impairment, mining, and the introduction of non-native species. Conservation measures or recovery actions implemented include relicensing of major hydropower facilities that have provided upstream and downstream fish passage or complete removal of dams, land acquisition to conserve bull trout habitat, floodplain restoration, culvert removal, riparian revegetation, levee setbacks, road removal, and projects to protect and restore important nearshore marine habitats.

Klamath Recovery Unit: The Klamath recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (U.S. Fish and Wildlife Service 2015c). The Klamath Recovery Unit is located in southern Oregon and northwestern California. The Klamath Recovery Unit is the most significantly imperiled recovery unit, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (U.S. Fish and Wildlife Service 2015). This recovery unit currently contains three core areas and eight local populations (U.S. Fish and Wildlife Service 2015; U.S. Fish and Wildlife Service 2015c). Nine historic local populations of bull trout have become extirpated (U.S. Fish and Wildlife Service 2015c). All three core areas have been isolated from other bull trout populations for the past 10,000 years (U.S. Fish and Wildlife Service 2015c). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, habitat degradation and fragmentation, past and present land use practices, agricultural water diversions, nonnative species, and past fisheries management practices. Conservation measures or recovery actions implemented include removal of nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for instream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, culver replacement, and habitat restoration.

Mid-Columbia Recovery Unit: The Mid-Columbia recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (U.S. Fish and Wildlife Service 2015d). The Mid-Columbia Recovery Unit is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia Recovery Unit is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic Regions. This recovery unit contains 24 occupied core areas comprising 142 local populations, 2 historically occupied core areas, 1 research needs area, and 7 FMO habitats (U.S. Fish and Wildlife Service 2015; U.S. Fish and Wildlife Service 2015d). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, agricultural practices (e.g. irrigation, water withdrawals, livestock grazing), fish passage (e.g. dams, culverts), nonnative species, forest management practices, and mining. Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements.

Upper Snake Recovery Unit: The Upper Snake recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (U.S. Fish and Wildlife Service 2015f). The Upper Snake Recovery Unit is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake Recovery Unit is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This recovery unit contains 22 core areas and 207 local populations (U.S. Fish and Wildlife Service 2015), with almost 60 percent being present in the Salmon River Region. The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (e.g., water diversions, grazing). Conservation measures or recovery actions implemented include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration.

Columbia Headwaters Recovery Unit: The Columbia headwaters recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (U.S. Fish and Wildlife Service 2015b). The Columbia Headwaters Recovery Unit is located in western Montana, northern Idaho, and the northeastern corner of Washington. The Columbia Headwaters Recovery Unit is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene Geographic Regions (U.S. Fish and Wildlife Service 2015b). This recovery unit contains 35 bull trout core areas; 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The 20 simple core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and isolated existence (U.S. Fish and Wildlife Service 2015b). Fish passage improvements within the recovery unit have reconnected some previously fragmented habitats (U.S. Fish and Wildlife Service 2015b), while others remain fragmented. Unlike the other recovery units in Washington, Idaho and Oregon, the Columbia Headwaters Recovery Unit does not have any anadromous fish overlap. Therefore, bull trout within the Columbia Headwaters Recovery Unit do not benefit from the recovery actions for salmon (U.S. Fish and Wildlife Service 2015b). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, mostly historical mining and contamination by heavy metals, expanding populations of nonnative fish predators and competitors, modified instream flows, migratory barriers (e.g., dams), habitat fragmentation, forest practices (e.g., logging, roads), agriculture practices (e.g. irrigation, livestock grazing), and residential development. Conservation measures or recovery actions implemented include habitat improvement, fish passage, and removal of nonnative species.

St. Mary Recovery Unit: The St. Mary recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (U.S. Fish and Wildlife Service 2015e). The Saint Mary Recovery Unit is located in Montana but is heavily linked to downstream resources in southern Alberta, Canada. Most of the Saskatchewan River watershed which the St. Mary flows into is located in Canada. The United States portion includes headwater spawning and rearing habitat and the upper reaches of FMO habitat. This recovery unit contains four core areas, and seven local populations (U.S. Fish and Wildlife Service 2015e) in the U.S. Headwaters. The current condition of the bull trout in this recovery unit is attributed primarily to the outdated design and operations of the Saint Mary Diversion operated by the Bureau of Reclamation (e.g., entrainment, fish passage, instream flows), and, to a lesser extent habitat impacts from development and nonnative species.

B. Critical Habitat

B.1 Legal Status

Litigation resulted in the U.S. District Court for the District of Oregon granting the Service a voluntary remand of the 2005 critical habitat designation. Subsequently, the Service published a proposed critical habitat rule on January 14, 2010 (75 FR 2260) and a final rule on October 18, 2010 (75 FR 63898). The rule became effective on November 17, 2010. A justification document was also developed to support the rule and is available on our website (http://www.fws.gov/pacific/bulltrout). The scope of the designation involved the species' coterminous range.

Rangewide, the Service designated reservoirs/lakes and stream/shoreline miles in 32 critical habitat units (CHU) as bull trout critical habitat (Table 1). Designated bull trout critical habitat is of two primary use types: (1) spawning and rearing; and (2) foraging, migrating, and overwintering (FMO).

The final rule increases the amount of designated bull trout critical habitat by approximately 76 percent for miles of stream/shoreline and by approximately 71 percent for acres of lakes and reservoirs compared to the 2005 designation.

Table 1. Stream/shoreline distance and reservoir/lake area designated as bull trout critical habitat by state.

State	Stream/Shoreline Miles	Stream/Shoreline Kilometers	Reservoir/ Lake (acres)	Reservoir/ Lake (hectares)
Idaho	8,771.6	14,116.5	170,217.5	68,884.9
Montana	3,056.5	4,918.9	221,470.7	89,626.4
Nevada	71.8	115.6	-	-
Oregon	2,835.9	4,563.9	30,255.5	12,244.0
Oregon/Idaho	107.7	173.3	-	-
Washington	3,793.3	6,104.8	66,308.1	26,834.0
Washington (marine)	753.8	1,213.2	-	-
Washington/Idaho	37.2	59.9	-	-
Washington/Oregon	301.3	484.8	-	-
Total	19,729.0	31,750.8	488,251.7	197,589.2

This rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. No unoccupied habitat was included in the 2005 designation. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower mainstem river environments that can provide seasonally important migration habitat for bull trout. This type of habitat is essential in areas where bull trout habitat and population loss over time necessitates reestablishing bull trout in currently unoccupied habitat areas to achieve recovery.

The final rule continues to exclude some critical habitat segments based on a careful balancing of the benefits of inclusion versus the benefits of exclusion. Critical habitat does not include: (1) waters adjacent to non-Federal lands covered by legally operative incidental take permits for habitat conservation plans (HCPs) issued under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (Act), in which bull trout is a covered species on or before the publication of this final rule; (2) waters within or adjacent to Tribal lands subject to certain commitments to conserve bull trout or a conservation program that provides aquatic resource protection and restoration through collaborative efforts, and where the Tribes indicated that inclusion would impair their relationship with the Service; or (3) waters where impacts to national security have been identified (75 FR 63898). Excluded areas are approximately 10 percent of the stream/shoreline miles and 4 percent of the lakes and reservoir acreage of designated critical habitat. Each excluded area is identified in the relevant CHU text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. It is important to note that the exclusion of water bodies from designated critical habitat does not negate or diminish their importance for bull trout conservation. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

Conservation Role and Description of Critical Habitat: The conservation role of bull trout critical habitat is to support viable core area populations (75 FR 63943). The core areas reflect the metapopulation structure of bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. CHUs generally encompass one or more core areas and may include FMO areas, outside of core areas, that are important to the survival and recovery of bull trout.

As previously noted, 32 CHUs within the geographical area occupied by the species at the time of listing are designated under the final rule. Twenty-nine of the CHUs contain all of the physical or biological features identified in this final rule and support multiple life-history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most of the physical or biological features necessary to support the bull trout's particular use of that habitat, other than those physical and biological features associated with Primary Constituent Elements (PCEs) 5 and 6, which relate to breeding habitat (see list below).

The primary function of individual CHUs is to maintain and support core areas, which (1) contain bull trout populations with the demographic characteristics needed to ensure their persistence and contain the habitat needed to sustain those characteristics (Rieman and McIntyre 1993); (2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (MBTSG 1998; Rieman and McIntyre 1993); (3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (MBTSG 1998; Rieman and McIntyre 1993); and (4) are distributed throughout the historic range of the species to preserve both genetic and phenotypic adaptations (MBTSG 1998; Rieman and Allendorf 2001; Rieman and McIntyre 1993).

The Olympic Peninsula and Puget Sound CHUs are essential to the conservation of amphidromous bull trout, which are unique to the Coastal-Puget Sound population segment. These CHUs contain marine nearshore and freshwater habitats, outside of core areas, that are used by bull trout from one or more core areas. These habitats, outside of core areas, contain PCEs that are critical to adult and subadult foraging, migrating, and overwintering.

In determining which areas to propose as critical habitat, the Service considered the physical and biological features that are essential to the conservation of bull trout and that may require special management considerations or protection. These features are the PCEs laid out in the appropriate quantity and spatial arrangement for conservation of the species. The PCEs for bull trout are those habitats components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering (75 FR 63898). The PCEs of designated critical habitat are:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

2. Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including, but not limited to, permanent, partial, intermittent, or seasonal barriers.

3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.

5. Water temperatures ranging from 2 to 15 C (36 to 59 F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.

6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departures from a natural hydrograph.

8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

9. Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

B.2 Current Range-wide Condition of Bull Trout Critical Habitat

The condition of proposed bull trout critical habitat varies across its range from poor to good. Although still relatively widely distributed across its historic range, the bull trout occurs in low numbers in many areas, and populations are considered depressed or declining across much of its range (67 FR 71240). This condition reflects the condition of bull trout habitat.

The primary land and water management activities impacting the physical and biological features essential to the conservation of bull trout include timber harvest and road building, agriculture and agricultural diversions, livestock grazing, dams, mining, urbanization and residential development, and non-native species presence or introduction (75 FR 2282). There is widespread agreement in the scientific literature that many factors related to human activities have impacted bull trout and their habitat, and continue to do so. Among the many factors that contribute to degraded PCEs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows:

1. Fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Dunham and Rieman 1999; Rieman and McIntyre 1993).

2. Degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989; MBTSG 1998).

3. The introduction and spread of nonnative fish species, particularly brook trout and lake trout, as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary et al. 1993; Rieman et al. 2006).

4. In the Coastal-Puget Sound region where amphidromous bull trout occur, degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore foraging and migration habitat due to urban and residential development.

5. Degradation of FMO habitat resulting from reduced prey base, roads, agriculture, development, and dams.

One objective of the final rule was to identify and protect those habitats that provide resiliency for bull trout use in the face of climate change. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PCEs 1,2, 3, 5, 7, 8, and 9. Protecting bull trout strongholds and cold water refugia from disturbance and ensuring connectivity among populations were important considerations in addressing this potential impact. Additionally, climate change may exacerbate habitat degradation impacts both physically (e.g., decreased base flows, increased water temperatures) and biologically (e.g., increased competition with non-native fishes).

C. Species and Critical Habitat Affected

The proposed action will occur in the Little Blackfoot drainage of the Columbia Headwaters Recovery Unit and the Clark Fork River Basin Critical Habitat Unit (Unit 31) and will affect bull trout populations therein. The Little Blackfoot drainage does not contain designated critical habitat; critical habitat for the Little Blackfoot River designated by the 2005 rule (U.S. Fish and Wildlife Service 2005) was removed in the 2010 revised rule (U.S. Fish and Wildlife Service 2010). Consequently, no further discussion of critical habitat will occur in this biological opinion.

C.1 Previous Consultations and Conservation Efforts

This section includes a discussion on previously consulted actions and subsequent effects that have been analyzed through section 7 consultation as reported in a Biological Opinion. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to bull trout, we analyzed all of the Biological Opinion received by the Region 1 and Region 6 Forest Service Offices, from the time of listing until August 2003; this summed to 137 Biological Opinion. Of these, 124 Biological Opinion (91 percent) applied to activities affecting bull trout in the Columbia Basin population segment, 12 Biological Opinion (9 percent) applied to activities affecting bull trout in the Coastal-Puget Sound population segment, 7 Biological Opinion (5 percent) applied to activities affecting bull trout in the Klamath Basin population segment, and one Biological Opinion (< 1 percent) applied to activities affecting the Jarbidge and St. Mary-Belly population segments (Note: these percentages do not add to 100 because several Biological Opinion applied to more than one population segment). The geographic scale of these consultations varied from individual actions (e.g., construction of a bridge or pipeline) within one basin to multiple-project actions occurring across several basins.

The current bull trout recovery plan modified the previous demographic units used in the interim recovery plan. Based on the current recovery plan, there have been 58 Biological Opinions issued for take in the Upper Clark Fork Geographic Region of the Columbia Headwaters Recovery Unit from August 2003 until now. Of these 58 Biological Opinions, 8 have occurred within the Upper Clark Fork River Core Area where the project is located. All of the Biological Opinions have included mandatory terms and conditions and reporting requirements, which are binding on the action agency, in order to reduce the potential impacts of anticipated incidental take to bull trout.

V. Environmental Baseline

Regulations implementing the Act, as amended (16 U.S.C. 1531 et seq.; 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 already undergone section 7 consultation, and the impacts of state and private actions in the action area that are contemporaneous with the consultation in progress. The environmental baseline should characterize the effects of past and ongoing human factors leading to the current status of the species, their habitats, and ecosystem within the action area.

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). For this biological opinion, environmental baseline conditions for bull trout were assessed using information in the biological assessment, Bull Trout Core Area Templates (U.S. Fish and Wildlife Service 2005a), bull trout recovery plan for the Columbia Headwaters recovery unit (U.S. Fish and Wildlife Service 2015b), Conservation Strategy for Bull Trout on USFS lands in Western Montana (BT Conservation Strategy, U.S. Forest Service 2013), and other sources of information.

A. Status of Bull Trout in the Action Area

The bull trout recovery plan considers a hierarchical order of demographic units ranging from local populations to the range of bull trout within the coterminous United States (Table 2). The Divide Travel Plan action area encompasses fifteen sub-watersheds (or 6th field Hydrologic Unit Code, HUC) west of the Continental Divide in the upper Little Blackfoot River drainage. In ascending hierarchical order of bull trout demographic units, the Divide Travel Plan action area is located within the Upper Clark Fork River Core Area, Upper Clark Fork Geographic Region, of the Columbia Headwaters Recovery Unit (Table 2). The Upper Clark Fork River Core Area contains three designated populations of bull trout.

Table 2. Hierarchy of bull trout demographic units

Bull Trout Analysis Scale	Hierarchical Relationship
Coterminous United States (DPS)	Range of bull trout
Columbia Headwaters Recovery Unit	One of 6 Recovery Units in the range of the species within the coterminous United States
Upper Clark Fork Geographic Region	One of 5 Geographic Regions in the Columbia Headwaters Recovery Unit
Upper Clark Fork River Core Area	One of 5 Core Areas in the Upper Clark Fork Geographic Region
Local Populations	Three local populations are designated within the Upper Clark Fork Core Area
Other Occupied Streams (resident population)	Undesignated populations within the Upper Clark Fork Core Area

Local populations refer to the smallest functional unit for recovery and analysis under the recovery plan. However, generally smaller, more adjunct resident populations of bull trout that do not meet the criteria for designation as local populations by the U.S. Fish and Wildlife Service also exist. Bull trout in the Divide Travel Plan action area are a resident population that does not meet the requirements for designation as a local population.

A very limited bull trout population likely remains within the action area. Intensive sampling using traditional methods by the U.S. Forest Service from 2008-2010 in the headwaters of the Little Blackfoot River yielded two adult bull trout, while efforts by Montana FWP in the Little Blackfoot River did not find any bull trout (U.S. Forest Service 2013). As a result, bull trout in the Little Blackfoot River are believed to be close to extinction. However, newer methods testing for bull trout DNA in the water (environmental DNA, referred to as eDNA) have increased detection probabilities for species that occur in low densities such as bull trout. Subsequently, initial efforts using eDNA testing in fall 2015 indicated the presence of a bull trout population within the upper Little Blackfoot River and Ontario Creek portions of the action area (Alli Johnson, U.S. Forest Service, pers. Com. 2015). Sampling in 2015 focused on the most likely areas for bull trout to occur, in the Ontario Creek and Little Blackfoot-Larabee HUC's. Demographics of this population and the presence of bull trout in other sub-watershed (Table 3) of the action area are currently unknown.

The upper portion of the Little Blackfoot River drainage is considered a priority watershed on the Forest, receiving the highest priority for monitoring and restoration efforts. Bull trout habitat in priority watersheds also receives special attention and treatment. Seven of the fifteen HUC's in the action area are within the priority watershed (Table 3). Habitat in the upper Little

Blackfoot is suitable for spawning and rearing by bull trout, especially from Ontario Creek upstream to the headwaters (U.S. Forest Service 2013). The BT conservation strategy (U.S. Forest Service 2013) rates the Little Blackfoot-Larabee Creek and Little Blackfoot-Hat Creek HUC's, in part, as "functioning well enough to provide a foundation from which other populations can anchor to and reconnect with as active improvements occur in other Core Area locations". The conservation strategy for all HUC's of the action area is shown in Table 3.

Table 3. Presence of bull trout (2015 eDNA).

Sub-Watershed	Bull trout detected	Priority watershed	Conservation strategy*
Ontario Creek	Y	Y	Active
Little Blackfoot-Larabee Creek	Y	Y	Conserve
Telegraph Creek	not sampled	Y	Active
Mike Renig Creek	not sampled	Y	Passive
Upper Dog Creek (North)	not sampled	y	Active
Lower Dog Creek	not sampled	Y	Passive
Little Blackfoot-Hat Creek	not sampled	Y	Conserve
North Trout Creek	not sampled	n	Active
Snowshoe Creek	not sampled	n	Passive
Little Blackfoot-Elliston Creek	not sampled	n	Active
Carpenter Creek	not sampled	n	Passive
Trout Creek	not sampled	n	Passive
South Fork Dog Creek	not sampled	n	Passive
Upper Dog Creek (South)	not sampled	n	Passive
Threemile Creek	not sampled	n	Passive

Location within priority sub-watershed (Y=yes, n=no), and recommended conservation strategy for sub-watersheds within the Divide Travel Plan action area. Conservation Strategy from BT Conservation Strategy (U.S. Forest Service 2013) and defined as:

Active restoration is management intervention systematically focused on improving a degraded habitat condition or dysfunctional watershed processes such that the improved habitat can be maintained via restored processes and removal of impairments

Passive restoration is restoration process more typified by simply reducing or eliminating the sources of degradation that may allow recovery over time. For instance, INFISH standards and guidelines are intended to reduce new or ongoing management pressures to riparian areas that can degrade or maintain a de-graded to riparian and stream conditions

Conservation is a strategy intended to maintain one or more existing local populations, habitats and processes that, compared to other areas in the Core, are functioning well enough to provide a foundation from which other populations can anchor to and reconnect with as active improvements occur in other Core Area locations

In the Little Blackfoot River below the action area, brown trout are the dominant species and are likely a factor that limits bull trout due to the potential for competition and predation. Multiple water diversions occur on the river between Elliston and Garrison. Low flows due to water diversion result in increased water temperature during the summer months that are not optimum for bull trout. Low flows also limit fish movements, but do not present complete barriers to bull trout in most years. Agriculture practices and habitat alterations from highway and railroad construction have further affected stream morphology and reduced the quality of fish habitat.

Threats to bull trout recovery in the upper Little Blackfoot drainage include recreational fishing, nonnative species, and forestry practices, (i.e., sedimentation from roads) (U.S. Fish and Wildlife Service 2015; MTDEQ 2005; U.S. Fish and Wildlife Service 2002; U.S. Forest Service 2000). Irrigation withdrawals and channelization occurring outside the action area in the downstream portion of the Little Blackfoot River also influence recovery by limiting migratory movements and reducing the availability of FMO habitat.

The inadvertent harvest of bull trout from recreational fishing occurs through misidentification of bull trout relative to other salmonid species, especially brook trout (U.S. Forest Service 2000). Schmetterling and Long (1999) found that only 43 percent of resident anglers, and 22 percent of the non- resident anglers correctly identified bull trout among 6 other common salmonid species in western Montana. In addition, poaching is considered easy due to the small size and remoteness of spawning streams. Bull trout are particularly susceptible to poaching because they concentrate in predictable habitats, are highly visible, and remain in tributaries for several weeks (Swanberg 1997). The combination of misidentification, predictability, and angling pressure on spawning and pre-spawning areas likely has impacts to bull trout populations.

Nonnative brook trout and brown trout are often cited as contributing to the decline of native fish (MBTSG 1998). Current fishing regulations restrict harvest of brown trout, a known competitor of bull trout. Regulations that restrict harvest of larger brown trout may result in additional competitive interactions between bull and brown trout due to increased numbers of large brown trout. As pointed out in other reports, there is substantial potential for competitive interactions of brown trout with bull trout (Bond 1992; Moyle 1976; Mullan et al. 1992; Rieman and McIntyre 1993). Managing for increased numbers of large sized brown trout likely increases predation on smaller bull trout that are present, given the piscivorous nature of brown trout and the likelihood that both brown and bull trout will occupy similar habitat at times in the main-stem river. These interactions will likely become further exacerbated from increasing water temperatures as climate change progresses.

The nature of negative interaction between bull trout and brook trout is thought to include competition, predation and hybridization. The result of species interaction is suspected to be detrimental to bull trout given the apparent overlapping niches of these two species (Leary et al. 1983). Kanda et al. (2002) found that hybridization tends to occur between male brook trout and female bull trout indicating a greater reproductive wasted effort for bull trout than brook trout. The degree of hybridization, other interactions, and distribution of the two species is likely influenced by habitat condition (Rieman and McIntyre 1993). Bull trout are rare, if present at all, in many streams supporting large numbers of brook trout (Buckman et al. 1992; Ziller 1992; Rich 1996). Rich (1996) found brook trout occupied more degraded stream reaches than bull trout. Leary et al. (1993) documented a shift in community dominance from bull trout to brook trout, and expect the trend to continue until bull trout are displaced. Gunckel et al. (2002) found that when resources are scarce brook trout would likely displace bull trout. Adams et al. (1999) suggested that bull trout brook trout interaction is likely to result in bull trout replacement (nonnative species invading after declines in native species) rather than displacement (nonnative causing the decline). Rich et al. (2003) suggested that bull trout may resist brook trout invasion in streams with high habitat complexity and “strong” neighboring populations. Nonnative fish were identified as a significant threat in the original listing of bull trout (U.S. fish and Wildlife Service 1998b, 1999), and the threat has grown significantly since that time (U.S. fish and Wildlife Service 2008). Consequently, nonnative fishes are currently cited as the single primary threat in several core areas within the six recovery units (U.S. fish and Wildlife Service 2015).

B. Factors Affecting Species Environment (Habitat) Within the Action Area

Roads directly affect natural sediment and hydrologic regimes by altering streamflow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition, stream temperatures, water quality, and riparian conditions within a watershed. For example, interruption of hill-slope drainage patterns alters the timing and magnitude of peak flows and changes base stream discharge (Furniss et al. 1991; Harr et al. 1975) and sub-surface flows (Furniss et al. 1991). Road-related mass soil movements can continue for decades after the roads have been constructed (Furniss et al. 1991). Such habitat alterations can adversely affect all life-stages of fishes, including migration, spawning, incubation, emergence, and rearing (Furniss et al. 1991; Henjum et al. 1994; Rhodes et al. 1994).

Road /stream crossings can also be a major source of sediment to streams due to erosion of channel fill around culverts and subsequent road crossing failures (Furniss et al. 1991). Plugged culverts and fill slope failures are frequent and often lead to catastrophic increases in stream channel sediment, especially on old abandoned or unmaintained roads (Weaver et al. 1987). Unnatural channel widths, slope, and streambed form occur upstream and downstream of stream crossings (Heede 1980). These alterations in channel morphology may persist for long periods of time. Channelized stream sections resulting from riprapping of roads adjacent to stream channels are directly affected by sediment from side casting, snow removal, and road grading; such activities can trigger fill slope erosion and failures. Because improper culverts can reduce or eliminate fish passage (Belford and Gould 1989), road crossings are a common migration barrier to fish (Evans and Johnston 1980, Furniss et al. 1991, Clancy and Reichmuth 1990).

In forested western Montana watersheds, the secondary road network is a major contributor of sediment to perennial streams (MBTSG 1998). Montana Bull Trout Restoration Team (2000) ranked forest practices (including road construction and use of secondary forest roads) as the greatest risk to restoration of bull trout in Montana. An assessment of fish populations in the Interior Columbia River Basin found that bull trout are less likely to use streams for spawning and rearing in highly road systems (Quigley et al. 1997). As linear compacted features, roads in forested watershed can substantially alter hill slope hydrology, causing surface flow in areas far from established stream channels (Luce 1997). Roads and drainage ditches are essentially ephemeral stream channels (Leopold and Miller 1956) and greatly expand the natural watershed drainage network (Montgomery 1994). Watersheds with high road densities commonly produce elevated sediment levels and experience increased peak flows (Meehan 1991; Luce 1997). Luce and Black (1999) observed that most segments of road within forested watersheds produced little sediment, but a few segments produced large amounts.

Targeting sections that exhibit the greatest sediment production can substantially reduce road erosion (Luce and Black 1999). Factors that influence the delivery of sediment to streams from forest roads include the proximity of the road to the stream, stream gradient, road length near streams, degree of road use, road condition (maintenance), number of stream crossings and soil type. The location of forest roads in relation to the stream channel and the density of stream crossings within a watershed is a key factor in the amount of sediment delivered to the stream from the road surface and associated features (Baxter et al. 1999, McCaffery et al. 2007). Much of the existing road network was established decades ago and contains numerous stream crossing structures (i.e., culverts). The aging of these structures and level (percent) of maintenance likely increases the potential for stream crossing failure that may result in significant sediment delivery to streams.

In addition to sedimentation, culverts can fragment stream habitat. A large percentage of culverts on Forest Service lands are either a total or partial barrier for juvenile salmonids (U.S. Forest Service 2006). Many of the culverts surveyed had high constriction ratios, limiting the ability of the culverts to pass 100-year flow events, thus increasing the potential for culvert failure over time (U.S. Forest Service 2006). Recent information concerning climate change indicates that these non-climate stressors (fish passage barriers and undersized culverts) can exacerbate climate impacts (Rieman and Isaak 2010). As stream temperatures increase, access to first and second order streams (higher elevation and cooler) becomes more important. In addition, the likelihood of road crossing failures increases as rain on snow events become more frequent or intense. Stream crossing failures can result in large pulses of sediment delivery to streams.

VI. Effects of the Action

Effects of the action are the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species for purposes of preparing a biological opinion on the proposed action [50 CFR §402.02]. The environmental baseline covers past and present impacts of all Federal actions within the action area. This includes the effects of existing Federal projects that have not yet been submitted for section 7 consultation.

A. Basis for the Analyses of Effects

This biological opinion analyzes the impacts of an administrative decision to change travel restrictions on the existing road network in the action area. It addresses both summer and winter travel in the Divide Travel Plan area. Changes related to open route/area designations and restrictions would occur from those shown on the 2006 Helena National Forest Travel Plan Map. Because a time frame for these changes has not been proposed, this biological opinion strictly addresses effects of the change in regulations and does not consider the time frame over which these changes will occur. A decision has also not been made regarding the method by which on-the-ground actions will occur; if routes (roads and trails open to motorized use) proposed for closure will be obliterated, stored, or administratively closed and the location of culverts on routes proposed for closure that will be removed, replaced, or remain in their current status.

Actual on-the-ground activities will require further consultation with the Service on a project-by-project basis.

To assess effects to bull trout and bull trout critical habitat, the Service created "A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale" (framework/matrix; U.S. Fish and Wildlife Service 1998). The framework provides a way to systematically assess baseline conditions and project-related effects using four Species Indicators to assess Subpopulation Characteristics and 6 Habitat Pathways incorporating 19 Habitat Indicators. Ratings of the species and habitat indicators are then used to derive an "Integration of Species and Habitat Conditions" ratings. This single value integrating habitat and subpopulation conditions is intended to help arrive at a determination of the potential effects of land management activities on bull trout. Baseline ratings are typically assessed for each of four species indicators, 19 habitat indicators, and an integration of species and habitat indicators for every 6th field HUC within an analysis area (Appendix A).

Indicators are rated as "functioning appropriately" (FA), "functioning at risk" (FAR), and "functioning at unacceptable risk" (FUR). Indicators rated FA provide habitats that maintain strong and significant populations, are interconnected and promote recovery of a proposed or listed species or its critical habitat to a status that will provide self-sustaining and self-regulating populations. When a habitat indicator is FAR, they provide habitats for persistence of the species but in more isolated populations and may not promote recovery of a proposed or listed species or its habitat without active or passive restoration efforts. FUR indicates the proposed or listed species continues to be absent from historical habitat, or is rare or being maintained at a low population level; although the habitat may maintain the species at this low persistence level, active restoration is needed to begin recovery of the species. Effects of the project are considered to either "maintain", restore", or "degrade" habitat indicators relative to existing or baseline conditions. Effects are characterized as either "major" effects that will likely produce a change in one functional level to baseline conditions (e.g. change FAR to FA), or minor effects that may result in an incremental or cumulative effect but will not result in a functional change within the HUC.

The Forest relies on a Geographical Information System (GIS) analysis to provide a structured assessment of the 19 habitat indicators on Forest Service owned lands. Four of the baseline habitat indicators (temperature, barriers, pools, and fine sediment) are considered primary habitat indicators because they are the most important attributes of bull trout habitat within the Forests control. They serve as a starting point to gage potential need for habitat change in any given 6th field HUC. These four indicators are also used to generate an overall *integrated status of habitat conditions* for each HUC (U.S. Forest Service 2013).

This biological opinion relies on the status of the species in the action area and the ratings and effects to the following indicators from the framework/matrix; (1) individual primary indicators, (2) *integrated status of habitat conditions*, and, (3) *integration of species and habitat conditions*. Together, these variables provide a comprehensive analysis of the proposed action as required for section 7 consultation.

Transportation networks can adversely affect bull trout by degrading the condition class (e.g FAR to FUR) of all four primary habitat indicators. Adverse effects to bull trout result from sediment generated and delivered to streams from the road network itself and any ground-disturbing activities associated with the road network (road maintenance, culvert removal/replacement, and road decommissioning). Road culverts can act as fish barriers. Roads often occur in high densities on the landscape, exist within unstable areas, and their location often follows stream routes. Therefore, road networks can increase water temperature by reducing streamside shading and allowing drainage of warmer water along roads into streams and reduce pool frequency and quality by limiting the amount of large wood available for recruitment into streams (U.S. Forest Service 2013). Roads located near streams may also facilitate dispersed campsites and creation of unauthorized roads near streams that can adversely affect riparian conservation areas and further degrade the four primary indicators as well as non-primary indicators.

This biological opinion addresses motorized travel during summer and winter. Winter travel by snowmobile seldom causes erosion, disturbs soils, or disrupts ground cover when the ground is frozen and a layer of snow separates the snowmobile from the ground. For these reasons, cross country skiing, snowshoeing, winter camping, and snowmobiling were considered as having no effect to bull trout. However, use of roads by wheeled vehicles during winter for access to recreation areas can result in sediment delivery to streams during warm weather when the ground thaws and roads are located near streams. Similarly, motorized use of roads and trails outside the winter period can increase sediment flows to streams when roads and trails are wet. Changes in dates motorized roads and trails are open was considered in the analysis to account for seasonal variation in the effects of the road network.

The biological assessment provided by the Forest categorized "high-risk roads" as roads and trails open to motorized use (vehicles 50" or less for trails) within 300 feet of fish-bearing streams or 150 feet of non-fish-bearing streams. This distance is consistent with riparian habitat conservation area (RHCA) buffers as defined by the Inland Native Fish Strategy (INFISH, U.S. Forest Service 1995). Trails open to motorized use typically do not receive the same volume of traffic as roads open to highway legal vehicles, but can be a similar source of chronic sediment because they are not graded or graveled to reduce rutting, erosion, and enable the delivery of surface water to streams. The terms "roads" and "routes" are synonymous throughout this biological opinion and include roads open to highway legal vehicles and trails open to motorized vehicles 50" or less.

The proposed action is an administrative decision determining travel restrictions; which roads will be closed and which roads will remain open. It is a dichotomous decision because effects of open roads affect habitat indicators differently than effects of closed roads. In addition to the differences in effects between open and closed roads, designated open roads must be looked at separately because; (1) these roads will continue to have an effect on habitat indicators and bull trout as long as they remain open and exist on the landscape, and, (2) the contribution of the existing road network to baseline conditions has not been previously addressed.

B. Direct and Indirect Effects

Direct effects are considered immediate effects of the project on the species or its habitat. Indirect effects are those caused by the proposed action and are later in time, but are still reasonably certain to occur. 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.

The proposed action is an administrative decision determining travel regulations for the road network within the Travel Plan action area. Neither a time frame nor method of implementing closures of roads and stream crossings, nor other travel management decisions have been made by this decision. Proposed travel regulations are reasonably certain to occur later in time. Therefore, changes to habitat indicators and resulting effects to bull trout due to the proposed travel regulations are considered indirect effects.

Direct effects are: (1) the continued influence of roads designated to remain open under the Divide Travel Plan decision, and, (2) the influence of currently closed roads and stream crossings that remain on the landscape. The influence of roads and stream crossings that remain on the landscape as a result of the Divide Travel Plan decision has likely contributed to a degraded value for baseline conditions. Designated open roads and roads closed prior to the Divide Travel Plan will continue to contribute to degraded baseline conditions until they are analyzed/repaired by the Forest and consulted upon with the Service. The framework/matrix (U.S. Fish and Wildlife Service 1998) facilitates an analysis of the environmental baseline conditions, direct effects, and indirect effects of the Divide Travel Plan.

B.1 Primary Habitat Indicators (sediment, barriers, temperature, and pools)

Sediment: Roads are a chronic source of erosion that adds sediment to Forest streams. The greatest potential for adverse effects from sedimentation occurs during spring thaw and breakup. Elevated levels of sediment in stream gravels pose a threat to native fish by reducing rearing habitat or entombing the eggs or fry within the gravels. The level of road-related sediment impacts to bull trout is related to the location and condition of the road, road density, and amount of road use within each sub-watershed. The current adverse baseline conditions in the action area are indicated by the FUR and FAR determinations for the *sediment* habitat indicator (Appendix A, U.S. Forest Service 2010).

Bull trout are most sensitive to changes in habitat that occur in headwater areas encompassing important spawning and rearing habitats for fluvial and adfluvial stocks as well as remnant resident populations (Quigley et al. 1997). McCaffery et al. (2007) found that the number of stream crossings in a watershed is an important factor when considering the overall impact of road networks to fish habitat and in-stream sediment levels. Riggers et al. (1998) found increased sediment levels as road densities increased. Roads near small perennial and intermittent, non-fish bearing streams are especially important because they account for more than half the total drainage network and can direct runoff and sediment to downstream fish bearing streams (Quigley et al. 1997). Older culverts in need of replacement and the number of structures at risk of failure increases the potential for impacts to important spawning and rearing habitats.

Generally, watersheds that are aquatic strongholds occur in areas of low road density (Baxter et al. 1999).

Increased levels of fine sediment can affect developing bull trout eggs by filling interstitial spaces within stream substrate that reduces or eliminating water flow through the redd, thus limiting the supply of oxygen to developing eggs and removal of waste products. Fine sediment in sufficient quantities may retard or eliminate the ability of juvenile fish to emerge from interstitial gravel areas within the spawning redd. Fine sediments may also reduce the availability of wintering habitat for adult and juvenile fish by increasing substrate embeddedness and reducing the volume of over-wintering pools. High levels of sediment can affect food production, thereby reducing growth. Finally, if the length of disturbance is great enough in a limited area, the increased amount of sediment can affect the structure and stability of the channel (Furniss et al. 1991) or result in direct mortality to fish by damaging delicate gill structures.

The most common direct effects of elevated sediment on fish populations occur during egg incubation and fry emergence. Elevated fine sediment (<6.4 mm) in spawning gravels can lead to reduced egg survival (Rieman and McIntyre 1993) and reduced emergence success of both bull and cutthroat trout (Weaver and White 1985 as cited in Rieman and McIntyre 1993). Elevated sediment levels limit access to substrate interstices that provide important cover during rearing and over-wintering periods (Goetz 1994 and Jakober et al. 1998). It also decreases the pool habitat quality, an essential rearing and cover component for bull trout which provides protection from predators and the elements. Fine sediments may also reduce the availability of wintering habitat for adult and juvenile fish by increasing substrate embeddedness. Sediment that increases substrate embeddedness can also reduce juvenile rearing success and decrease growth rates due to reduced aquatic insect production (Bjornn et al. 1977, Weaver and Fraley 1991, Bowerman et. al 2014).

Increased recreational use of all National Forests has resulted in an 11 fold increase in traffic in comparison to the 1950s. Recreational use and traffic in National Forests is expected to continue to increase dramatically as the U.S. population increases over the next century. Increasing traffic levels on unpaved roads have been correlated with increased fine sediment delivery to stream channels. Recreational use and traffic on the Forest is anticipated to continue to increase similar to the national averages as the human population increases. Traffic and road maintenance are two components of road management that have the potential to influence sediment movement from forest roads (Grace and Clinton 2007). For example, reducing traffic levels in the Clearwater River watershed reduced surface erosion by a factor of 10 (Reid and Dunne 1984).

Baseline conditions for the *sediment* indicator are FAR in one priority HUC (one of the two where bull trout were found during eDNA sampling during fall 2015) and one non-priority HUC (Appendix A). Baseline conditions for *sediment* in the remaining 13 sub-watersheds within the action area are rated FUR. Implementation of the proposed action (indirect effects) would provide a minor “restore” to six of the seven priority sub-watersheds, including the two sub-watersheds bull trout were recently found. The restorative effects are mainly due to the elimination of traffic that closure of motorized routes and stream crossings will provide. Reducing the time period some motorized routes are open would also result in a slight decrease in sediment delivery to streams. Reduction of sediment is not expected to improve the *sediment* indicator above current baseline conditions for any sub-watershed due to the limited area affected.

The method used to close routes and stream crossing will influence the magnitude and location of improvements. Obliteration of routes would provide the greatest benefits in the long-term by restoring natural contours and eliminating ditches that may continue to serve as sediment delivery points to streams. Active re-vegetation or passively allowing re-vegetation to occur would provide the second-best method of closing routes, while closure with limited maintenance to provide administrative use would provide the least benefits. Similarly, the type of stream crossing (culvert or ford) and the manner in which it will be closed will influence the effects. For all situations other than complete obliteration of routes and crossings, a monitoring program is needed to identify and clear culverts if they become plugged, or other failures occur over time due to road closure activities. Because the methods, locations, and timeframe for implementation of the proposed action have not been determined, the magnitude and locations of improvements cannot be determined. Existing motorized routes that are designated to remain open will continue to affect the *sediment* and other habitat indicators. The Service anticipates that elevated sediment levels will continue to occur in all sub-watersheds from the existing transportation network that remains open to motorized travel due to the limited area affected by the proposed actions.

Barriers: Barriers can limit fish movement to habitats required for spawning, growth, and refuge from harsh conditions or disturbance events. The size of habitat networks and migratory connections may be the key to population persistence as climate change progresses (Rieman and Isaak 2010). Isolated populations are at a higher risk of extinction due to loss of genetic variability, loss of resilience, and both demographic and environmental stochasticity. Sub-watersheds that are FAR or FUR for the barrier indicator contain fish passage barriers (or partial barriers). A FUR rating indicates the sub-watershed contains a fish passage barrier in the road system on a third order or larger stream. A FAR rating indicates that a sub- watershed contains fish passage barriers in the road system on first and second order streams. These barriers, typically culverts, can delay migration and or limit access to refugia habitat. In addition, culverts that are barriers or partial barriers are typically undersized and are at risk of failure. Culvert failures often result in large pulses of sediment delivery to streams.

Because of the finite and linear configuration of streams and rivers (i.e. fish habitat), migratory movement is critical for maintaining populations. When natural disturbances occur in these systems, access to refuge habitat is especially important. Predicted increase in air temperatures from climate change (Rieman and Isaak 2007), suggests that under sized culverts with high constriction ratios are at increased risk of failure. Culvert replacements can reduce the risk of catastrophic failure from rain on snow events that are likely to become more frequent with climate change. Connected stream systems allow bull trout to recover from disturbance events at a more rapid rate than those that are fragmented by physical barriers (Rieman et al. 1997, Gresswell 1999).

Baseline conditions for the *barrier* indicator are FAR for the Ontario Creek HUC and FA for the Little Blackfoot River-Larabee Creek HUC, the two sub-watersheds bull trout were present in fall 2015. *Barriers* are rated FAR in three of the other priority sub-watershed and FA in the remaining two priority sub-watersheds in the action area. Six HUC's are rated FUR, one rated FAR, and one rated FA for the eight sub-watersheds within the action area that are not priority sub-watersheds. The Forest has recently upgraded a number of culverts throughout the action area and few barriers are believed to currently exist. Overall, due to the limited area affected, proposed actions will "maintain" the *barriers* indicator.

Temperature: Water temperature is particularly important to bull trout. Bull trout have been repeatedly associated with the coldest water within river basins (Quigley et al. 1997). Road and road management can reduce stream side vegetation that results in temperature increases. The risk of temperature increases is highest in very small streams and on roads adjacent to or crossing stream channels. However, changes to temperature are difficult to quantify. Temperature of streams can be increased by decreasing vegetation in the RHCA and increasing the amount of sunlight that reaches the stream (U.S. Forest Service 2011). Sub-watersheds that are FAR or FUR for *temperature* often have a high percent of stream with 300 feet of roads. Warmer temperatures are associated with lower bull trout densities and can increase the risk of invasion by other species that displace, compete with, or prey on juvenile bull trout.

Temperature is rated FAR in five of the seven priority sub-watersheds (both sub-watersheds where bull trout are present) and FUR in the remaining two in the action area. *Temperature* is rated FAR in the eight HUC's that are not priority sub-watersheds within the action area. The proposed action would close 19.2 miles of routes considered high-risk within RHCA's. Closure of these routes may produce a decrease in solar gain to streams in the long-term. However, beneficial effects of the action depends on the actual distance from streams where these routes are located, size of the sub-watershed relative to miles of high-risk roads that would be closed, and growth of appropriate vegetation to provide shade. Overall, due to the limited area affected, these actions will "maintain" the *temperature* indicator.

Pool frequency and quality: The habitat indicator for pool frequency and quality is primarily influenced by recruitment of large woody debris (LWD) into the stream. This indicator is also affected by the removal of trees that have fallen across the road and into the stream and clearing material within stream crossing structures (Furniss et al. 1991). Cover, in the form of pools, and habitat complexity are important components of bull trout habitat (Quigley et al. 1997), providing shelter from predators, thermal refugia and habitat for prey. LWD is one of the primary means by which pools are formed in many stream channel types (Quigley et al. 1997) and is an important element for providing habitat complexity in aquatic ecosystems. Removal of LWD from streams upstream of bridges and culverts to reduce risk of bridge or culvert blockage during high water is another means by which pool habitat can be adversely affected.
The recruitment of LWD into the stream is affected by the proximity of the road to the stream. Roads within the RHCA have the potential to affect pools by maintaining compacted surfaces that do not allow the growth and eventual recruitment of LWD into the stream. Roads facilitate access to the RHCA and can result in reduced habitat function (i.e. degrade to the *pool frequency and quality* indicator).

Dispersed campsites that are often associated with roads near streams can further reduce the recruitment of LWD to streams. They are often located in flat areas which contain lower-gradient stream segments. Lower gradient stream segments provide good fish habitat because lower-gradients allow for more large pools and meandering channels. Driving to and parking in dispersed campsites affects streams by creating areas of compacted soils, which tend to grow native vegetation poorly and thereby provide good growing conditions for noxious weeds. They are also prone to erosion which results in sedimentation to the stream. Dispersed campsites often expand beyond their initial small size as the sites are generally not maintained or properly laid-out (sloped to drain when it rains), which encourages the next campers to use an adjacent area. Areas around dispersed campsites are often used as firewood collection sites by campers and illegal firewood gatherers. When vehicles are driven to and park in streamside areas, there is increased risk of spilled fuel and other contaminants entering the water.

For the seven priority sub-watersheds in the action area, the *pool frequency and quality* indicator is rated FA for one, FAR for three, and FUR for three. The two HUC's containing bull trout are rated FAR and FA. Five of the HUC's outside the priority sub-watershed are rated FAR and three are rated FUR. When implemented, closing dispersed campsites and increasing the distance that motorized travel is allowed near streams will allow slight improvements over time where dispersed camping and motorized use have occurred. Due to the limited area affected, these actions will "maintain" the *pool frequency and quality* indicator for all sub-watersheds.

Integration of Primary Habitat Indicators: The *integrated primary habitat indicator* provides an overall indication of baseline habitat conditions for each HUC. Ratings are FAR for the Little Blackfoot-Larabee Creek HUC and FUR for all other sub-watersheds in the action area. The FUR rating for the *sediment* indicator individually is the reason most of the integrated habitat values are rated FUR. Little Blackfoot-Larabee Creek and the Carpenter Creek HUC's are the only HUC's where the *sediment* indicator was not rated FUR. In Little Blackfoot-Larabee Creek, FA rating for two primary indicators (*physical barriers* and *pool frequency and quality*), combined with FAR for *sediment* and *temperature* resulted in the *integrated* value of FAR. Carpenter Creek HUC was rated FAR for *sediment* and *temperature* individually, but the FUR rating for *physical barriers* and *pool frequency and quality* resulted in an integrated value of FUR.

As discussed for the primary habitat indicators individually, the road network is the principal reason for degraded ratings for *sediment* and is also the major contributor to degraded ratings for *physical barriers* and *pool frequency and quality*. The biological assessment identified a total of 99.6 miles of high-risk roads and 260 stream crossings on Forest land in the action area. Of these, 19.2 miles of high risk roads and 41 stream crossings would be designated for closure. Analysis of the *sediment* indicator indicated some improvement upon implementing closure of these 19.2 miles of roads and 41 stream crossings, but reductions in sediment would not improve the *sediment* by a functional level (e.g. FUR to FAR) due to the limited area affected. Closure of roads and crossings would maintain existing conditions for *temperature*, *physical barriers*, and *pool frequency and quality*. The influence of high-risk roads and stream crossings that would remain open under the proposed action will continue to maintain the *integrated primary habitat indicator* at FUR for 14 HUC's and FAR for one HUC.

B.2 Integration of Species and Habitat Conditions

The *integration of species and habitat conditions* integrates values from the four species indicators with the 19 habitat indicators into one overall rating. Individually, the four species indicators were rated the same for all HUC's in the action area; *subpopulation size* and *growth and survival* were rated FAR, while *life history diversity and isolation* and *persistence and genetic integrity* were rated FUR (Appendix A). Ratings for the species indicators reflect the small population within the action area, limited reproductive and survival success, lack of connectivity within the action area, difficulty for the influx of migratory fish, and effects to genetic diversity and isolation that result from small populations with limited connectivity. Below are the definitions of ratings for the *integration of species and habitat conditions* (U.S. Fish and Wildlife Service 1998):

> **FA:** Habitat quality and connectivity among subpopulations is high. The migratory form is present. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival or growth are consistent with pristine habitat. The subpopulation has the resilience to recover from short-term disturbance within one to two generations (5 to 10 years). The subpopulation is fluctuating around equilibrium or is growing.
>
> **FAR:** Fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to pre-disturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. The subpopulation is stable or fluctuating in a downward trend. Connectivity among subpopulations occurs but habitats are more fragmented
>
> **FUR:** Cumulative disruption of habitat has resulted in a clear declining trend in the subpopulation size. Under current management, habitat conditions will not improve within two generations (5 to 10 years). Little or no connectivity remains among subpopulations. The subpopulation survival and recruitment responds sharply to normal environmental events.

The *integration of species and habitat conditions* was rated FAR for Little Blackfoot-Larabee Creek HUC and FUR for all remaining HUC's in the action area. Individual species indicators are rated the same for all HUC's. Therefore, any difference in the *integration of species and habitat conditions* among HUC's reflects habitat conditions. The higher rating for the Little Blackfoot-Larabee Creek HUC reflects improved habitat conditions in this sub-watershed. Improvements to habitat conditions in other sub-watersheds would similarly result in improvements to the *integration of species and habitat conditions* if improvements to habitat indicators occurred.

For HUC's not designated priority sub-watersheds, implementation of the Divide Travel Plan was determined to "maintain" all subpopulation indicators and habitat indicators. Therefore, the rating of FUR for the *integration of species and habitat conditions* will also be maintained for non-priority HUC's. For HUC's designated priority sub-watersheds, the proposed action would result in a minor “degrade” to three species indicators and either a minor “restore” or “maintain” to the remaining habitat indicators. The proposed action is therefore expected to degrade the *integration of species and habitat conditions* for all priority HUC’s. Chronic sediment resulting from ongoing effects of roads designated to remain open will continue to affect priority sub-watersheds. A minor “degrade” to the FAR rating of Little Blackfoot-Larabee Creek HUC will occur as will a minor “degrade” to the FUR rating of the other six priority sub-watersheds in the action area.

B.3 Species Response to the Proposed Action

The existing road network is the major contributor to degraded (FAR and FUR) baseline conditions for habitat indicators in sub-watersheds throughout the action area. Chronic sediment resulting from stream crossings and roads near streams is reducing egg/fry and fingerling survival in HUC’s where bull trout and bull trout habitat are present. Culverts acting as barriers to fish movement are delaying or preventing migration and limiting access to refugia habitat. To a lesser extent, roads near streams may be limiting the recruitment of woody debris that contributes to the number and quality of large pools that provide habitat for bull trout. The overall influence of the existing road network has contributed to the decline of bull trout and bull trout habitat in the action area. Resiliency of habitat to recover from disturbance is low. Survival and growth rates of bull trout have been reduced from those in the best habitats.

The Divide Travel Plan is a decision-making action that currently does not make on-the-ground changes to the existing road network. Changes to the existing adverse baseline due to the decision were considered indirect because they are reasonably certain to occur, but will not change effects to bull trout until they are implemented. Direct effects of the Divide Travel Plan will maintain the existing status and configuration of roads designated to remain open. The decision to keep specific high-risk roads and stream crossings open to motorized vehicles and the resulting effects on bull trout will continue until another decision is made and consulted on with the Service at either the project or planning level.

Closure of high-risk roads and stream crossings would provide slight long-term reductions to adverse effects from the existing road network. Culvert removal and replacements that meet INFISH standards would eliminate barriers that currently limit bull trout movement, thus improving population resiliency to disturbance by increasing the availability of additional spawning and rearing habitat. A short-term increase in sediment delivery to streams during construction typically accompanies long-term benefits. Similarly, road decommissioning near streams provides a permanent solution to sediment delivery from roads but can also increase sediment during the construction phase. The use of signs alone to close roads reduces the amount of sediment generated from motorized traffic, but sediment delivery to streams will not be reduced until re-vegetation at sediment delivery points occurs. Signs alone also do not prevent illegal use of closed roads that may perpetuate sediment delivery to streams.

Upon implementation of decisions made by the Divide Travel Plan, slight long-term reductions to adverse effects from the existing road network would occur. The most notable improvement will be a reduction in the amount of sediment delivered to streams. Given the existing ratings for *sediment* and *the integration of species and habitat conditions*, any reduction in sediment delivery to streams would be beneficial to bull trout. However, reductions in sediment resulting from the implementation of the Divide Travel Plan decision are not expected to rise to the level they would improve habitat or species indicators by one functional level (e.g. change FAR to FA) due to the limited area affected. Chronic effects of sediment from the remaining road network will continue to have an adverse effect on bull trout.

The Service anticipates the effects of sediment from the remaining high-risk roads and stream crossings will result in a low level of injury or mortality to individual bull trout. The risk of injury or mortality is greatest where bull trout eggs or fry and juveniles are present. Stream crossing barriers will also result in a low level of injury or mortality. Physiological stresses leading to injury or mortality may occur as fish expend energy passing artificial obstacles (Fleming 1989) and from increased competition/predation if fish are concentrated below passage structure. Effects from the remaining primary habitat indicators (*temperature* and *pool frequency and quality*) will continue to reduce habitat function (FAR and FUR ratings) that result in low level sub-lethal stressors to individuals.

Although the bull trout population in the upper Little Blackfoot drainage is considered a resident population that does not meet criteria for designation as a local population, it is important due to its geographic location and is functioning well enough to provide a foundation from which other populations can anchor to and reconnect with as active improvements occur in other Core Area locations (U.S. Forest Service 2013). Current connectivity with local populations in the Core Area is extremely low due to habitat conditions on the Little Blackfoot River below the action area. Mortality and reduced survivability and reproduction associated with the proposed action are extremely important to the Little Blackfoot population due to the current small population and lack of connectivity with other local populations.

Brook trout are present in the action area and will remain a threat to bull trout unless extensive control of non-native species is undertaken. Brook trout commonly hybridize with bull trout and are better adapted to compete with bull trout, but the competitive advantage of brook trout is accentuated in degraded habitat (U.S. Forest Service 2013). Greater efforts to improve habitat conditions can lead to reduced competition by brook trout in addition to better habitat for bull trout. Addressing the effects of additional high-risk roads and stream crossings will lead to further reductions in sediment and improvements to the primary and integrated habitat indicators. Habitats that are FA maintain strong populations that are interconnected to promote bull trout recovery to a status that will provide self-sustaining and self-regulating populations. Although the bull trout population in the Little Blackfoot drainage is considered a resident population that does not meet criteria for designation as a local population it will continue to be rare and maintained at low population levels as a result of the Divide Travel Plan.

VII. 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.

Residential development is anticipated to increase throughout western Montana which can affect both the species and habitat. Both commercial and residential development on private lands often occur along stream corridors, leading to stream channel alterations exacerbating water temperature, nutrient, and bank stability problems. Angler harvest and poaching has been identified as one reason for bull trout decline (U.S. Fish and Wildlife Service 2015b). It is likely that recreational fishing, especially in known spawning streams in the fall, will increase as the human population in western Montana increases. Misidentification of bull trout has been a concern because of the similarity of appearance with brook trout. Although harvest of bull trout is illegal, incidental catch does occur. The fate of the released bull trout is unknown, but some level of hooking mortality is likely due to the associated stress and handling of the fish (Long 1997).

The harvest of bull trout, either unintentionally or illegally, could have a direct effect on the resident bull trout population and possibly the migratory adfluvial component of bull trout populations in Montana. The extent of the effect would be dependent on the amount of increased recreational fishing pressure, which is a function of the increased number of fishermen utilizing the fish resources each season. Illegal poaching is difficult to quantify, but generally increases in likelihood as the human population in the vicinity grows (Ross 1997).

Global climate change and the related warming of our climate have been well documented. Evidence of global climate change/warming includes widespread increases in average air and ocean temperatures, accelerated melting of glaciers, and rising sea level. Given the increasing certainty that climate change is occurring and is accelerating (IPCC 2007, Battin et al. 2007), we can no longer assume that climate conditions in the future will resemble those in the past.

Cumulative effects within the core areas are reflected in bull trout population numbers and life history forms. All core areas are at risk of increased activities and concern for the viability and effects to bull trout populations are well documented (U.S. Fish and Wildlife Service 2015). Activities occurring on private lands at the same time the proposed federal activities are occurring may result in additive adverse effects to bull trout, at least in the short-term. However, some non-federal activities will likely also be targeted for improving conditions for bull trout over the long-term and will work in concert with federal actions toward recovery of bull trout in some instances.

VIII. Conclusion

Jeopardy analysis of Columbia Basin Bull Trout Population

After reviewing the current status of bull trout, the environmental baseline (including effects of Federal actions covered by previous biological opinions) for the action area, the effects of the proposed road management actions, and the cumulative effects, it is the Service's biological opinion that the actions as proposed, are not likely to jeopardize the continued existence of bull trout. This conclusion is based on the magnitude of the project effects (to reproduction, distribution, and abundance) in relation to the listed population. Implementing regulations for section 7 (50 CFR 402) defines "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 is based on but not limited to the information presented in the 2015 biological assessment (U.S. Forest Service 2015b), correspondence during this consultation process, information in our files, and informal discussions between the Service and the Forest.

Jeopardy determinations for bull trout are made at the scale of the listed entity, which is the coterminous United States population (64 FR 58910). This follows the April 20, 2006, analytical framework guidance described in the Service's memorandum to Ecological Services Project Leaders in Idaho, Oregon and Washington from the Assistant Regional Director – Ecological Services, Region 1 (U.S. Fish and Wildlife Service 2006). The guidance indicates that a biological opinion should concisely discuss all the effects and take into account how those effects are likely to influence the survival and recovery functions of the affected IRU(s), which should be the basis for determining if the proposed action is "likely to appreciably reduce both survival and recovery of the coterminous United States population of bull trout in the wild."

As discussed earlier in this biological opinion (see Part III.), the approach to the jeopardy analysis in relation to the proposed action follows a hierarchical relationship between units of analysis (i.e., geographical subdivisions) that characterize effects at the lowest unit or scale of analysis (the local population) toward the highest unit or scale of analysis (the Columbia Headwaters Recovery Unit). The hierarchical relationship between units of analysis (local population, core areas) is used to determine whether the proposed action is likely to jeopardize the survival and recovery of bull trout. As mentioned previously, should the adverse effects of the proposed action not rise to the level where it appreciably reduces both survival and recovery of the species at a lower scale, such as the local or core population, the proposed action could not jeopardize bull trout in the coterminous United States (i.e. range wide). Therefore, the determination will result in a no-jeopardy finding. However, should a proposed action cause adverse effects that are determined to appreciably reduce both survival and recovery of the species at a lower scale of analysis (i.e., local population or core area), then further analysis is warranted at the next higher scale (i.e., core area).

Our conclusion is based on the magnitude of the project effects in relation to the existing Little Blackfoot population of bull trout. Our rationale for this no jeopardy conclusion is based on the following:

- The Divide Travel Plan is a decision-only action that does not provide measures for implementation of activities that would reduce on-going adverse effects from the existing road network. However, beneficial activities under the decision meet the definition for indirect effects because they are later in time, but still are reasonably certain to occur.

- Proposed Action implementation would close 27% of high-risk roads and 32% of high-risk stream crossings in seven bull trout priority HUC's and 23% of high-risk roads and 44% of high-risk stream crossings in eight adjacent sub-watersheds.

- Local populations are the smallest demographic scale considered important for recovery under the current recovery plan. The Little Blackfoot population of bull trout is does not meet requirements for designation as a local population, but is an important resident population due to its geographical location and potential to be a foundation from which other populations can anchor to and reconnect.

As a result, the Service concludes that implementation of this project is not likely to appreciably reduce the continued existence of bull trout in the upper Little Blackfoot River or at the scale of the Upper Clark Fork River Core Area. Therefore, by extension, the Service concludes that this project will not appreciably reduce both the survival and recovery of the coterminous United States population of the bull trout in the wild.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to 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 essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species 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 the terms and conditions of this Incidental Take Statement.

The measures described below are not discretionary and must be undertaken by the Helena National Forest (Forest) so that they become binding conditions of any contract issued to a road maintenance contractor, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate and oversee the activity covered by this Incidental Take Statement. If the Forest fails to assume and implement the terms and conditions of the Incidental Take Statement, 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 [50 CFR 402.14(i)(3)].

Amount or Extent of Take Anticipated

The Service anticipates that the ongoing use and maintenance of the existing road network results in incidental take of bull trout in the form of harm, harassment, or mortality. Sediment generated and delivered to steams from the existing road network may impact bull trout habitat due to degradation of the *sediment* and *substrate embeddedness* indicators. Sedimentation may cause adverse effects to bull trout and result in mortality during the egg, and juvenile life history stages by smothering redds (direct mortality) and impairing feeding and sheltering patterns of juvenile bull trout to the extent of injury or mortality (harm and/or harassment). Additionally, the Service anticipates a low level of take from degradation over the long-term to the other primary habitat indicators (*temperature*, *barriers*, and *pool frequency and quality*). Degradation of these habitat indicators will impair feeding and sheltering patterns of juvenile and adult bull trout to the extent that injury or mortality (harm and/or harassment) may occur. However, the amount of take is difficult to quantify for the following reasons:

1) The amount of sediment produced and delivered to streams from the existing road network is influenced by site parameters (topography and soil type), weather, location and condition of roads, traffic patterns, and frequency of use.

2) Location and amount of sediment deposition depends on numerous factors (flow regime, size of stream, channel roughness, gradient).

3) Due to the wide ranging distribution of bull trout, identification and detection of dead or impaired species at the egg and larval stages is unlikely. Losses may also be masked by seasonal fluctuations in numbers.

4) Aquatic habitat modifications are difficult to ascribe to particular sources, especially in sub-watersheds that are currently degraded.

5) The proposed action is a travel plan decision that currently does not include a timeframe or method of actually implementing the decision.

For these reasons, the Service has determined the actual amount or extent of incidental take is difficult to determine. Therefore, the Service uses surrogate measures of incidental take. In this biological opinion the Service uses the four primary indicators (*barriers*, *sediment*, *temperature*, and *pool frequency and quality*), proposed reductions in miles of open high risk roads, stream crossings, dispersed campgrounds that are located near streams (Table 4), and other proposed measures to reduce the effects of the existing road network (Table 5) for anticipated levels of incidental take. The metrics in Tables 4 and 5 are the surrogate measures of incidental take. The level of take covered by these surrogate measures would be exceeded if improvements do not occur within the time frame specified or if impacts from proposed designated open roads result in further degradation of the primary indicators.

Table 4. Proposed net change in open high-risk roads[1], stream crossings, and dispersed campsites near streams for sub-watersheds west of the Continental Divide where bull trout may be present.

Sub-watershed	High-Risk Roads (miles)	Stream Crossings (#)	Dispersed Campsites near Streams[2]
Ontario Creek	-0.37	-3	-1
Little Blackfoot-Larabee Creek	-3	-5	-5
Telegraph Creek	-2.38	0	0
Mike Renig Creek	0	0	0

Upper Dog Creek (North)	-6.17	-11	na
Lower Dog Creek	-1.3	-7	na
Little Blackfoot-Hat Creek	-0.36	0	-3
North Trout Creek	-0.35	-1	na
Snowshoe Creek	-2.13	-8	na
Little Blackfoot-Elliston Creek	+0.13	+1	0
Carpenter Creek	-1.06	-3	na
Trout Creek	-0.40	0	0
South Fork Dog Creek	-0.81	-1	0
Upper Dog Creek (South)	-0.96	-3	0
Threemile Creek	0	0	na
Total	**-19.15**	**-41**	**-9**

[1] High-risk roads are roads within INFISH buffers

[2] Surveys have only been completed in sub-watersheds south of Highway 12

The Service anticipates that incidental take of bull trout would occur in the upper Little Blackfoot River and Ontario Creek within the Upper Clark Fork River Core Area. The continued presence of bull trout in these streams is susceptible to road-related adverse effects (influxes of road and activity-created sediment and culvert barriers). Incidental take of bull trout is anticipated to occur for approximately ten years beginning in 2016 and continuing through 2026.

Table 5. Other proposed measures to reduce effects of the existing road network for sub-watersheds west of the Continental Divide where bull trout may be present.

Item No.	Description of Measure
1	Exclude off-route motorized travel and parking within 30 feet of water bodies, wetlands, or any other designated riparian conservation area.
2	Administrative closure and signing of unauthorized roads that prevent attainment of riparian management objectives.
3	Develop a plan to either remove culverts at stream crossings that will be closed (from Table 4) or monitor them annually for failure or plugging.
4	Develop an implementation plan designating which closed high-risk roads (from Table 4) will be closed, stored, or decommissioned and the level of each category.
5	Complete the ongoing road sediment surveys for remaining INFISH priority watersheds and develop a plan to mitigate high-risk roads, crossings, and sediment delivery points that are identified in the remaining surveys.
6	Fords on FSR # 495-DI (123-001, Ontario Creek) and FSR # 4100 would be closed to motorized use until these crossings can be replaced with a bridge or other bottomless AOP compliant structure sized to pass 100-year flood flows.

Effect of the Take

In the accompanying biological opinion, the Service determined that the extent and type of take described is not likely to jeopardize the continued existence of bull trout in the Upper Clark Fork River Core Area of the Columbia Headwaters Recovery Unit.

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 believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of bull trout.

1. Identify and implement means to reduce the potential for incidental take of bull trout that results from adverse effects due to the existing road network.

2. Develop and maintain a minimum road system.

3. Implement reporting requirements as outlined in the terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Forest must comply with the following terms and conditions that implement the reasonable and prudent measure described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary:

To fulfill reasonable and prudent measure 1 the following terms and conditions shall be implemented:

A. Implement proposed actions described in Tables 4 and 5 of this biological opinion within 5 years (by 2021) for the Ontario Creek, Little Blackfoot-Larabee Creek, and Little Blackfoot-Hat Creek HUC's. Proposed actions described in Tables 4 and 5 will be implemented within 10 years (by 2026) for the remaining HUC's.

B. The Forest shall monitor road and trail access in RHCAs for impacts from dispersed recreation. Provide a strategy to the Service to minimize access impacts on RMOs consistent with INFISH standards (RF-1-3) by 2026.

To fulfill reasonable and prudent measure 2 the following terms and conditions shall be implemented within 15 years (by 2031):

C. The Forest shall identify the minimum road system that will result in the primary habitat indicators functioning appropriately (FA) for sub-watersheds within the Divide Travel Plan action area.

D. The Forest will develop and implement a plan to improve habitat indicators that are not functioning appropriately (FUR or FAR) due to road management. If the minimum road system cannot meet the FA condition, the Forest shall clearly document the reasons and identify alternative minimization measures.

E. Identify how the minimum road system implementation plan would improve habitat indicators.

To fulfill reasonable and prudent measure 3, the following terms and conditions shall be implemented:

F. The Forest shall provide monitoring reports on the progress of term and condition A, above, annually by December 1, or by an alternate date as agreed by the Service.

G. The Forest shall provide monitoring reports on the progress of terms and conditions B, C, D, and E at 5-year intervals (2021, 2026, 2031). The report will include an explanation for each indicator that is not planned to become functionally established (i.e. Functioning Appropriately). A map will also be provided in the report to document areas of the Forest that have gone through the minimum roads analysis (CFR 36, part 212.5(a)(1) Sub Part A).

H. Upon locating dead, injured or sick bull trout, or upon observing destruction of redds, notification must be made within 24 hours to the Montana Field Office at 406-449-5225. Record information relative to the date, time, and location of dead or injured bull trout when found, and possible cause of injury or death of each fish and provide this information to the Service.

Closing statement

The Service is unable to precisely quantify the number of bull trout that will be incidentally taken as a result of the Divide Travel Plan. Therefore, we use a surrogate measure for the amount of take we anticipate and provide, in the incidental take statement, specific measures of the incidental take we anticipate. We use proposed reductions in miles of open high risk roads, stream crossings, dispersed campgrounds that are located near streams (Table 4), and other proposed measures (Table 5) as our surrogate measure of the incidental take we anticipate to result from the Divide Travel Plan.

Reasonable and prudent measures, with their implementing terms and conditions, are typically designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, 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

Section 7(a)(1) of the Act directs Federal agencies to utilize 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 recommendations that; (1) identify discretionary measures a Federal agency can take to minimize or avoid the adverse effects of a proposed action on listed or proposed species, or designated or proposed critical habitat, (2) identify studies, monitoring, or research to develop new information on listed or proposed species, or designated or proposed critical habitat, and, (3) include suggestions on how an action agency can assist species conservation as part of their action and in furtherance of their authorities under section 7(a)(1) of the Act. The Service provides the following recommendations:

1. Section 2672.2 of the Forest Service Manual states: "The Forest Service must manage habitats at levels that accomplish the recovery of Federally listed species so that protective measures under the Act are no longer necessary." The BT Conservation Strategy (U.S. Forest Service 2013) was intended, in part, to "help direct resources to the most important opportunities, where FS management has the potential to increase habitat quality and connectivity". The BT Conservation Strategy should be considered for management opportunities to improve habitat conditions that are conducive to the recovery of bull trout.

2. The Forest should continue to monitor, inventory, investigate, and document bull trout populations and spawning activities throughout the entire action area. For example, recent techniques using eDNA provide efficient, cost-effective methods to document bull trout in the action area and potential sub-watersheds on other areas of the Forest. The use of eDNA sampling or some other method of sampling is especially encouraged in priority sub-watersheds of the Little Blackfoot River that were not sampled during fall 2015.

3. Work cooperatively with state, private, and other federal agencies to reduce impacts caused by dewatering and habitat degradation in the Little Blackfoot River portion of the Upper Clark Fork River Core Area.

Reinitiation Notice

This concludes formal consultation for bull trout on the Divide Travel Plan for the Helena National Forest. 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 retained (or is authorized by law) and if: (1) the amount or extent of incidental take 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 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. In this particular case, this anticipated level of take in the incidental take statement would be exceeded if improvements listed in Tables 4 and 5 do not occur within the time frame specified, or if impacts from the proposed designated open roads result in degradation of a primary indicator during 2016 through 2026.

References Cited

Adams, S. B. 1999. Mechanisms limiting a vertebrate invasion: brook trout in mountains streams of northwestern USA. PhD dissertation. University of Montana, Missoula, MT.

Ardren, W.R., P.W. DeHaan , C.T. Smith , E.B. Taylor , R. Leary , C.C. Kozfkay , L. Godfrey , M. Diggs , W. Fredenberg , J. Chan, C.W. Kilpatrick , M.P. Small, and D.K. Hawkins. 2011. Genetic Structure, Evolutionary History, and Conservation Units of Bull Trout in the Coterminous United States, Transactions of the American Fisheries Society, 140:2, 506-525.

Battin, J., M.W. Wiley, M.H. Ruckelshaus, R.N. Palmer, E. Korb, K.K. Bartz, and H. Imaki. 2007. Projected impacts of climate change on salmon habitat restoration. Proceedings of the National Academy of Sciences of the United States of America 104(16):6720-6725.

Baxter, C.V. 2002. Fish movement and assemblage dynamics in a Pacific Northwest riverscape. Doctor of Philosophy in Fisheries Science. Oregon State University, Corvallis, Oregon. 174 pp.

Baxter, C.V., C.A. Frissell, and F.R. Hauer. 1999. Geomorphology, logging roads, and the distribution of bull trout spawning in a forested river basin: implications for management and conservation. Transactions of the American Fisheries Society 128: 854-867.

Beauchamp, D.A., and J.J. VanTassell. 2001. Modeling seasonal trophic interactions of adfluvial bull trout in Lake Billy Chinook, Oregon. Transactions of the American Fisheries Society 130:204-216.

Belford, D. A., and W. R. Gould. 1989. An evaluation of trout passage through six highway culverts in Montana. N. Am. J. Fish. Manage. 9: 437-445.

Bjornn, T.C., Brusven, M. A., Molnau, M. P., Milligan, J. H., Klamt, R. A., Chacho, E. and Scbaye, C. 1977. Transport of granitic sediment and iu effects on insects and fish. Bulletin Number 17, College o(Forestry, Wildlife, and Range Sciences, University of Idaho, Boise, ID, 43 p

Boag, T.D. 1987. Food habits of bull char (*Salvelinus confluentus*), and rainbow trout (*Salmo gairdneri*), coexisting in a foothills stream in northern Alberta. Canadian Field-Naturalist 101(1):56-62.

Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. Pages 1-4 in Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis.

Bonneau, J.L., and D.L. Scarnecchia. 1996. Distribution of juvenile bull trout in a thermal gradient of a plunge pool in Granite Creek, Idaho. Transactions of the American Fisheries Society 125(4):628-630. Can. J. Fish. Aquat. Sci. 71: 1059–1071

Bowermann, T., B. T. Nielson, and P. Budy. 2014. Effects of fine sediment, hyporheic flow, and spawning site characteristics on survival and development of bull trout embryos.

Brenkman, S.J., and S.C. Corbett. 2005. Extent of anadromy in bull trout and implications for conservation of a threatened species. North American Journal of Fisheries Management 25:1073-1081.

Brewin, P.A., and M.K. Brewin. 1997. Distribution maps for bull trout in Alberta. Pages 209-216 In Mackay, W.C., M.K. Brewin and M. Monita eds. Friends of the Bull Trout, Bull Trout Task Force (Alberta), c/o Trout Unlimited, Calgary, Alberta T2P 2C8, Canada. 8 pp.

Buchanan, D.V., and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other cold water species in Oregon. Pages 119-126 In Mackay, W.C., M.K. Brewing and M. Monita eds. Friends of the Bull Trout, Alberta, Canada.

Buckman, R.C., W.E. Hosford, and P.A. Dupee. 1992. Malheur River bull trout investigations. Pages 45-57 in Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis.

Burkey, T.V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance of migration between reserve fragments. Oikos 55:75-81.

Burkey, T.V. 1995. Extinction rates in archipelagoes: Implications for populations in fragmented habitats. Conservation Biology 9: 527-541

Cavender, T.M. 1978. Taxonomy and distribution of the bull trout, *Salvelinus confluentus* (Suckley), from the American Northwest. California Fish and Game 64(3):139-174.

Clancy, C.G.; Reichmuth, D.R. 1990. A detachable fishway for steep culverts. North American Journal of Fisheries Management. 10(2): 244-246.

Costello, A.B., T.E. Down, S.M. Pollard, C.J. Pacas, and E.B. Taylor. 2003. The influence of history and contemporary stream hydrology on the evolution of genetic diversity within species: an examination of microsatellite DNA variation in bull trout, *Salvelinus confluentus* (Pisces: Salmonidae). Evolution. 57(2): 328-344.

Donald, D.B., and D.J. Alger. 1993. Geographic distribution, species displacement, and niche overlap for lake trout and bull trout in mountain lakes. Canadian Journal of Zoology 71:238-247.

Dunham, J.B. and B.E. Rieman. 1999. Metapopulation structure of bull trout: influences of physical, biotic, and geometrical landscape characteristics. Ecological Applications. 9: 642-655.

Dunham, J., B. Rieman, and G. Chandler. 2003. Influences of temperature and environmental variables on the distribution of bull trout within streams at the southern margin of its range. North American Journal of Fisheries Management 23:894-905.

Evans, W.A. and F. B. Johnston. 1980. Fish Migration and Fish Passage. A Practical Guide to Solving Fish Passage Problems. U.S. Department of Agriculture-Forest Service Region 5 report. June 1972. Revised March 1974. Revised 1980. 63 pages.

Fleming, D.F, 1989. "Effects of Spawning Run Delay on Spawning Migration of Arctic Grayling." Alaska Cooperative Fishery Research Unit, Unit Contribution No. 29, Univ. of Alaska, Fairbanks.

Fraley, J.J., and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake and River system, Montana. Northwest Science 63(4):133-143.

Frissell, C.A. 1999. An ecosystem approach to habitat conservation for bull trout: groundwater and surface water protection. Flathead Lake Biological Station, University of Montana, Open File Report Number 156-99, Polson, MT, January 07, 1999. 46 pp.

Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. Road construction and maintenance. Pages 297-323 in W.R. Meehan, editor. American Fisheries Society Special Publication.

Goetz, F. 1989. Biology of the bull trout, *Salvelinus confluentus*, a literature review. Willamette National Forest, Eugene, Oregon, February 1989. 53 pp.

Goetz, F.A. 1994. Distribution and juvenile ecology of bull trout (*Salvelinus confluentus*) in the Cascade Mountains. M.S. thesis. Oregon State University, Corvallis.

Goetz, F., E.D. Jeanes, and E.M. Beamer. 2004. Bull trout in the nearshore. U.S. Army Corps of Engineers, Preliminary draft, Seattle, Washington, June 2004. 396 pp.

Gunckel S. L., A. R. Hemmingsen, and L. L. Judith. 2002. Effects of bull trout and brook trout interactions on foraging habitat, feeding behavior, and growth. Transactions of the American Fisheries Society. 131:1119-1130.

Grace, J.M. III and B.D. Clinton. 2007. Protecting soil and water in forest road management. Trans. ASABE 50(5): 1579-1584

Gresswell, R. E. 1999. Fire and aquatic ecosystems in forested biomes of North America. Transactions of the American Fisheries Society. 128:193–221

Haas, G.R., and J.D. McPhail. 2001. The post-Wisconsin glacial biogeography of bull trout (Salvelinus confluentus): a multivariate morphometric approach for conservation biology and management. Canadian Journal of Fisheries and Aquatic Sciences 58:2189-2203.

Harr, R. D., W. C. Harper, J. T. Krygier, and F. S. Hsieh. 1975 Changes in storm hydrographs after road building and clear-cutting in the Oregon Coast Range, Water Resour. Res., 11(3), 436-444.

Heede, B.H. 1980. Stream dynamics: an overview for land managers. Gen. Tech. Rep. RM-72. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 26 p.

Henjum. M. G.. and seven coauthors. 1994. Interim protection for late-successional forests, fisheries, and watersheds. National forests cast of the Cascade Crest, Oregon and Washington. The Wildlife Society.Bethesda. Maryland.

Hoelscher, B., and T.C. Bjornn. 1989. Habitat, density, and potential production of trout and char in Pend Oreille Lake tributaries. Idaho Department of Fish and Game, Project F-710R-10, Subproject III, Job No. 8., Boise, Idaho, January 1989. 60 pp.

Howell, P.J., and D.V. Buchanan. 1992. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon. 67 pp.

Isaak, D.J., C.H. Luce, B.E. Rieman, D.E. Nagel, B.E. Peterson, D.L. Horan, S. Parkes, and G.L. Chandler. 2010. Effects of climate change and wildfire on stream temperatures and salmonid thermal habitat in a mountain river network. Ecological Applications 20:1350-1371.

Isaak, D.J., M.K. Young, D. Nagel, and D. Horan. 2014. Coldwater as a climate shield to preserve native trout through the 21st century. Pages 110-116 in: R.F. Carline and C. LoSapio (editors). Looking back and moving forward. Proceedings of the Wild Trout Symposium XI, Bozeman, Montana.

Isaak, D.J., M.K. Young, D. Nagel, D. Horan and M.C. Groce. 2015. The coldwater climate shield: Delineating refugia to preserve salmonid fishes through the 21st century. Global Change Biology 21:2540-2553.

IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

Jakober, M.J. 1998. Role of stream ice on fall and winter movements and habitat use by bull trout and cutthroat trout in Montana headwater streams. Transactions of the American Fisheries Society 127:223-235.

Kanda, N., R.F. Leary, and F.W. Allendorf. 2002. Evidence of introgressive hybridization between bull trout and brook trout. Transactions of the American Fisheries Society, 131:772-782.

Koopman, M.E., R.S. Nauman, B.R. Barr, S.J. Vynne, and G.R. Hamilton. 2009. Projected future conditions in the Klamath Basin of Southern Oregon and Northern California. National Center for Conservation and Science Policy, Climate Change Leadership Initiative, MAPPS Team of U.S. Department of Agriculture, Forest Service, Ashland, Ore.

Leary, R.F., F.W. Allendorf, and K.L. Knudsen. 1983. Consistently high meristic counts in natural hybrids between brook and bull trout. Systematic Zoology 32: 369-376.

Leary, R.F.; F.W. Allendorf, and S. H. Forbes. 1993. Conservation genetics of bull trout in the Columbia and Klamath River watersheds. Conservation Biology. 7:856-865.

Leary, R.F., and F.W. Allendorf. 1997. Genetic confirmation of sympatric bull trout and Dolly Varden in western Washington. Transactions of the American Fisheries Society 126:715-720.

Leathe, S.A., and P.J. Graham. 1982. Flathead Lake fish food habits study. US EPA, Region VIII, Water Division, Contract R008224-01-4, Denver, Colorado, October, 1982. 209 pp.

Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow and J.E. Williams. 1997. Chapter 4: Broadscale assessment of aquatic species and habitats. Pages 1057-1496 in Quigley, T.M. and S.J. Arbelbide, editors. An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins: Volume III. PNW-GTR-405. U.S. Forest Service, Portland, Oregon.

Leopold and Miller. 1956. Ephemeral stream-hydraulic factors and their relation to the drainage network. USGS Professional Paper 282-A. USGS Gov. Printing office. Wash.DC.

Long, M.H. 1997. Sociological implications of bull trout management in northwest Montana: illegal harvest and game warden efforts to deter. In: W.C. Mackay, M.K. Brewin, and M. Monita, editors. Friends of the bull trout conference proceedings, Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada, Calgary pp. 71-74.

Luce, C. H. 1997. Effectiveness of road ripping in restoring infiltration capacity of forest roads. Restoration Ecology. 5(3):265-270.

Luce, C. A. and T. A. Black 1999. Sediment production from forest roads in western Oregon. Water Resour. Res. 35(8):2561-2570.

McCaffery, M. T. A. Switalski, and L. Eby. 2007. Effects of road decommissioning on stream habitat characteristics in the South Fork Flathead River. Transactions of the American Fisheries Society 136: 553-561.

McPhail, J.D., and J.S. Baxter. 1996. A review of bull trout (*Salvelinus confluentus*) life-history and habitat use in relation to compensation and improvement opportunities. Department of Zoology, University of British Columbia, Vancouver, British Columbia. Fisheries Management Report No. 104.

Meehan, W.R., editor. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19.

Meffe, G.K., and C.1L Carroll. 1994. Principles of conservation biology. Sinauc~ Associate,Inc. Sunderland, MA.

MBTSG (Montana Bull Trout Scientific Group). 1998. The relationship between land management activities and habitat requirements of bull trout prepared for: The Montana Bull Trout Restoration Team, Montana Fish, Wildlife and Parks, Helena.

McPhail, J.D., and J.S. Baxter. 1996. A review of bull trout (*Salvelinus confluentus*) life-history and habitat use in relation to compensation and improvement opportunities. Department of Zoology, University of British Columbia, Fisheries Management Report Number 104, Vancouver, British Columbia. 36 pp.

Montana Bull Trout Restoration Team. 2000. Restoration plan for bull trout in the Clark Fork River basin and Kootenai River basin, Montana. Montana Fish, Wildlife and Parks, Helena.

MTDEQ (Montana Department of Environmental Quality). 2005. Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area. Montana Department of Environmental Quality, Helena, Montana.

Montgomery, D. R. 1994. Road surface drainage, channel initiation and slope instability. Water Resour. Res. 30(6): 1925-1932.

Mote, P. W., A. F. Hamlet, M. P. Clark, and D. P. Lettenmaier. 2005. Declining mountain snowpack in western North America. Bulletin of the American Meteorological Society 86:39-49.

Moyle P.B. 1976. Fish Introductions in California. History and impacts on native fishes. Biological Conservation. 9: 101-118.

Mullan J. W. Williams K, Rhodus J. Hillman T., McIntyre J. 1992. Production and habitat of salmonids in mid-Columbia River tributary streams. Monograph 1, Washington D.C. U.S. Fish and Wildlife Service. 60 pp.

Myrick, C.A., F.T. Barrow, J.B. Dunham, B.L. Gamett, G.R. Haas, J.T. Peterson, B. Rieman, L.A. Weber, and A.V. Zale. 2002. Bull trout temperature thresholds:peer review summary. USFWS, Lacey, Washington, September 19, 2002. 14 pp.

Nelson, K. C. and M. A. Palmer. 2007. Stream temperature surges under urbanization and climate change: data, models, and responses. Journal of American Water resources Association 43(2):440-452.

ODEQ (Oregon Department of Environmental Quality). 1995. 1992-1994 water quality standards review: dissolved oxygen - final issue paper. Oregon Department of Environmental Quality, Portland, OR.

Peterson, D.P., S.J. Wenger, B.E. Rieman, and D.J. Isaak. 2013. Linking climate change and fish conservation efforts using spatially explicit decision support tools. Fisheries 38:112-127.

Poff, N.L., M.M. Brinson, and J.W. Day, 2002. Aquatic Ecosystems and Global Climate Change, Pew Center on Global Climate Change, Arlington, Virginia, 44 pp.

Pratt, K. L. 1985. Pend Oreille trout and char life history study. Idaho Department of Fish and Game, Boise.

Pratt, K.L. 1992. A review of bull trout life history. Pages 5-9 In Howell, P.J. and D.V. Buchanan eds. Proceedings of the Gearhart Mountain bull trout workshop, Oregon Chapter of the American Fisheries Society, Corvallis, Oregon. 5 pp.

Pratt, K.L., and J.E. Huston. 1993. Status of bull trout (*Salvelinus confluentus*) in Lake Pend Oreille and the lower Clark Fork River: draft. The Washington Power Company, Spokane.

Quigley, T. M. and S. J. Arbelbide. 1997. An assessment of ecosystem components in the interior Columbia basin and portion of the Klamath and Great basins: volume III. Pages 1,057 - 1,713 in Quigley, T.M., editor. The Interior Columbia Basin Ecosystem Management Project: Scientific Assessment. PNW-GTR-405.U.S. Forest Service, Portland, Oregon.

Quinn, T. P. 2005. The behavior and ecology of Pacific salmon and trout. University of Washington Press, Seattle.

Ratliff, D.E., and P.J. Howell. 1992. The status of bull trout populations in Oregon. Pages 10-17 in Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis.

Rhodes, J.J., McCullough, D.A., and Espinosa Jr., F.A. 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Technical Report. 94-4, Portland, Or.

Rich, C. F. 1996. Influence of abiotic and biotic factors on occurrence of resident bull trout in fragmented habitats, western Montana. M. S. thesis Montana State University, Bozeman.

Rieman, B.E. and F.W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. North American Journal of Fisheries Management 21:756-764.

Rieman, B., and J. Clayton. 1997. Wildfire and native fish: Issues of forest health and conservation of sensitive species. Fisheries 22:6-14.

Rieman, B.E., and J.B. Dunham. 2000. Metapopulations and salmonids: a synthesis of life history patterns and empirical observations. Ecology of Freshwater Fish 9:51-64.

Rieman, B.E., D. Isaak, S. Adams, D. Horan, D. Nagel, C.H. Luce, and D. Myers. 2007. Anticipated climate warming effects on bull trout habitats and populations across the interior Columbia River Basin. Transactions of the American Fisheries Society 136(6):1552-1565.

Rieman, B. E., D.C. Lee, and R. F. Thurow. 1997. Distribution, status, and likely future trends of bull trout in the interior Columbia River basin and Klamath River basins. North American Journal of Fisheries Management 17:1111-1125.

Rieman, B. E. and J. D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. GTR-INT-302. U.S. Forest Service, Boise, Idaho.

Rieman, B. E. and J. D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. Transactions of the American Fisheries Society 124:285-296.

Rieman, B.E., and J.D. McIntyre. 1996. Spatial and temporal variability in bull trout redd counts. North American Journal of Fisheries Management 16:132-141.

Rieman, B. E., J. T. Peterson, and D. L. Myers. 2006. Have brook trout displaced bull trout along longitudinal gradients in central Idaho streams? Canadian Journal of Fisheries and Aquatic Sciences 63:63–78.

Rieman, B. E., D. Isaak. 2007. Anticipated Climate Warming Effects on Bull Trout Habitats and Population Across the Interior Columbia River Basin. Transactions of the American Fisheries Society 136:1552-1565.

Rieman, B. E., D. Isaak. 2010. Climate Change, Aquatic Ecosystems, and fishes in the Rocky Mountain West: Implications and Alternatives for Management. Gen. Tech. Rep. RMS-GTR-250. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 46p.

Riggers, B. W. et al. 1998. An Evaluation of Fisheries and Aquatic Habitat Conditions in Developed and Undeveloped Watersheds on the Lolo National Forest, U.S. Forest Service.

Reid, L. M., and T. Dunne. 1984. Sediment production from forest road surfaces. Water Resources Research. 20:1753–1761

Ross, M.R.. 1997. Fisheries Conservation and Management. Chapter 4: The Human Factor in Fisheries Conservation and Management. Prentice Hall, New Jersey. 374pp.

Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentalion: A review. Conservation Biology 5:18-32.

Schmetterling, D.A. and M.H. Long. 1999. Montana anglers' inability to identify bull trout and other salmonids. Fisheries 24(7):24-27.

Sedell, J.R., and F.H. Everest. 1991. Historic changes in pool habitat for Columbia River Basin salmon under study for TES listing. Pacific Northwest Research Station, Draft U.S. Department of Agriculture Report, Corvallis, Oregon. 6 pp.

Sexauer, H.M., and P.W. James. 1997. Microhabitat use by juvenile bull trout in four streams located in the eastern Cascades, Washington. Pages 361-370 *In* W.C. McKay, M.K. Brewin, and M. Monita, eds. Friends of the Bull Trout Conference Proceedings, Bull Trout Task Force (Alberta), c/o Trout Unlimited, Calgary, Alberta, Canada.

Simpson, J.C., and R.L. Wallace. 1982. Fishes of Idaho. University of Idaho Press, Moscow, ID. 93 pp.

Spruell, P., B.E. Rieman, K.L. Knudsen, F.M. Utter, and F.W. Allendorf. 1999. Genetic population structure within streams: microsatellite analysis of bull trout populations. Ecology of Freshwater Fish (8):114-121.

Spruell, P., A.R. Hemmingsen, P.J. Howell, N. Kanda, and F. Allendorf. 2003. Conservation genetics of bull trout: Geographic distribution of variation at microsatellite loci. Conservation Genetics 4: 17-29.

Stewart, D.B., N.J. Mochnacz, C.D. Sawatzky, T.J. Carmichael, and J.D. Reist. 2007. Fish life history and habitat use in the Northwest territories: Bull trout (*Salvelinus confluentus*). Department of Fisheries and Oceans, Canadian Manuscript Report of Fisheries and Aquatic Sciences 2801, Winnipeg, MB, Canada, 2007. 54 pp.

Swanburg, T. 1997. Movements of bull trout (*Salvelinus confluentus*) in the Clark Fork River system after transport upstream of Milltown Dam. Northwest Science 71:313-317.

Taylor, B.E., S. Pollard, and D. Louie. 1999. Mitochondrial DNA variation in bull trout (*Salvelinus confluentus*) from northwestern North America: implications for zoogeography and conservation. Molecular Ecology 8:1155-1170.

Thomas, G. 1992. Status report: bull trout in Montana. Montana Department of Fish, Wildlife and Parks, Helena.

Taylor, E.B., S. Pollard, and D. Louie. 1999. Mitochondrial DNA variation in bull trout (*Salvelinus confluentus*) from northwestern North America: implications for zoogeography and conservation. Molecluar Ecology. 8:1155-1170.

U.S. Fish and Wildlife Service. 1996. Policy regarding the recognition of distinct vertebrate population segments under the Endangered Species Act. February 7, 1996. Federal Register 61:4722-4725

U.S. Fish and Wildlife Service. 1998. A framework to assist in making endangered species act determinations of effect for individual or grouped action at the bull trout subpopulation watershed scale. Region 1, USFWS.

U.S. Fish and Wildlife Service. 1998a. Biological Opinion for the Effects to Bull Trout from the Continued Implementation of Land and Resource Management Plans and Resource Management Plans as Amended by the Interim Strategies for Managing Fish Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana and portions of Nevada (INFISH) and the Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho and portions of California (PACFISH). Region 1, USFWS.

U.S. Fish and Wildlife Service. 1998b. Endangered and threatened wildlife and plants: determination of threatened status for the Klamath River and Columbia River distinct population segments of bull trout. June 10, 1998. Federal Register 63:31647-31674.

U.S. Fish and Wildlife Service. 1999. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States. Fish and Wildlife Service, Department of the Interior. 50 CFR 17, Vol. 64, No. 210, p. 58910-58933.

U.S. Fish and Wildlife Service. 2002. Chapter 1, Introduction, Bull Trout (Salvelinus confluentus) Draft Recovery Plan. Portland, Oregon (www.fws.gov/pacific/bulltrout/colkla/recovery/).

U.S. Fish and Wildlife Service. 2004. Designation of critical habitat for the Klamath River and Columbia River populations of bull trout. 69 FR 59996 – 60076.

U.S. Fish and Wildlife Service. 2004a. Draft Recovery Plan for the Coastal-Puget Sound Distinct Population Segment of Bull Trout (*Salvelinus confluentus*). Volume I (of II): Puget Sound Management Unit. Portland Oregon.

U.S. Fish and Wildlife Service. 2004b. Draft Recovery Plan for the Jarbidge Distinct Population Segment of Bull Trout (*Salvelinus confluentus*). Volume I (of II): Puget Sound Management Unit. Portland Oregon.

U.S. Fish and Wildlife Service. 2005. Endangered and threatened wildlife and plants; designation of critical habitat for the bull trout. September 26, 2005. 70 FR 56212-56311.

U.S. Fish and Wildlife Service. 2005a. Bull trout core area templates - complete core area by core area analysis. U.S. Fish and Wildlife Service, Portland, Oregon. 662 pp.

U.S. Fish and Wildlife Service. 2005b. Bull trout core area conservation status assessment. W. Fredenberg, J. Chan, J. Young and G. Mayfield, editors. U. S. Fish and Wildlife Service. Portland, Oregon. 95 pages plus attachments.

U.S. Fish and Wildlife Service. 2006. Jeopardy Determinations under Section 7 of the Endangered Species Act for the Bull Trout. Memorandum to Ecological Services Project Leaders - Idaho, Oregon, Washington from Region 1 Assistant Regional Director, U.S. Fish and Wildlife Service, Ecological Services. Portland, Oregon. April 20, 2006.

U.S. Fish and Wildlife Service. 2007. Biological Opinion of Road Related Actions on Western Montana's Federal Lands that is Likely to Adversely Affect Bull Trout. U.S. Forest Service, and U.S Bureau of Land Management. Helena Montana.

U.S. Fish and Wildlife Service. 2008. Bull trout (*Salvelinus confluentus*) 5-year review: Summary and evaluation. U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service. 2009. Bull trout core area templates - complete core area by core area re-analysis. W. Fredenberg and J. Chan, editors. U. S. Fish and Wildlife Service. Portland, Oregon. XX pp

U.S. Fish and Wildlife Service. 2009a. Bull Trout Proposed Critical Habitat Justification: Rationale for Why Habitat is Essential, and Documentation of Occupancy. U. S. Fish and Wildlife Service. Portland, Oregon. 32 pages

U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; revised designation of critical habitat for bull trout in the coterminous United States; final rule. October 18, 2010. Federal Register 75:63898-64070.

U.S. Fish and Wildlife Service. 2015. Recovery plan for the coterminous United States population of bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Portland, Oregon. xii + 179 pp.

U.S. Fish and Wildlife Service. 2015a. Coastal recovery unit implementation plan for bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Lacey, Washington, and Portland, Oregon. 155 pp.

U.S. Fish and Wildlife Service. 2015b. Columbia headwaters recovery unit implementation plan for bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Kalispell, Montana, and Spokane, Washington. 179 pp.

U.S. Fish and Wildlife Service. 2015c. Klamath recovery unit implementation plan for bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Klamath Falls, Oregon. 35 pp.

U.S. Fish and Wildlife Service. 2015d.Mid-Columbia recovery unit implementation plan for bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Portland, Oregon. 345 pp.

U.S. Fish and Wildlife Service. 2015e. St. Mary recovery unit implementation plan for bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Kalispell, Montana. 30 pp.

U.S. Fish and Wildlife Service. 2015f. Upper Snake recovery unit implementation plan for bull trout (*Salvelinus confluentus*). U.S. Fish and Wildlife Service, Boise, Idaho. 113 pp.

U.S. Forest Service, 1995. Inland Native Fish Strategy Environmental Assessment (INFISH), Decision Notice and Finding of No Significant Impact, 1995, Intermountain, Northern, and Pacific Northwest Regions. U.S. Department of Agriculture, Forest Service. July 28. http://www.fs.fed.us/r6/fish/9506-infish.pdf.

U.S. Forest Service. 2000. Watershed Baseline Condition; Little Blackfoot River Portion of the Upper Clark Fork Section 7 Watershed. Helena National Forest Supervisors Office, Helena Montana.

U.S. Forest Service. 2005. Travel management; Designated routes and areas for motor vehicle use; final rule. November 9, 2005. Federal Register 70:68264-68291.

U.S. Forest Service. 2006 Northern Region Culvert/Aquatic Organism Passage Assessment October 2006. Region 1 Forest Service, Missoula Montana.

U.S. Forest Service. 2007. Biological Assessment of Road Related Actions on Western Montana's Federal Lands that is Likely to Adversely Affect Bull Trout. U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management. Submitted to the U.S. Fish and Wildlife Service, Montana Field Office. Helena, Montana. 21 pp.

U.S. Forest Service. 2010. Watershed Baseline Condition Update; Little Blackfoot River Portion of the Upper Clark Fork Section 7 Watershed. Helena National Forest Supervisors Office, Helena Montana.

U.S. Forest Service. 2011. Projects that would likely benefit bull trout that are planned to be implemented by the Bitterroot National Forest by 2015. Memo Bitterroot National Forest, Hamilton Montana, Region 1 Forest Service.

U.S. Forest Service. 2013. Conservation Strategy for Bull Trout on USFS Lands in Western Montana. USDA Forest Service, Northern Region. Missoula, MT.

U.S. Forest Service 2015. Travel analysis report for Helena National Forest. Helena National Forest Supervisors Office, Helena Montana

U.S. Forest Service. 2015a. Biological assessment for bull trout, Divide travel plan, including supplemental information received during consultation. Helena Ranger District, Helena National Forest. U.S.D.A. Forest Service, Helena National Forest, Helena, Montana.

Watson, G., and T.W. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: an investigation at hierarchical scales. North American Journal of Fisheries Management 17(2):237-252.

Weaver, W. E., M. M. Hektner, D. K. Hagans, L.J. Reed, R.A. Sonneville, and G.]. Bundros. 1987. An evaluation of experimental rehabilita tion work, Redwood National Park. Technical report 19. Redwood National Park, Arcata, California.

Weaver, T.; Fraley, J. 1991. Fisheries habitat and fish populations. Flathead basin forest practices, water quality and fisheries cooperative program. Kalispell, MT: Flathead Basin Commission. 47 p.

Wenger, S.J., D.J. Isaak, J.B. Dunham, K.D. Fausch, C.H. Luce, H.M. Neville, B.E. Rieman, M.K. Young, D.E. Nagel, D.L. Horan, and G.L. Chandler. 2011. Role of climate change and invasive species in structuring trout distributions in the interior Columbia River Basin, USA. Canadian Journal of Fisheries and Aquatic Sciences 68:988-1008.

Westerling, A.L., H.G. Hidalgo, D.R. Cayan, and T.W. Swetnam. 2006. Warming and earlier spring increase western U.S. forest wildfire activity. Science 313:940-943.

Whiteley, A., P. Spruell and F.W. Allendorf. 2003. Population genetics of Boise Basin bull trout (*Salvelinus confluentus*). Final Report to Bruce Rieman, Rocky Mountain Research Station. University of Montana Wild Trout and Salmon Genetics Lab, Missoula, Montana.

Whitesel, T.A. and 7 coauthors. 2004. Bull trout recovery planning: A review of the science associated with population structure and size. Science Team Report #2004-01, U.S. Fish and Wildlife Service, Region 1, Portland, Oregon.

WDFW, FishPro Inc., and Beak Consultants. 1997. Grandy Creek trout hatchery biological assessment. Washington Department of Fish and Wildlife, Olympia, WA, March 1997. 47 pp.

WDOE. 2002. Evaluating criteria for the protection of freshwater aquatic life in Washington's surface water quality standards - dissolved oyxgen: Draft discussion paper and literature summary. Washington Department of Ecology, Publication Number 00-10-071, Olympia, WA, December 2002.
90 pp.

Ziller, J.S. 1992. Distribution and Relative Abundance of Bull Trout in the Sprague River Subbasin, Oregon. Pages 18-29 in Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis

Appendix A. Environmental baseline and effects analysis for sub-watersheds in the action area.

The framework/matrix on the following pages defines the biological requirements for bull trout and facilitates an evaluation of the environmental baseline and effects of the proposed action. Evaluation of species and habitat indicators were conducted at the 6th field Hydrologic Unit Code (HUC or sub-watersheds) to establish the environmental baseline (from USFS 2010). Definitions for the baseline determinations are Functioning Appropriately (FA), Functioning at Risk (FAR), and Functioning at Unacceptable Risk (FUR), as discussed in U.S. Fish and Wildlife Service 1998, Table 1. Analysis of species and habitat indicators can provide a thorough evaluation of the existing baseline condition and potential project impacts to the species.

Matrix checklist of baseline condition[1] and action effects[2] for watersheds (indicated by last 5 numbers of 6th field HUC) west of the continental divide in the Divide Travel Plan area.

Diagnostic/Pathways Indicators	10501* Ontario	10502* Larabee	10503 Telegraph	10504 Mike Renig	10505 Upper Dog	10506* Lower Dog
Subpopulation Characteristics						
Subpopulation size	FAR (d)	FAR (d)	FAR (d)	FAR (d)	FAR (d)	FAR (d)
Growth & Survival	FAR (d)	FAR (d)	FAR (d)	FAR (d)	FAR (d)	FAR (d)
Life History Diversity & Isolation	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)
Persistence and Genetic Integrity	FUR (d)	FUR (d)	FUR (d)	FUR (d)	FUR (d)	FUR (d)
Water Quality						
Temperature	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FUR (m)	FUR (m)
Sediment	FUR (r)	FAR (r)	FUR (r)	FUR (m)	FUR (r)	FUR (r)
Chemical Contamination/ Nutrients	FUR (m)	FA (m)	FUR (m)	FAR (m)	FAR (m)	FAR (m)
Habitat Access						
Physical Barriers	FAR (m)	FA (m)	FAR (m)	FAR (m)	FA (m)	FA (m)
Habitat Elements						
Substrate Embeddedness	FUR (r)	FAR (r)	FUR (r)	FUR (m)	FUR (r)	FUR (r)
Large Woody Debris	FAR (m)	FA (m)	FAR (m)	FA (m)	FUR (m)	FUR (m)
Pool Frequency & Quality	FAR (m)	FA (m)	FUR (m)	FAR (m)	FUR (m)	FUR (m)
Large Pools	FAR (m)	FA (m)	FUR (m)	FAR (m)	FUR (m)	FUR (m)
Off Channel Habitat	FUR (m)	FAR (m)	FUR (m)	FAR (m)	FUR (m)	FUR (m)
Refugia	FAR (m)	FA (m)	FAR (m)	FAR (m)	FUR (m)	FUR (m)
Channel Condition & Dynamics						
Wetted Width/Depth Ratio	FAR (m)	FA (m)	FAR (m)	FAR (m)	FUR (m)	FUR (m)
Streambank Condition	FAR (m)	FA (m)	FAR (m)	FAR (m)	FUR (m)	FUR (m)
Floodplain Connectivity	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FUR (m)	FUR (m)
Flow Hydrology						
Change in Peak/Base Flows	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Drainage Network Increase	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Watershed Conditions						
Road Density & Location	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)
Disturbance History	FAR (m)	FA (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Riparian Conservation Areas	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FUR (m)	FUR (m)
Disturbance Regime	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FUR (m)	FUR (m)
INTEGRATION OF SPECIES HABITAT CONDITIONS	FUR (d)	FAR (d)	FUR (d)	FUR (d)	FUR (d)	FUR (d)

[1] FA = Functioning Appropriately, FAR = Functioning at Risk, FUR = Functioning at Unacceptable Risk.

[2] r = restore, m = maintain, d = degrade. Lower case = minor effects, uppercase = major effects.

* Indicates watersheds where bull trout have been documented at some point.

Matrix (continued) of baseline condition[1] and action effects[2] for watersheds (indicated by last 5 numbers of 6th field HUC) west of the continental divide in the Divide Travel Plan area.

	10507* Hat	10601 North Trout	10602 Snowshoe	10603 Elliston	10604 Carpenter	10605 Trout
Subpopulation Characteristics						
Subpopulation size	FAR (d)	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Growth & Survival	FAR (d)	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Life History Diversity & Isolation	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)
Persistence and Genetic Integrity	FUR (d)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)
Water Quality						
Temperature	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Sediment	FUR (r)	FUR (m)	FUR (m)	FUR (m)	FAR (m)	FUR (m)
Chemical Contamination/ Nutrients	FUR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Habitat Access						
Physical Barriers	FAR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FAR (m)
Habitat Elements						
Substrate Embeddedness	FUR (r)	FUR (m)	FUR (m)	FUR (m)	FAR (m)	FUR (m)
Large Woody Debris	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FUR (m)	FA (m)
Pool Frequency & Quality	FAR (m)	FUR (m)	FUR (m)	FAR (m)	FUR (m)	FAR (m)
Large Pools	FAR (m)	FUR (m)	FUR (m)	FAR (m)	FUR (m)	FAR (m)
Off Channel Habitat	FAR (m)	FUR (m)	FUR (m)	FAR (m)	FUR (m)	FAR (m)
Refugia	FAR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FAR (m)
Channel Condition & Dynamics						
Wetted Width/Depth Ratio	FAR (m)	FUR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
Streambank Condition	FAR (r)	FUR (m)	FUR (m)	FAR (m)	FUR (m)	FAR (m)
Floodplain Connectivity	FAR (m)	FUR (m)	FAR (m)	FAR (m)	FUR (m)	FAR (m)
Flow Hydrology						
Change in Peak/Base Flows	FAR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)
Drainage Network Increase	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FUR (m)	FAR (m)
Watershed Conditions						
Road Density & Location	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)
Disturbance History	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FUR (m)	FAR (m)
Riparian Conservation Areas	FAR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FAR (m)
Disturbance Regime	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)	FAR (m)
INTEGRATION OF SPECIES AND HABITAT CONDITIONS	FUR (d)	FUR (m)	FUR (m)	FUR (m)	FUR (m)	FUR (m)

[1] FA = Functioning Appropriately, FAR = Functioning at Risk, FUR = Functioning at Unacceptable Risk.

[2] r = restore, m = maintain, d = degrade. Lower case = minor effects, uppercase = major effects.

* Indicates watersheds where bull trout have been documented at some point.

Matrix (continued) of baseline condition[1] and action effects[2] for watersheds (indicated by last 5 numbers of 6th field HUC) west of the continental divide in the Divide Travel Plan area.

	10606 S Frk Dog	10607 Upper Dog	10610 Threemile
Subpopulation Characteristics			
Subpopulation size	FAR (m)	FAR (m)	FAR (m)
Growth & Survival	FAR (m)	FAR (m)	FAR (m)
Life History Diversity & Isolation	FUR (m)	FUR (m)	FUR (m)
Persistence and Genetic Integrity	FUR (m)	FUR (m)	FUR (m)
Water Quality			
Temperature	FAR (m)	FAR (m)	FAR (m)
Sediment	FUR (m)	FUR (m)	FUR (m)
Chemical Contamination/ Nutrients	FAR (m)	FUR (m)	FAR (m)
Habitat Access			
Physical Barriers	FUR (m)	FUR (m)	FA (m)
Habitat Elements			
Substrate Embeddedness	FUR (m)	FUR (m)	FUR (m)
Large Woody Debris	FAR (m)	FAR (m)	FAR (m)
Pool Frequency & Quality	FAR (m)	FAR (m)	FAR (m)
Large Pools	FAR (m)	FAR (m)	FAR (m)
Off Channel Habitat	FAR (m)	FAR (m)	FAR (m)
Refugia	FAR (m)	FAR (m)	FAR (m)
Channel Condition & Dynamics			
Wetted Width/Depth Ratio	FAR (m)	FAR (m)	FAR (m)
Streambank Condition	FAR (m)	FAR (m)	FAR (m)
Floodplain Connectivity	FAR (m)	FAR (m)	FAR (m)
Flow Hydrology			
Change in Peak/Base Flows	FUR (m)	FUR (m)	FUR (m)
Drainage Network Increase	FAR (m)	FAR (m)	FA (m)
Watershed Conditions			
Road Density & Location	FUR (m)	FUR (m)	FAR (m)
Disturbance History	FUR (m)	FUR (m)	FUR (m)
Riparian Conservation Areas	FUR (m)	FUR (m)	FAR (m)
Disturbance Regime	FAR (m)	FAR (m)	FAR (m)
INTEGRATION OF SPECIES AND HABITAT CONDITIONS	FUR (m)	FUR (m)	FUR (m)

[1] FA = Functioning Appropriately, FAR = Functioning at Risk, FUR = Functioning at Unacceptable Risk.

[2] r = restore, m = maintain, d = degrade. Lower case = minor effects, uppercase = major effects.

* Indicates watersheds where bull trout have been documented at some point.