Endangered Species Act - Section 7 Consultation

FINAL
BIOLOGICAL OPINION

on the

Effects to Bull Trout and Bull Trout Critical Habitat
From the Implementation of
Proposed Actions Associated with the Plan of Operations
for the
Montanore Minerals Corporation Copper/Silver Mine

As proposed by the
U.S. Forest Service, Kootenai National Forest

Completed by
U.S. Fish and Wildlife Service
Montana Ecological Services Office

March 31, 2014

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

Predicted adverse effects of the proposed Montanore mine project (hereafter referred as the Montanore Project) to bull trout (*Salvelinus confluentus*) and designated bull trout critical habitat include permanent reductions in stream flow in important bull trout streams and increased water temperature and sediment delivery. Disruption of groundwater inflow to streams that would occur due to development of the underground mine workings have been modeled to cause baseflow reductions in Libby Creek, Poorman Creek, and Ramsey Creek on the east side of the Cabinet Mountains, and East Fork Rock Creek, mainstem Rock Creek, and East Fork Bull River on the west side of the Cabinet Mountains. Rock Creek, East Fork Bull River, and Libby Creek are predicted to sustain permanent stream flow depletions. Adverse effects to bull trout and designated bull trout critical habitat are predicted to occur as water temperatures are increased by the discharge of mine and adit water into Libby Creek. Initial development of the mine and its access roads will cause temporary increases in sediment delivery to many streams in the project area; this in turn will cause adverse impacts to bull trout and designated bull trout critical habitat. Additionally, based on the modeled predictions of decreased stream flow, increased water temperatures (Libby Creek), and increased sediment delivery to various streams, it is probable there will be indirect adverse impacts to bull trout from increased numbers of non-native fishes that result from degraded habitat conditions for native bull trout and conversely improved habitat conditions for non-native fish.

As part of the proposed action, the Kootenai National Forest (KNF) developed a Bull Trout Mitigation Plan (KNF biological assessment, Appendix A) which includes a number of minimization and mitigation actions that are proposed to offset adverse effects to bull trout caused by development of the mine. <u>However, the U.S. Fish and Wildlife Service (Service) has determined that the Bull Trout Mitigation Plan (Plan), as proposed, is unlikely to be implemented in its entirety and in a timely manner.</u> Based on discussions with the KNF, the Service is uncertain that the Plan's minimization and mitigation measures would be fully implemented and well-timed due to the qualifying statements in the biological assessment (BA) and the Plan that condition implementation of certain elements of the Plan on completion of a further hydrologic assessment that will determine the extent of predicted streamflow depletions. As a result of the uncertainty of timely implementation of the Plan in its entirety, the Service conducted its effects analysis *only* on those actions and associated minimization and mitigation measures of the proposed action that are reasonably certain to occur. However, the effects of implementing the Plan as proposed are analyzed and deficiences in the Plan identifed in this BO (Appendix A) because the Service views those uncertainties in the Plan, <u>if modified</u>, as having potential to reduce impacts to bull trout from the Mine's adverse effects.

The Service's biological opinion is that the proposed action of construction and operation of the Montanore Project is not likely to jeopardize the continued existence of bull trout. The Service's opinion is based on the conclusions that implementation of the Montanore Project is not likely to appreciably reduce the reproduction, numbers, or distribution of bull trout at the scale of either the Lower Clark Fork River or Kootenai River core areas, and by extension not at the Clark Fork River Management Unit or Kootenai River Management Unit levels and larger scale of the Columbia River Interim Recovery Unit. Therefore, the Service concludes that the proposed Montanore Project will not jeopardize the bull trout at the scale of the coterminous U.S.

population of bull trout.

As proposed, implementation of the Montanore Project is anticipated to negatively impact designated bull trout critical habitat in Libby Creek, Bear Creek, West Fisher Creek, Rock Creek and East Fork Bull River. Bull trout habitat (without the designation of "critical habitat") in a number of less significant bull trout streams will also be negatively impacted. Negative impacts to both critical and non-critical habitat will be caused by diminishing the function of important bull trout habitat characteristics due to baseflow depletions, increases in sedimentation, augmentation (addition) of warm water (Libby Creek), and degradation of habitat conditions that favors enhancement of nonnative fish populations. Based on the small extent of the Montanore Project effects in relation to the size of designated critical habitat for bull trout at the Columbia River Basin scale, it is the Service's biological opinion that the adverse effects of the Montanore Project are not likely to destroy or adversely modify bull trout critical habitat.

As previously stated, the Service has determined in this biological opinion that the proposed action will not jeopardize bull trout, and is not likely to destroy or adversely modify bull trout critical habitat because KNF has committed to implementation of Best Management Practices (BMPs) to control erosion and sediment delivery from road construction on all affected bull trout streams within the project area. The Service anticipates take of bull trout will occur as a result of the previously outlined adverse effects. This biological opinion provides KNF with reasonable and prudent measures and terms and conditions that will minimize the impact of incidental take to bull trout and minimize adverse effects to primary constituent elements (PCEs) associated with bull trout critical habitat. KNF must comply with the terms and conditions in order to be exempt from section 9 prohibitions in the Endangered Species Act (Act).

I. INTRODUCTION

This biological opinion (BO) is based on information provided in the KNF's biological assessment (KNF BA 2013) for the proposed action associated with the Plan of Operations for the Montanore Minerals Corporation Copper/Silver Mine, personal communications with researchers and experts, and scientific literature, unpublished reports, field investigations, and other sources of information cited herein. The complete project file for this consultation is found at the Service's Helena, Montana Field Office.

Section 7(b)(3)(A) of the 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 a 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 to a listed species or adverse modification of critical habitat, if any has been designated. This BO addresses the impacts to the federally threatened bull trout and does not address the overall environmental acceptability of the proposed action. KNF has made a "no-effect" determination for the other federally listed aquatic species in the action area: Kootenai River white sturgeon (*Acipenser transmontanus*).

The Service has determined in this BO that the proposed action will not jeopardize bull trout, and is not likely to destroy or adversely modify bull trout critical habitat. Existing habitat conditions in most streams in the project area will be maintained or improved over the long-term with this project, and while some adverse impacts to bull trout may occur during implementation, minimization measures will reduce the effects of those impacts. Several streams, notably Rock Creek, East Fork Bull River, and Libby Creek, will sustain long-term (permanent) adverse impacts to bull trout and bull trout critical habitat associated with predicted depletions in stream base flow conditions. As previously stated, this BO provides KNF with reasonable and prudent measures and terms and conditions that will minimize the impact of incidental take to bull trout and minimize adverse effects to PCEs associated with bull trout critical habitat. KNF must comply with the terms and conditions in order to be exempt from section 9 prohibitions in the Act.

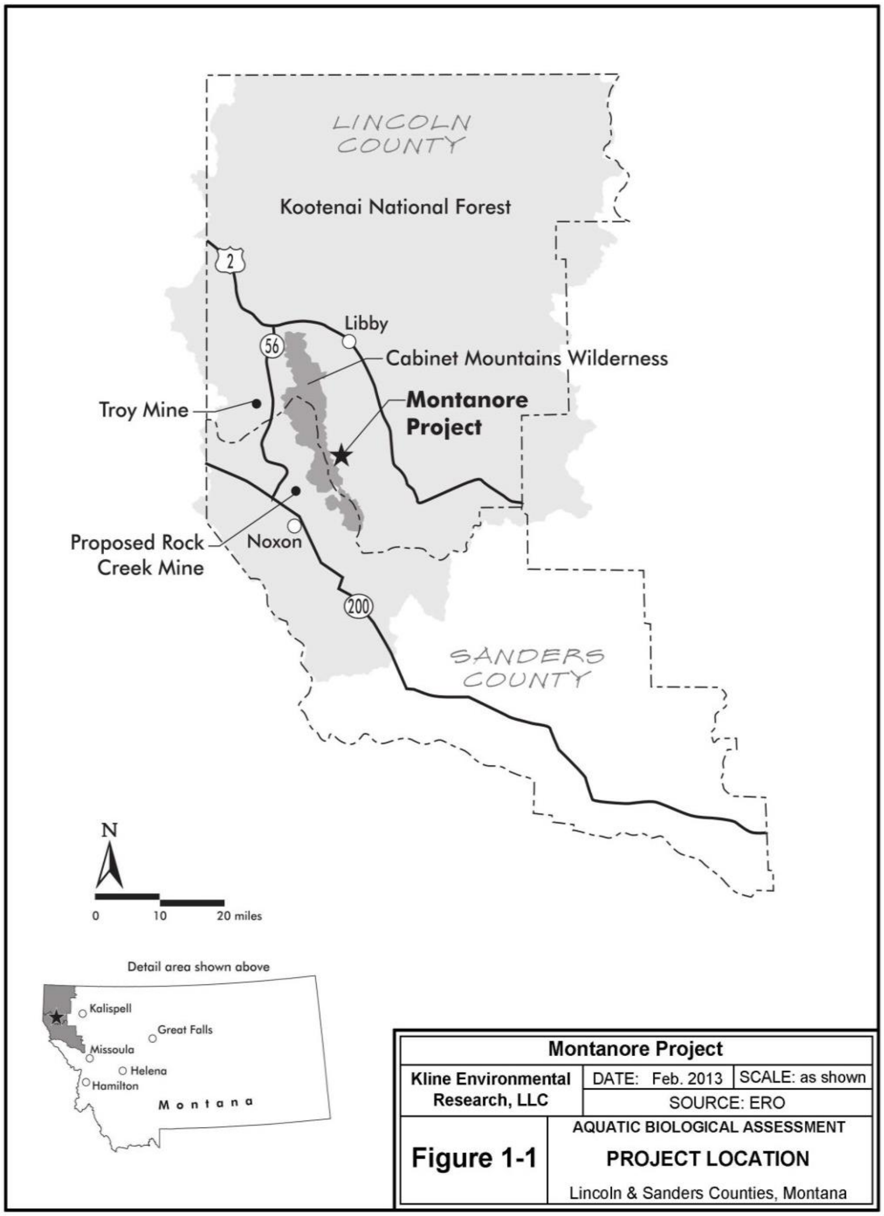
Consultation History

Informal consultation for this project was initiated in May 2009 with Service comments on the *Draft Environmental Impact Statement for the Montanore Project* provided to the KNF. On July 5, 2011, the KNF provided the Service a *Biological Assessment for Threatened and Endangered Aquatic Species on the Montanore Minerals Corp. Montanore Project.* The Service determined (letter dated February 17, 2012) that the BA was inadequate and recommended that KNF revise the BA and that informal consultation continue until a revised BA was completed. Formal consultation began February 25, 2013, with Service determination and acceptance of the KNF BA as adequate and in response to the KNF request for formal consultation. The Service provided KNF a draft BO for review and comment on February 5, 2014, and received comments from the KNF dated March 6, 2014 in the Service's Montana Field Office on March 12, 2014.

In addition to these events, numerous phone calls and electronic correspondences were exchanged during the course of the informal and formal consultation. Some data and information presented in this BO, has been reviewed by the Service and then excerpted directly from the BA and related documents. The analysis in this BO is based on information received prior to February 25, 2013. A complete administrative record of this consultation is on file at the Montana Ecological Services office, Helena, Montana.

This BO describes potential direct and indirect effects to threatened bull trout and its' critical habitat that may occur as a result of construction and operation of the proposed action by Montanore Minerals Corp. (MMC). The Montanore Project and its potential effects are located in Lincoln and Sanders Counties, Montana, near the cities of Libby and Noxon (Figure 1).

Figure 1. Montanore Project Location (Adapted from KNF BA 2013).



Project Background

Discovery of mineral deposits for the Montanore Project dates back to the early 1980s. Control of the mining claims was held by several companies. Leasing to other companies began in 1984 and in 1988 Noranda Minerals Corporation (Noranda) signed a lease. In 2002 Noranda terminated the lease agreement and conveyed its interests to Newhi. In 2006, Newhi acquired all shares of Noranda and changed the name to MMC.

The permitting process for the Montanore Project began in 1989 under Noranda. Noranda obtained an exploration license from the Montana Department of State Lands (DSL) and other associated permits for construction of an exploration adit from private land in upper Libby Creek. Soon after obtaining the exploration license, Noranda began excavating the Libby Adit. Noranda also submitted a "Petition for Change in Quality of Ambient Waters" (Petition) to the Montana Board of Health and Environmental Sciences (BHES) requesting an increase in the concentration of select constituents in surface water and groundwater above ambient water quality, as required by Montana's 1971 non-degradation statute. After construction of about 14,000 feet of the Libby adit, Noranda ceased construction in 1991 in response to elevated nitrate concentration in surface water and low metal prices.

Although construction ceased in 1991, the permitting process continued. Specifically, the KNF, the Montana Department of Health and Environmental Sciences (DHES), the Montana Department of Natural Resources and Conservation (DNRC), and the DSL, DEQ's predecessor agency, prepared a Draft, Supplemental Draft, and Final EIS on the proposed project. The environmental review process culminated in 1992 with BHES's issuance of an Order approving Noranda's Petition (BHES 1992) and the DSL's issuance of a Record of Decision (ROD) and Hard Rock Operating Permit #00150 (DSL 1992) to Noranda. In 1993, the KNF issued its ROD (KNF 1993), the DNRC issued a Certificate of Environmental Compatibility and Public Need under MFSA (DNRC 1993), and the U.S. Army Corps of Engineers issued a Clean Water Act Section 404 permit (Corps 1993). These decisions selected mine and transmission line alternatives that allowed for the construction, operation, and reclamation of the project.

In 1997, a Montana Pollutant Discharge Elimination System (MPDES) permit was issued to Noranda by the DEQ (MT-0030279) to allow discharges of water flowing from the Libby Adit to Libby Creek.

Apart from the permitting process, Noranda filed an application for patent with the Bureau of Land Management (BLM) in 1991 for lode claims HR 133 and HR 134 (Patent Application MTM 80435). In 1993, a Mining Claim Validity Report was issued by BLM recommending that BLM issue patent to Noranda for HR 133 and HR 134. In 2001, a patent was issued to Noranda for the portion of HR 134 that lies outside the CMW (Patent Number 25-2001-0140) and a separate patent was issued to Noranda for the mineral deposits for HR 133 and the portion of HR 134 that lies inside the CMW (Patent Number 25-2001-0141).

As discussed above, Noranda conveyed its interests in its lode claims to Newhi in 2002. By that time, many of Noranda's permits for the Montanore Project terminated or expired, such as DEQ's air quality permit, the Corps' 404 permit, KNF's approval, and the State's certification of the transmission line. In 2002, Noranda notified the KNF it was relinquishing the authorization to operate and construct the Montanore Project. Noranda's DEQ Operating Permit #00150 and MPDES permit were not terminated because reclamation of the Libby Adit was not completed.

Following the acquisition of Noranda and DEQ Operating Permit #00150, MMC submitted, and the DEQ approved in 2006, two requests for minor revisions to DEQ Operating Permit #00150 (MR 06-001 and MR 06-002). The KNF has not approved any activities at the Libby Adit that may affect National Forest System lands. The revisions involved reopening the Libby Adit and re-initiating the evaluation drilling program that Noranda began in 1989. The key elements of the revisions include: excavation of the Libby Adit portal; initiation of water treatability analyses; installation of ancillary facilities; dewatering of the Libby Adit decline; extension of the current drift; and underground drilling and sample collection.

The KNF determined the activities associated with the Libby Adit evaluation drilling were a new proposed Plan of Operations under the Federal Locatable Minerals Regulations (36 CFR 228 Subpart A), and MMC needed KNF approval prior to dewatering and continuing excavation, drilling, and development work at the Libby Adit. Under the authority of Minor Revision 06-002 of the DEQ operating permit, MMC installed a Water Treatment Plant and is treating water from the adit.

In 2006, the KNF initiated a NEPA analysis that included public scoping for the proposed road use and evaluation drilling at the Libby Adit site. In 2008, the KNF decided the best approach for disclosing the environmental effects of the Libby Adit evaluation program was to consider this activity as the initial phase for the overall Montanore project EIS. The Libby Adit evaluation program would be the first phase of the Montanore project.

II. DESCRIPTION OF THE PROPOSED ACTION

A. Proposed Action (Mining Activities and Best Management Practices)

MMC proposes to develop an underground copper and silver mine, an ore processing plant, a tailings impoundment, a power transmission line, and associated facilities, and mitigation. The following project description of mining related activities is based on Alternative 3 D-R (FS and DEQ 2013). The operating permit area would total 2,153 acres and the disturbance area would total 1,565 acres. The project would occur in five phases, as described below. Best Management Practices (BMPs) would be implemented and maintained through the life of the project to minimize sediment impacts to streams. BMPs are described below when they are specific to an action or project phase. Only those BMPs/actions relevant to effects to bull trout or bull trout critical habitat are discussed

Resource Evaluation Phase (approximately two years in duration)

The Libby Adit evaluation program would be the first phase of the Montanore Project. Supporting surface facilities are presently located on private lands within the KNF at the Libby Adit Site. During initial start-up, power to the Libby Adit Site would be supplied by up to two, EPA Tier 3 diesel generators. The Libby Adit would be fully rehabilitated and the existing drift extended 3,300 feet. An additional 7,100 feet of adit, including 16 drill stations, would be developed under the currently defined ore zones generating an estimated 256,000 tons (174,000 cubic yards) of waste rock that would be stored at the Libby Adit Site. Waste rock storage areas would be lined to collect runoff and water that seeps through the waste rock. A sump would be located at the toe of the pile where runoff and seepage would be collected and pumped to a water treatment plant. Runoff and seepage from waste rock would be monitored for metals and nitrate to determine if the full facility would need to be lined. The Libby Adit would be fully dewatered and the water would be treated prior to discharging to one of three permitted outfalls according to effluent limits set in Montana Pollutant Discharge Elimination System (MPDES) permit MT-0030279.

An estimated 35,000 feet of primary drilling and 12,800 feet of infill drilling would delineate the first 5 years of planned production. Resource modeling, mine planning, metallurgical testing, preliminary hydrology assessment, and rock mechanic studies for the full project would be based on drill cores collected during this phase.

If adit closure and site reclamation were necessary after completion of the evaluation drilling program, MMC would install a concrete-reinforced hydraulic plug in bedrock, reconstruct the original adit plug, remove all surface facilities, regrade, and revegetate the disturbed areas.

Construction (three to four years in duration) and Operation Phase (approximately 16 to 20 years in duration)

If the evaluation program proved successful and the extent of the deposit is determined to be economically viable to pursue mining, then the construction and operational phases of the mine would be implemented. That process would include vegetation clearing, earthwork, road construction, facility construction and mine workings development.

Vegetation, including merchantable and non-merchantable timber would be removed from the Plant Site, the Tailings Storage Facility, access roads, and along the proposed transmission line alignment. Slash would be managed according to State law (76-13-407, MCA). Where possible, slash would be salvaged and chipped to be sold, used as mulch, or used as an additive to stored soil. As part of final design, MMC would prepare a Vegetation Removal and Disposition Plan for the agencies' approval. The plan would evaluate the potential uses of vegetation removed from disturbed areas, and describe disposition and storage plans during mine life. It also would address vegetation removal along the transmission line, with the goal of minimizing tree and other vegetation clearing.

Soil salvage would begin during vegetation removal. Soil salvage would occur in all disturbed areas, with the exception of slopes exceeding 50 percent. Soils would be salvaged in two lifts in the Tailings Storage Facility, borrow areas, and Libby Plant Site. The first lift would include the relatively organic-rich topsoil, and the second lift would include the subsoil immediately below the topsoil to a depth based on need and suitability.

At road disturbances, soils would be salvaged in one lift. Soils with more than 50 percent rock fragment generally would not be salvaged. Soils with rock fragment contents up to 60 percent by volume would be salvaged in some areas to provide erosion protection on the tailings impoundment embankments. Erosion and sediment control Best Management Practices (BMPs) would be implemented including: interim reclamation of access roads; seeding, fertilizing, and stabilizing road cut-and-fill slopes and other disturbances along roads as soon as final post-construction grades were achieved; decommissioning new roads and reclaiming most other currently existing roads to pre-operational conditions at the end of operations; ripping compacted soils prior to soil placement; and disking and harrowing seedbeds.

Soil stockpiles would be constructed with 40 percent side slopes, 33 percent sloping ramps, and stored as close as possible to redistribution sites. Organic matter and fertilizer would be added to help retain soil quality and promote successful revegetation. Stockpiles would be stabilized to reduce erosion and maintain soil biological activity in the surface.

MMC has a Weed Control Plan approved by Lincoln County Weed Control District. The plan requires modification and would be submitted to the lead agencies during final design for their approval. Following approval of the final Weed Control Plan, it would be resubmitted to the Lincoln County Weed Control District. MMC would implement all weed BMPs identified in Appendix A of the KNF Invasive Plant Management Final EIS (FS 2007) for all weed-control measures. Weed spraying would comply with state and local laws and agency guidelines for all noxious weed control activities. All herbicides used in the Action area would be applied according to the labeled rates and recommendations to ensure the protection of surface water, ecological integrity, and public health and safety. Herbicide selection and application timing would be based on target species on the site and site factors (such as soil types and distance to water), and with the objective to minimize impacts to non-target species.

Libby Plant Site and Adits

The Libby Plant Site would be located on a ridge separating Libby Creek and Ramsey Creek (see Figure 2). Access would be via Forest Service Road (FSR) 2316 and 6210. A bridge would be constructed across Ramsey Creek to provide access via FSR 6210 at a location where a former crossing washed out.

The existing Libby Adit would be enlarged to about 30 feet wide by 30 feet high. A second 18,000 foot long adit declining to the ore body at 5 percent grade would be constructed on private land near the existing Libby Adit portal (Figure 3). One adit would contain the underground conveyor and the other would be used for personnel access and material delivery into the mine. A third adit (Upper Libby Adit) would be constructed from underground to provide ventilation and emergency access.

Waste rock generated from the new Libby adits would be hauled and stockpiled within the tailings impoundment footprint. The waste rock stockpile would be lined with clay or a geomembrane to achieve a permeability of less than or equal to 10-6 cm/sec if monitoring indicates treatment of surface water runoff is necessary. Waste rock would be used in dam construction after initial testing.

Ore would be conveyed via an above-ground covered conveyor from the Libby Adit Site parallel to FSR 2316 and 6210 to the covered coarse ore stockpile at the Libby Plant Site. The conveyor and transfer points would be fully enclosed to minimize contact with precipitation and loss of ore. Any spillage would be promptly cleaned up to avoid contact with precipitation. Preliminary geotechnical evaluation indicates the Libby Plant Site could be built out of fill material from the large cut on the west side of the plant site. The cut-and-fill materials would be balanced, and waste rock would not be used in plant site construction.

Electrical power during construction/preproduction would be supplied by two diesel generators located at the Libby Adit Site. A temporary substation would be installed near the intersection of FSR 6210 and the Libby Plant Site access road to provide power to the Libby Adit Site activities. A buried 34.5-kV transmission line along FSR 278 and the Libby Plant access road would possibly be installed that would connect to this substation. Power would be distributed from the temporary substation to the Libby Adit Site and Libby Plant Site.

Figure 2. Montanore Project facilities and permit areas (Adapted from KNF BA 2013).

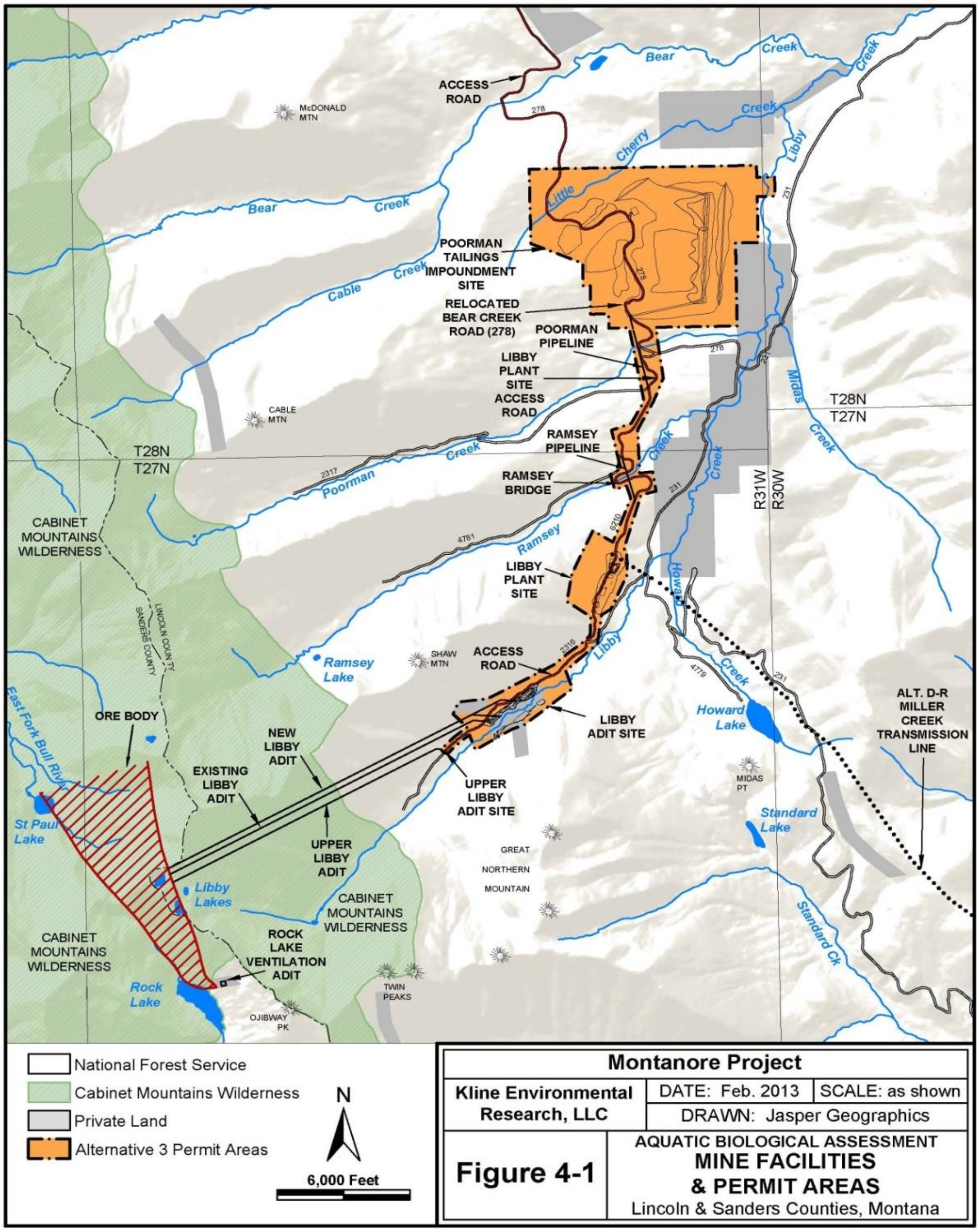
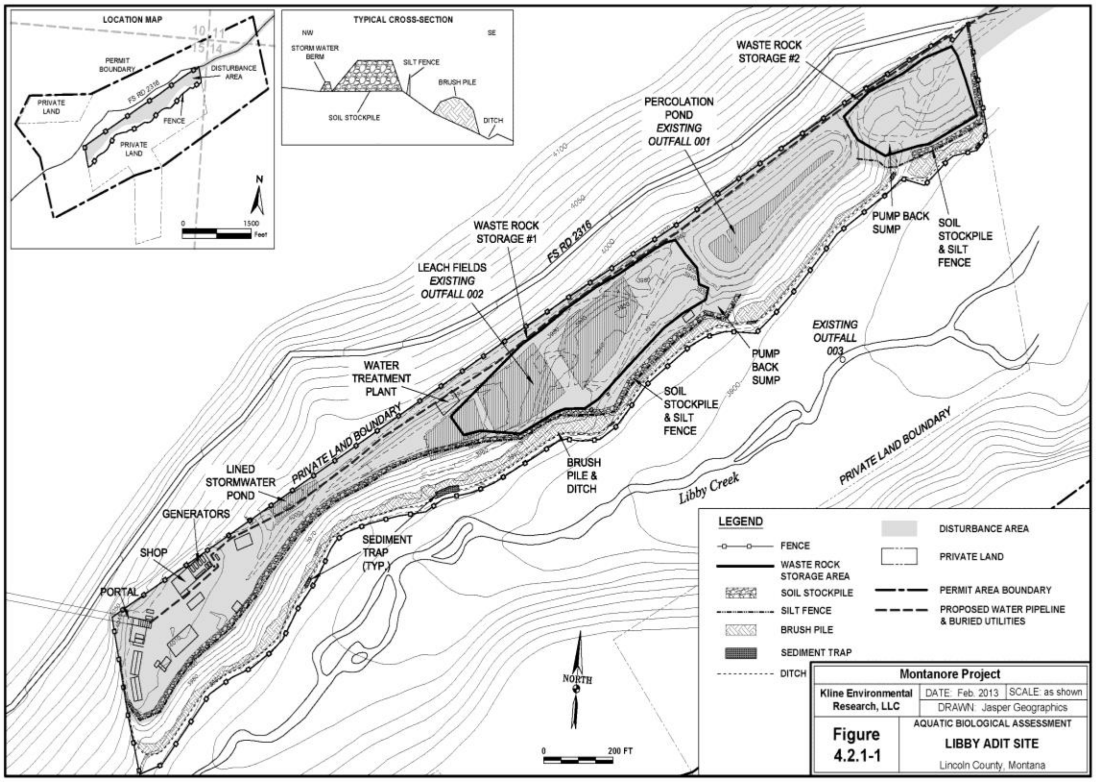


Figure 3. Montanore Project Libby Adit site (Adapted from KNF BA 2013).



Poorman Tailings Storage Facility

A double-walled pipeline would carry tailings slurry from the Libby Plant Site to a thickener at the Tailings Storage Facility. A parallel double-walled pipeline would return water from the Tailings Storage Facility. The pipeline system would include extra tailings and water pipelines for designed redundancies. The pipelines would be buried at least 2 feet deep and run adjacent to and at least 2 feet from the main haul road between the sites. The pipelines would include an automatic leak detection system that would allow a leak to be located at its onset. In the event of a leak, the slurry pipeline would be flushed with water to prevent sanding and the section with the leak would be isolated and repaired. There would be no risk of release of tailings along the vast majority of the pipeline because it would be buried, be double-walled, and have a leak detection system.

The only sections where tailings could potentially be released to streams would be at the Ramsey Creek and Poorman Creek crossings. The most likely scenario of a complete failure of the system would be vandalism or equipment accidentally damaging the pipe. The pipe would be covered over the bridges to reduce this possibility and would include a containment system. The final designs for the tailings pipeline, leak detection system, and stream crossing protection and containment would be submitted to the agencies for approval.

The Tailings Storage Facility would be located on National Forest System (NFS) lands between Little Cherry Creek and Poorman Creek (T28N, R31W, sect. 24 & 25) about 0.25 mile west of Libby Creek (see Figure 2). The site would include support facilities and an impoundment designed to hold 120 million tons of tailings. The design developed for the Poorman site is conceptual and is based on limited geotechnical investigations. The need for the specific design features (e.g., Rock Toe Berm) described below is uncertain.

A tailings thickener would be located above the tailings impoundment area. The thickener plant would be designed to receive, dewater, and pump up to 20,000 tons of tailings per day. Water removed from the tailings in the thickeners would be sent to a water storage pond on the north end of the impoundment. The fines fraction would be deposited with an average slurry density of 70 Percent. As water drains from the tailings and the mass consolidates over time, the average density could exceed 90 percent.

Site preparation at the tailings impoundment would start with stripping the topsoil prior to construction of a Starter Dam and Saddle Dam. During construction, a temporary water reclaim/storage pond would be constructed upstream from the Starter Dam to hold water until the Starter Dam was complete. A Rock Toe Berm would be built from waste rock from the mine that would be stockpiled at the site. This would be supplemented with local borrow from within or adjacent to the impoundment area. Once the Starter Dam and Saddle Dam were constructed and after operations begin, the impoundment footprint would be prepared for tailings deposition. Soft, unsuitable materials would be excavated and replaced with suitable material. Wetland soils would be excavated and used at wetland mitigation sites. A high-density, polyethylene (HDPE) geomembrane liner would be placed beneath a portion of the tailings impoundment and keyed into the low permeability zone of the Starter Dam. The upstream face of the Rock Toe Berm would be of screened material to create a surface that is filter compatible with the tailings sand to prevent the tailings sand from migrating into the Rock Toe Berm.

Artesian conditions are present along the toe area of the dam footprint so a drainage collection system would be installed under the Rock Toe Berm extending upstream under the Main and Starter dam footprints to collect and control groundwater. Drain materials for the toe and dam drainage would be obtained from onsite crushing and screening of the sand and gravel lenses in the glacial alluvial deposits on the tailings site proper or obtained from a commercial source. This drain system would be separate from the tailings impoundment seepage collection system to enable separate monitoring of the two before flowing into the Seepage Collection Pond.

A seepage collection system consisting of trunk drains over the impoundment floor and beneath the tailings dam would convey seepage to the toe of the dam. Smaller secondary lateral drains would convey water into the trunk drains. The estimated seepage rate into the foundation below the impoundment is 25 gallons of water per minute (gpm). Pumpback recovery wells would be located beyond the dam toe, and would be designed to collect seepage not collected by the drain system.

A clay or HDPE-lined Seepage Collection Pond and return facility would be 500 feet west of Libby Creek, 500 feet downstream of the impoundment. The capacity of the Seepage Collection Pond would be 153 acre-feet (50 million gallons) or up to 30 days of drain flow plus runoff from the 6-hour Probable Maximum Precipitation (PMP) storm event. A pump station would be located on the west side of the Seepage Collection Pond. The pond facility design would include collection of water from the impoundment seepage collection drains, the ground water relief drains, and runoff from the downstream slope and toe area of the tailings dam facility. The return water pipelines would plumb either into the return water lines in the thickener plant, or into the tailings facility where the water would combine with the tailings water and then would be recovered through the tailings impoundment return water system.

In the last year or two of operation, tailings would be deposited to facilitate closure of the facility with surface water drainage reporting to the northern corner of the impoundment. Distribution pipelines around the impoundment would be surface mounted for maintenance and operation purposes.

MMC would design all sediment ponds and ditches that would contain process water or mine drainage for a 100-year/24-hour storm. Sediment and runoff from all disturbed areas would be minimized through the use of BMPs developed in accordance with the Forest Service's National Best Management Practices for Water Quality Management on National Forest System Lands (FS 2012). Sediment and runoff from the tailings impoundment would be minimized by limiting unreclaimed areas to the active disposal areas. Localized sediment retention structures and BMPs would be used in the down slope perimeter of the impoundment for control, sampling, and recovery of drainage from the impoundment. Structures and collection ditches would act as storm water diversions to channel the water and sediment from the active portion of the tailings thickener facility into storm water ponds.

Runoff from reclaimed and fully revegetated, stabilized portions of the tailings would be diverted to settling basins before mixing with runoff from undisturbed areas. Settling ponds for runoff from newly reclaimed areas along the perimeter of the tailings thickener facility would be unlined but vegetated, and would drain through a constructed drainage network to existing intermittent drainages. Storm water from reclaimed areas that were not fully stabilized would be captured along with runoff from the active areas of the tailings facility. Undisturbed portions of the facility would either drain into existing drainages or be diverted away from active areas, soil stockpiles, and the storm water pond. All diversions would be sized to handle a 10-year/24-hour storm event. The diversions would be reclaimed and permanent drainages would be established when mine operations ended and the site was fully reclaimed.

Transmission Line

From the substation, the alignment would traverse an east-facing ridge immediately north northwest of the substation, and would cross Hunter Creek 2 miles north northwest of the substation. After crossing Hunter Creek, the alignment would head west, crossing U.S. 2, the Fisher River, West Fisher Creek, and FSR 231. The alignment would then cross a ridge between West Fisher Creek and Miller Creek, follow FSR 4724 to a ridge separating Miller Creek from the Standard Creek drainage and traverse the ridge into the Howard Creek drainage. The centerline would be about 0.5 mile south of Howard Lake and would generally parallel Howard Creek before crossing Howard Creek and Libby Creek, and terminating at the Libby Plant Site substation (see Figure 2).

Ninety-one wooden H-frame structures would be used to support the line, with an average span length of 793 feet. All of the line would be strung by helicopter. Sixteen of the structure sites would be accessed by helicopter, primarily in the upper Miller Creek and Howard Creek drainages. The remaining structure sites would be accessed by open roads, currently closed roads, or new roads, as described below. Annual inspections and most transmission line maintenance would be completed via helicopter or non-motorized access. The transmission line would be located through existing open areas in the forest where feasible. Based on a preliminary design, six structures would be in a riparian habitat conservations area on NFS land and three structures would be in a riparian area on private land. During final design, MMC would locate these structures outside of riparian areas if the agencies determined alternative locations were technically and economically feasible. During final design, MMC would submit a final Vegetation Removal and Disposition Plan for lead agencies' approval. The plan's goal would be to minimize vegetation clearing, particularly in riparian areas.

Most construction activity would be contained in the 150-foot right-of-way with major exceptions being access road construction. For analysis purposes, the lead agencies have assumed the proposed line would require a maximum of 200 feet of clearing along the entire alignment. In areas adjacent to core grizzly bear habitat, MMC would use a helicopter to clear vegetation, reducing the need for access roads. Helicopter landing sites would generally be on roads.

Closure and Post-Closure Phases (approximately 20 years in duration)

All surface facilities, buildings, power supply, structures and equipment would be removed, including at the Libby Adit Site, Libby Plant Site, Tailings Storage Facility, and transmission line corridor. Portal plugs would be installed. Waste rock not used in construction would be placed underground. Surface features at all sites would be regraded to match the surrounding topography based on final plans that would require agency approval. Stockpiled soil would be placed over regraded and scarified areas. All disturbed sites would be reseeded.

The tailings pipelines would be flushed into the tailings impoundment, removed from all stream crossings and anywhere they were less than 3 feet below the surface. For other segments, the pipelines would be cut at 0.5-mile intervals, capped and left in place. Some inert materials may be buried within the Tailings Storage Facility prior to placement of the final cover. MMC would provide a list of material and items to be buried and a cover plan to the lead agencies for approval. After evaporation or treatment and discharge of all water from the tailings surface in the northern area, and after the near surface tailings were stabilized for equipment access, a channel would be excavated through the tailings and Saddle Dam abutment to route runoff from the site toward a tributary of Little Cherry Creek. The channel would be routed at no greater than 1 percent slope and along an alignment requiring the shallowest depth of tailings to be excavated down to the channel grade. The side slopes would be designed to a stable slope and covered with coarse rock to prevent erosion. As part of the final closure plan, MMC would complete a hydraulic and hydrologic (H&H) analysis of the proposed runoff channel during final design, and submit it to the lead agencies and the Corps for approval. The H&H analysis would include a channel stability analysis and a sediment transport assessment. Based on the analysis, modifications to the final channel design would be made and minor modifications to the upper reaches of the tributary of Little Cherry Creek may be needed to minimize effects on channel stability in the tributary of Little Cherry Creek and to avoid allowing water to pond on the surface of the reclaimed tailings. Other drainage alternatives for the surface of the reclaimed tailings impoundment that protect against erosion but also provide aquatic habitat may be developed with agency approval under the Waters of the U.S. mitigation plan.

MMC would survey tailings settlement at closure on a 100-foot by 100-foot grid. The area would be surveyed after borrow material used for fill was placed to create final reclamation gradients, and again after soil placement to ensure runoff gradients were achieved and soil thicknesses were met. MMC would place rocky borrow from within the disturbance area to provide erosion protection of surface material. Borrow material volumes would be determined during final design.

MMC would operate the seepage collection and the pumpback well systems until BHES Order limits or nondegradation criteria were met without additional treatment. Long-term treatment may be required if BHES Order limits or nondegradation criteria were not met. The length of time these activities would occur is not known, but may be decades or more.

All disturbed areas that require soil placement would be ripped to 18" depth prior to soil placement to reduce compaction and facilitate storm water infiltration. Disturbed areas would be seeded, fertilized, and mulched as necessary. All cut-and-fill slopes on roads would be seeded, fertilized, and stabilized with hydromulch, netting, or by other methods. In reclaimed areas where trees would be planted, wood-based compost would be incorporated into the upper 6" of soil to promote the rebuilding of mycorrhizae in the soil. Additional nitrogen fertilizer may be needed to compensate for wood-based mulch. Sites would be revegetated to a density of 400 trees/ac and 200 shrubs/ac. Seed mixtures would consist of native species, to the extent native species are commercially available. MMC would assess which native species were available commercially, and submit final seed mixes to the lead agencies for approval. The seed mixtures would not include clovers or other plants attractive to black or grizzly bears.

Water Use and Management

Mine and adit water would not be used "beneficially" in any phase, and would be treated and discharged from the Water Treatment Plant during all phases. In all phases except Evaluation when water was used beneficially, water would be discharged whenever flow in Libby Creek at LB-2000 was less than 40 cfs, such that flow in Libby Creek would not be reduced by MMC's appropriations.

MMC applied for three beneficial use permits to appropriate Libby Creek surface water or groundwater tributary to Libby Creek. Groundwater tributary to Libby Creek would be appropriated from Libby Creek alluvium between April 1 and July 31 at an average flow rate of 765 gallons per minute (gpm) and a maximum flow rate of 1,125 gpm (403 acre-feet/year maximum volume). Water would be diverted using a subsurface infiltration gallery installed in the gravels along the west side of the Libby Creek channel at the proposed point-of-diversion. The gallery would be connected to a pumping station that would pump water in a single pipe to the Poorman tailings impoundment. Groundwater tributary to Libby Creek also would be appropriated year-round at an average and maximum flow rate of 250 gpm (410 acre-feet/year maximum volume) from the pumpback wells. Precipitation captured by the impoundment would be appropriated year-round at an average flow rate of 625 gpm and a maximum flow rate of

1,950 gpm (1,038 acre-feet/year maximum volume). (The values shown are what MMC requested and may be more than those in any beneficial use permit issued.) Diverted water would be stored in the impoundment water pond and would be pumped to the plant/mill for ore-processing make-up water.

Whenever flow in Libby Creek at LB-2000 was less than 40 cfs, stored water would be treated at the Libby Adit Water Treatment Plant and discharged. The rates would vary, depending on actual precipitation and the total pumping rate of the pumpback wells. As part of the water balance monitoring described in Appendix C of the KNF BA (2013), MMC would measure precipitation and evaporation at the tailings impoundment and total pumping rate of the pumpback wells to determine the appropriate rate of discharges to avoid injury to senior water right holders.

Approval to discharge water was originally authorized to Noranda Minerals Corporation (NMC). Mines Management Incorporated (MMI) acquired NMC and changed the company name to Montanore Minerals Corporation. The permit remains active under the same ownership with MMC as a wholly owned subsidiary of MMI. As with the MPDES authorization, the State's Hard Rock Operating Permit 150, originally issued to NMC for the project, was also acquired by MMI and remains active for the original project that was permitted in 1993. In 2006, the Montana Department of Environmental Quality (DEQ) approved two requests by MMC for minor revisions to Operating Permit #00150 (MR 06-001 and MR 06-002). Under the revisions, the Libby Adit would be dewatered and water would be treated at the Libby Adit Water Treatment Plant prior to discharging to one of three Libby Creek outfalls at the Libby Adit Site: Outfall 001 – percolation pond; Outfall 002 – infiltration system of buried pipes; and Outfall 003 – pipeline outlet to Libby Creek. MMC treats and discharges mine inflows under the MPDES Minor Industrial Permit No. MT0030279. In 2011, MMC applied to the DEQ to renew the existing MPDES permit and requested the inclusion of five new storm water outfalls under the permit. The DEQ determined the renewal application was complete and administratively extended. If waste rock was used for construction of the Libby Plant Site, an MPDES permit modification to include runoff or seepage from the waste rock could be required. Other outfalls may be identified during the MPDES permitting process.

MMC samples untreated and treated adit discharge monthly for total and dissolved metals, nitrates, and other analytes. The existing Water Treatment Plant has been successful in treating adit discharge to comply with MPDES permitted effluent limits. The plant uses ultrafiltration to remove metals that are sorbed onto particulates suspended in the water, thereby reducing total metal concentrations. MMC expects lower nitrate concentrations during evaluation and operation than those experienced when the adit was driven by NMC because of its plans to use explosive emulsions and better housekeeping. MMC would continue monthly monitoring during all phases of the project. The Water Treatment Plant would be modified to increase capacity and to treat nitrogen compounds (primarily nitrates and ammonia) and possibly dissolved metals.

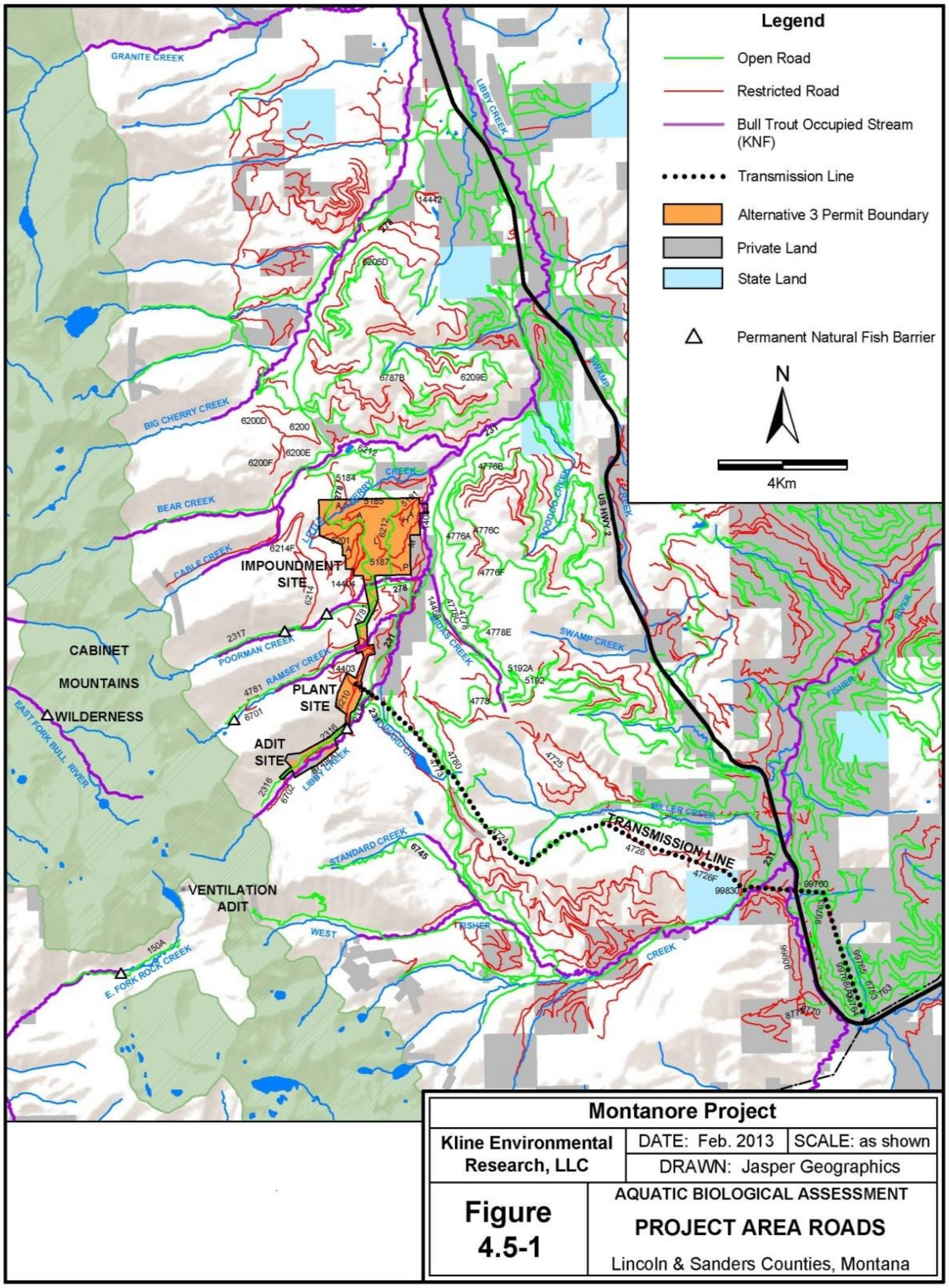
MMC would submit plans and specifications for construction of a sanitary waste treatment facility to the agencies for approval. During the evaluation and construction Phases, MMC would use an on-site sewage treatment and disposal system at the Libby Adit Site. During operations, MMC would use a similar system consisting of septic tanks for primary treatment, followed by discharge to the tailings impoundment for final disposal.

Post-operational seepage collection and the pumpback well systems for the Tailings Storage Facility would operate until all applicable water quality standards and limits were met without treatment. The length of time that water treatment would be required is unknown, and may be decades. After demonstration that untreated seepage meets and would continue to meet all applicable water quality standards and limits, untreated seepage from the Tailings Storage Facility would be allowed to flow to Libby Creek.

Road Usage

Access to the surface facilities at the Libby Adit Site would continue to be by FSR 231 and 2316 until completion of FSR 278 modifications and other road and stream crossing modifications during the construction period (see Figure 4 for project area roads).

Figure 4. Montanore Project area roads (Adapted from KNF BA 2013).



The currently used access roads would continue to be snowplowed as needed to allow year-round access to the Libby Adit Site until the road and stream crossing modifications were complete. FSR 231 has been gated and the KNF seasonally restricts public access as long as MMC uses and snowplows FSR 231 and 2316. During the evaluation phase, MMC would implement

BMPs, such as installing, replacing, or upgrading culverts, to bring FSR 231 and FSR 2316 up to INFS standards. All ditches on FSR 231 and FSR 2316 would be cleaned out to enhance drainage and reduce sedimentation. In RHCAs, MMC would not sidecast snow or surface materials.

MMC would use FSR 278 for main access during operations (see Figure 4). About 13 miles of the road, from U.S. Highway 2 to the Tailings Storage Facility, would be paved and upgraded to a roadway width of 26 feet. Additional widening would be necessary on curves. The disturbed area, including ditches and cut-and-fill slopes, would be up to 100 feet wide. FSR 278 from just south of Poorman Creek to FSR 231 would be surfaced with 6" of gravel, 16 feet wide. The abandoned portion of FSR 278 immediately north of Poorman Creek and a segment of FSR 6212 would be gated during operations and used exclusively by mine traffic. The gates on FSR 6212 would be near the tailings impoundment permit area boundary on the north end and near its intersection with FSR 278 south of Poorman Creek. The existing culvert at the FSR 278 crossing over Poorman Creek would be replaced during the construction phase. The new FSR 278 would require a new crossing over Poorman Creek and Ramsey Creek and replacement of the bridge over Bear Creek. The crossings would be built to be compatible with the reconstructed road width, accommodate the 100-year maximum flow event, and be in compliance with INFS standards.

Public access would be allowed on some of the mine roads, which would otherwise be restricted to mine traffic. During reconstruction, a travel lane on FSR 278 would be maintained to allow continued motorized public access. Public access would be by the new FSR 278 alignment. Except for a segment of the Upper Libby Creek Road (NFS road #2316) and the Poorman Creek Road (NFS road #2317) south of the impoundment, mine haul roads would be restricted to mine traffic only. These two segments would require joint public and mine traffic. During final design, MMC and the KNF would determine the most appropriate method to accommodate joint traffic.

MMC would use FSR 4781, 6210, and 2316 for access to the Libby Adit Site and Libby Plant Site. A segment of FSR 2316 west of the Libby Adit Site would provide access to the Upper Libby Adit Site. FSR 2316 is currently open to the public and would be widened to 56 feet to accommodate joint-use traffic. Public access to FSR 2316 would be via FSR 231. A segment of closed FSR 14403 would be disturbed by the Libby Plant Site.

Transmission line installation and removal would require the use of open roads, roads that currently have barriers with no administrative use, and construction of new roads. Reopened and new roads would otherwise be used for maintenance only, which is expected to be required infrequently. Winter use would be unlikely. Annual inspections and most transmission line maintenance would be completed via helicopter or non-motorized access. Except for brief periods during installation and removal of the transmission line, the majority of traffic on open roads associated with the transmission line would be public use. Reopened access roads on NFS lands would be placed into intermittent stored service after construction, and decommissioned after the transmission line was removed at the end of operations. Newly constructed roads in the transmission line corridor would be reclaimed after removal of the transmission line at mine closure. The road surface would be seeded to stabilize the surface. Where soil had been salvaged from new roads, the road surface would be covered with soil and then reseeded.

The transmission line would not require roads or structures on private land other than Plum Creek lands. Newly constructed roads on Plum Creek lands would be gated after construction. MMC would be able to use roads on Plum Creek lands for inspections and maintenance. These roads would be managed in the same manner as on National Forest System lands unless otherwise specified in the easement agreement between Plum Creek and MMC.

MMC would develop and implement a final Road Management Plan that would require approval of the lead agencies. It would describe the following for all new and reconstructed roads used for the mine and transmission line:

- Criteria that govern road operation, maintenance, and management;
- Requirements for pre-, during-, and post-storm inspections and maintenance;
- Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives;
- Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control;
- Mitigation plans for road failures.

The Road Management Plan would detail the management of road surface materials during plowing of snow and ice. Sidecasting of soils or snow would be avoided. Sidecasting of road material would be prohibited on road segments within or abutting RHCAs in priority watersheds. Facility access roads would be treated with water and/or chemical stabilization for dust suppression during operations. With the exception of FSR 278, all open roads in area of the Tailings Storage Facility would be gated and limited to mine traffic only. Non-motorized public access would be restricted within each permit area by signs at the permit area boundary.

B. Action Area

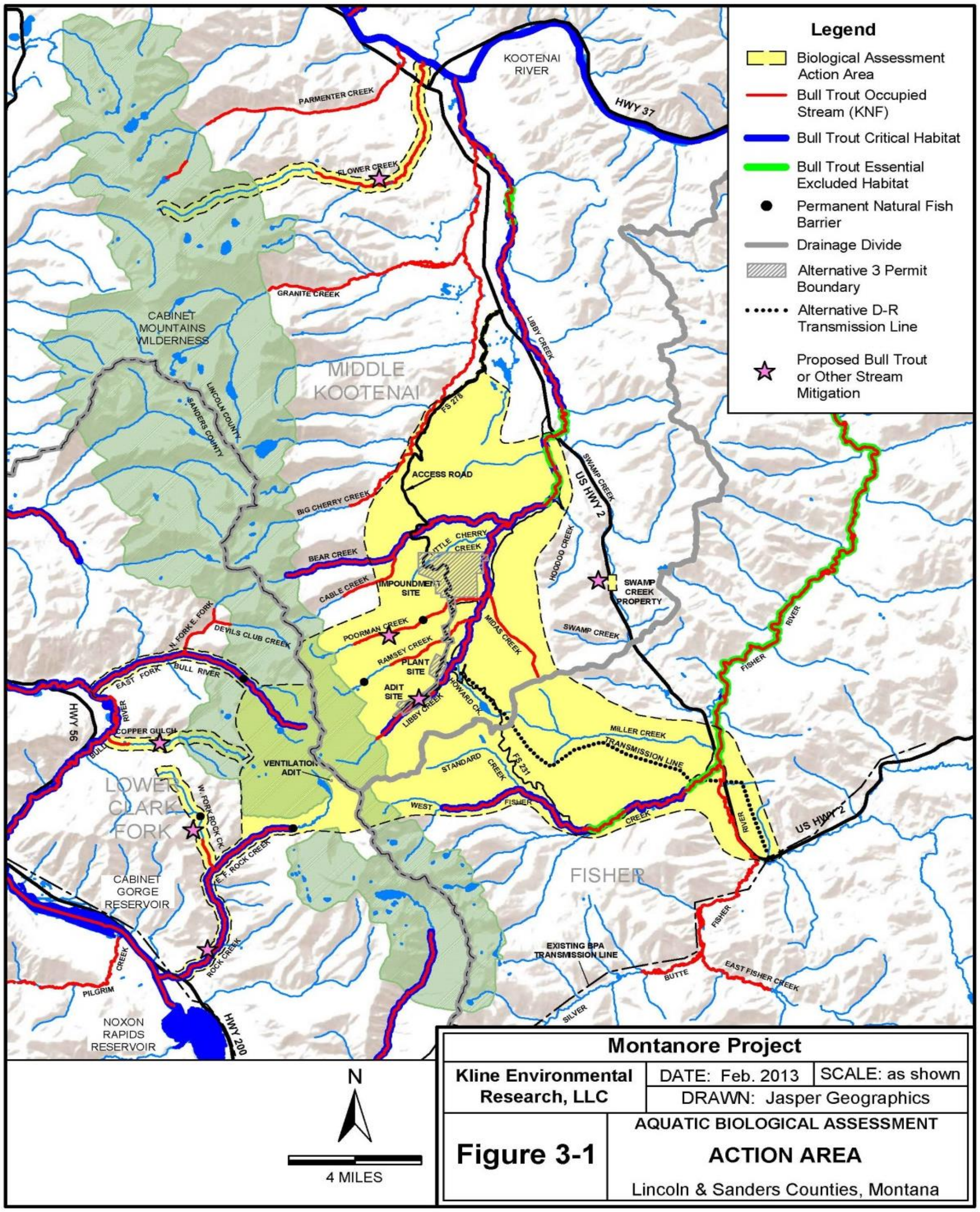
For purposes of consultation under section 7 of the Act, the "action area" is defined by 50 CFR 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The Proposed Action is centered approximately 18 miles south of Libby, Montana on the KNF Libby Ranger District, with potential effects occurring on the Libby and Cabinet Ranger Districts (Figure 5). The action area is mainly forested and ranges from 2,600 feet to nearly 8,000 feet in elevation. Precipitation ranges from 30 to 50 inches annually (rain plus snow water equivalent) where most project facilities would be located. The ore body is beneath the Cabinet Mountains Wilderness Area. All access and surface facilities would be located outside of the Cabinet Mountains Wilderness Area. In addition to National Forest System lands that are managed by the KNF, private land is found in the action area, most of which is owned by Plum Creek, David Cleveland, John Cleveland, Libby Placer Mining Company, or MMC. Residential areas are found along U.S. Highway 2, Forest Service Road (FSR) 231, and Miller Creek. Recreation, wildlife habitat, and timber harvesting are the predominant land uses.

An action area (Figure 5) was delineated to encompass all potential direct and indirect effects of the Proposed Action to aquatic biota based on Alternative 3 and transmission line alignment D-R that is described in the Environmental Impact Statement (FS and DEQ 2013). Most of the surface disturbance would occur in the Libby Creek drainage. The transmission line would cross West Fisher Creek and parallel Miller Creek before entering the Libby Creek drainage. The action area includes some headwaters in the Libby Creek drainage and Rock Creek, East Fork Rock Creek and East Fork Bull River on the west side of the Cabinet Mountains Wilderness Area due to predicted streamflow reductions during low flow conditions at are based, in part, on modeling of groundwater drawdown that could result from the underground workings. The action area includes streams that were proposed for mitigation specific to bull trout (Libby Creek, West Fork Rock Creek, Rock Creek), mitigation for potential impacts to Waters of the U.S. (Swamp Creek), and streams that would be impacted from proposed road access changes as part of the Wildlife Mitigation Plan (those potentially affecting bull trout occur in tributaries in Libby Creek, Fisher River, and Rock Creek drainages). Streams on the east and west side of the Cabinet Mountains divide are referred to as east side and west side streams, respectively.

In summary, the action area includes the following as related to the Proposed Action:

- Proposed surface disturbances;
- Roads that would be used, closed, modified, or created;
- A proposed transmission line;
- Stream reaches that would potentially be affected due to upstream activities or predicted flow changes;
- Potential bull trout and Waters of the U.S. mitigation streams.

Figure 5. Montanore Project Action Area and location of bull trout "Critical Habitat" and bull trout "Occupied Stream" reaches. (Adapted from KNF BA 2013).



C. Proposed Mitigation (Roads, Waters of the US, and Bull Trout)

The KNF proposed three categories of mitigation relevant to potential impacts to bull trout and bull trout critical habitat that are likely to be caused by the proposed action (KNF BA 2013). These categories are discussed below and include the following: 1) road status changes that would be implemented as part of the mitigation plan for potential impacts to wildlife (FS and DEQ 2013); 2) stream and watershed projects that would be completed as part of the mitigation plan for impacts to Waters of the U.S. (NewFields and Kline 2012); and 3) projects that were developed specifically to address the predicted impacts to bull trout (KNF BA 2013).

Road Status Changes

The Wildlife Mitigation Plan includes access changes to FS roads (FS and DEQ 2013). Depending on the road, changes would be implemented before the evaluation phase, before the construction phase, or during the closure phase. MMC would build and maintain gates or barriers on the roads and complete other activities so the roads would either be removed from service, or cause insignificant erosion risk if maintenance were not performed on them during the operation phase of the mine. In some cases, culverts would be removed, which could occur in active stream channels, requiring instream work, structure placement, and fill removal. In the short term, these activities would increase delivery of sediment to action area streams. After the activities are completed and the roads become stabilized, sediment delivery to streams would be nearly eliminated. MMC will monitor the effectiveness of closure devices at least twice annually and complete any necessary repairs.

Waters of the U.S.

Proposed compensatory mitigation for impacts to Waters of the U.S. (WUS) includes mitigation in stream channels (NewFields and Kline 2012). The U.S. Army Corps of Engineers (ACOE) will not approve WUS mitigation that creates a need for additional mitigation under a different program. Any proposed WUS mitigation beyond the disturbance boundary of the Tailings Storage Facility that could potentially impact sediment, habitat, or fish in an action area stream is described below.

Bull trout occupied streams could be impacted indirectly from WUS mitigation that would occur on tributaries. Potential impacts include short-term increased sediment input resulting from culvert removal or replacement, long-term sediment reduction resulting from erosion stabilization, and increased competition from non-native species due to habitat improvement.

The following projects are included in the WUS mitigation plan.

1. Surface runoff from the reclaimed Tailings Storage Facility would be diverted to Little Cherry Creek. Surface flow would be ephemeral or intermittent, depending on the ability of the reclaimed Tailings Storage Facility surface to provide delayed release of snowmelt and rainfall. Flow would be directed off the northwest edge of the reclaimed Tailings Storage Facility to Little Cherry Creek via WUS channel LCC-15. After reclamation, the watershed area of Little Cherry Creek would be increased by 44 percent relative to the current watershed (ERO 2010). The Tailings Storage Facility would be designed to act as a temporary sink so there would be a lag time between runoff events and increased flows to Little Cherry Creek. Increased flow may improve the flushing of fine sediment that often covers the majority of the streambed in some reaches of Little Cherry Creek.

2. Sediment sources in the Little Cherry Creek drainage would be stabilized. A preliminary sediment source inventory was conducted in the lower 5,200 feet of Little Cherry Creek during September 2011 to evaluate the potential to decrease the input of fine sediment. Several sediment sources were identified while walking in the stream and on the property. The largest area of erosion was documented on the north valley slope on MMC's property, approximately 2,300 feet upstream of Libby Creek. It appeared that sediment from this source flows into a wetland that may retain much of it before it reaches Little Cherry Creek. However, the majority of the streambed was covered in fine sediment downstream of this area, and conditions improved upstream, indicating that it may be the predominant sediment source.

3. Two culverts would be replaced on Little Cherry Creek. An increase in the watershed area of Little Cherry Creek after reclamation of the Tailings Storage Facility may necessitate replacement of the FSR 6212 culvert. Replacement of this culvert and the FSR 278 culvert would improve fish passage (Kline et al. 2005). Little Cherry Creek supports redband trout, that have been observed upstream and downstream of the FSR 6212 culvert (Kline 2004; Kline and Watershed Consulting 2005), but not upstream of the FSR 278 culvert.

4. MMC intends to purchase a property for wetland mitigation that includes a reach of Swamp Creek and channels from three springs that flow to it. Swamp Creek is a tributary to Libby Creek. It is not considered to be occupied by bull trout currently or historically. It flows 10.4 miles to its confluence with Libby Creek near U.S. Highway 2. Swamp Creek is not rated by FWP for fisheries habitat. Four reaches were electrofished during 2012 between the wetland mitigation parcel and the Libby Creek confluence. Brook trout were the most abundant species in all reaches, followed by *Oncorhynchus* sp. hybrids at two of the four stations (Kline and Savor 2012). Within the wetland mitigation parcel, the mainstem of Swamp Creek and the channels from springs 2 and 3 would be transformed from their current straight and deeply entrenched condition to a shallower and meandering condition. Livestock would be excluded from the Swamp Creek property. Livestock exclusion would reduce erosion, reduce the potential for excessive nutrient inputs, and protect riparian vegetation from trampling and grazing. The Swamp Creek property is planted with hay, which would be replaced with a diverse native stand of riparian vegetation that is suited for the conditions on the property after wetland and stream mitigation.

5. At closure, the bridge over Poorman Creek at FSR 6212 would be removed and the road would be decommissioned. Removal of the bridge over Poorman Creek at FSR 6212 would allow restoration of a natural channel and stream banks, reconnection of the affected reach with its floodplain, and establishment of riparian vegetation.

Bull Trout Mitigation

Included in KNF's proposed action, is a Bull Trout Mitigation Plan (Plan) intended to address potential impacts of the proposed action to bull trout and designated bull trout critical habitat (see Appendix A in KNF BA 2013). The Service assisted in preparing the Plan and applauds the KNF and MMC's objective to mitigate for adverse impacts through the measures identified in the Plan. <u>However, as proposed, the Service is concerned regarding the lack of certainty of mitigation measures in the Plan and based on discussions with the KNF has determined that only</u>

portions of the Plan would be fully implemented and in a timely fashion for the main reasons? stated below.

As proposed, implementation of the Plan is not likely to occur due to the qualifying statements in the Plan that condition implementation on completion of a further hydrologic assessment that will determine the extent of predicted streamflow depletions. Because the Service cannot base the jeopardy analysis on what might happen, the Service's effects and jeopardy analysis in this BO relied on only those minimization measures (e.g., sediment abatement measures) of the proposed action that are reasonably certain to occur and that the Service expects to be completed based on information provided by the KNF (KNF BA 2013). Therefore, other than these specific sediment abatement measures, the proposed mitigation measures in the Plan were not considered in the effects analysis of this BO.

In regards to the Plan, the Service determined that the future hydrologic assessment and modeling effort that would be conducted during the Resource Evaluation phase would supercede the previous three modeling efforts and provide another prediction which would have to be analyzed for its effects on bull trout and bull trout critical habitat. The Service agrees the Plan's adaptive management approach of using improved information when it becomes available either through monitoring or future modeling will make better informed decisions regarding appropriate mitigation. Furthermore, the Service can address this occurrence should it happen in the future. This process would likely require re-initiation of Section 7 consultation, a new jeopardy analysis and preparation of a revised BO.

In the Service's assessment of the Plan (Appendix A), we indicated deficiences of specfic mitigation measures in the Plan, as well as a number of mitigation actions, that if modified, would likely offset predicted permanent impacts to bull trout populations and bull trout critical habitat, including impacts initially determined to be minor or negligible (and risk of adverse impacts from catestrophic events). Despite the Plan's shortfall regarding implementation uncertainty and timeliness, we concluded that if measures in the Plan were implemented they could potentially increase resident and migratory populations in the two potentially impacted bull trout core areas; Lower Clark Fork River and Kootenai River.

III. STATUS OF THE SPECIES AND CRITICAL HABITAT

A. ESA Listing Status

The coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon and in the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound and east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Cavender 1978, Bond 1992, Brewin and Brewin 1997, Leary and Allendorf 1997).

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, and 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 (64 FR 58910).

The bull trout was initially listed as three separate Distinct Population Units (DPSs)(63 FR 31647, 64 FR 17110). The preamble to the final listing rule for the United States coterminous population of the bull trout discusses the consolidation of these DPSs, plus two other population segments, into one listed taxon and the application of the jeopardy standard under section 7 of the ESA relative to this species (64 FR 58930):

> *Although this rule consolidates the five bull trout DPSs into one listed taxon, based on conformance with the DPS policy for purposes of consultation under section 7 of the Act, we intend to retain recognition of each DPS in light of available scientific information relating to their uniqueness and significance. Under this approach, these DPSs will be treated as interim recovery units with respect to application of the jeopardy standard until an approved recovery plan is developed. Formal establishment of bull trout recovery units will occur during the recovery planning process.*

Please note that consideration of the above recovery units for purposes of the jeopardy analysis is done within the context of making the jeopardy determination at the scale of the entire listed species in accordance with Service policy (USDI Fish and Wildlife Service 2006).

B. Species Description and Life History

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 (Fraley and Shepard 1989, 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) to rear as subadults or to live as adults (Cavender 1978, 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), and both repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Leathe and Graham 1982, Fraley and Shepard 1989, Pratt 1992, Rieman and McIntyre 1996).

The iteroparous reproductive system of bull trout has important repercussions for the management of this species. Bull trout require two-way passage up and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous (fishes that spawn once and then die, and therefore require only one-way passage upstream) salmonids. 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 downstream passage route.

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 (Pratt 1985, Goetz 1989). The largest verified bull trout is a 32-pound specimen caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982).

Diet

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, Goetz 1989, Donald and Alger 1993). Adult migratory bull trout feed on various fish species (Leathe and Graham 1982, Fraley and Shepard 1989, Brown 1994, Donald and Alger 1993). In coastal areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) in the ocean (WDFW et al. 1997).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies. Optimal foraging theory can be used to describe strategies fish use to choose between alternative sources of food by weighing the benefits and costs of capturing one choice of food over another. For example, prey often occurs in concentrated patches of abundance ("patch model"; Gerking 1994). As the predator feeds the prey population is reduced, and it becomes more profitable for the predator to seek a new patch rather than continue feeding on the original one. This can be explained in terms of balancing energy acquired versus energy expended. 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 migratory route (WDFW et al. 1997). Anadromous bull trout also use marine waters as migratory corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005; Goetz 1994).

A single optimal foraging strategy is not necessarily a consistent feature in the life of a fish, but this foraging strategy can change from one life stage to another. Fish growth depends on the quantity and quality of food that is eaten (Gerking 1994) and as fish grow their foraging strategy changes as their food changes in quantity, size, or other characteristics. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, mysids and small fish (Shepard et al. 1984, Boag 1987, Goetz 1989, Donald and Alger 1993). Bull trout that are 4.3 inches long or longer commonly have fish in their diet (Shepard et al. 1984), and bull trout of all sizes have been found to eat fish half their length (Beauchamp and Van Tassell 2001).

Migratory bull trout begin growing rapidly once they move to waters with abundant forage that includes fish (Shepard et al. 1984, Carl 1985). As these fish mature they become larger bodied predators and are able to travel greater distances (with greater energy expended) in search of prey species of larger size and in greater abundance (with greater energy acquired). In Lake Billy Chinook as bull trout became increasingly piscivorous with increasing size, the prey species changed from mainly smaller bull trout and rainbow trout for bull trout less than 17.7 inches in length to mainly kokanee for bull trout greater in size (Beauchamp and Van Tassell 2001). Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources. Bull trout likely move to or with a food source.

Habitat Characteristics

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; Sedell and Everest 1991; Howell and Buchanan 1992; Pratt 1992; Rieman and McIntyre 1993, 1995; Rich 1996; 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), fish should not be expected to simultaneously occupy all available habitats (Rieman et al. 1997).

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; Gilpin 1997; Rieman et al. 1997). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed, or stray, to non-natal 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 that 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 very long time (Spruell et al. 1999, Rieman and McIntyre 1993).

Cold water temperatures play an important role in determining bull trout habitat, as these fish are primarily found in colder streams (below 59° Fahrenheit (F)), and spawning habitats are generally characterized by temperatures that drop below 48 degrees F 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, Baxter and Hauer 2000, Baxter and McPhail 1997, Rieman et al. 1997). Optimum incubation temperatures for bull trout eggs range from 35 to 39 degrees F, whereas optimum water temperatures for juvenile rearing range from about 46 to 50 degrees F (McPhail and Murray 1979, Goetz 1989, Buchanan and Gregory 1997). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a plunge pool, 46 to 48 degrees F, within a temperature gradient of 46 to 60 degrees F. 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 52 to 54 degrees F.

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman et al. 1997). Factors that can influence bull trout ability to survive in warmer rivers include availability and proximity of cold water patches and food productivity (Myrick et al. 2002). In Nevada, adult bull trout have been collected at 63 degrees F in the West Fork of the Jarbidge River (S. Werdon, Service, pers. comm. 1998) and have been observed in Dave Creek where maximum daily water temperatures were 62.8 to 63.6 degrees F. In the Little Lost River, Idaho, bull trout have been collected in water having temperatures up to 68 degrees Fahrenheit; however, bull trout made up less than 50 percent of all salmonids when maximum summer water temperature exceeded 59 degrees F and less than 10 percent of all salmonids when temperature exceeded 63 degrees F (Gamett 1999). In the Little Lost River study, most sites that had high densities of bull trout were in an area where primary productivity increased in the streams following a fire (B. Gamett, U. S. Forest Service, pers. comm. 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, Sedell and Everest 1991, Pratt 1992, Thomas 1992, Rich 1996, Sexauer and James 1997, Watson and Hillman 1997). Maintaining bull trout habitat requires 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.

Bull trout typically spawn from August to November during periods of 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, egg incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Eggs collected from wild bull trout in the Swan River, Montana drainage were experimentally incubated at different water temperatures; eggs incubated at 37.6° F hatched in 126 days while bull trout eggs incubated at 43.5° F hatched in 75 days (Fredenberg et al. 1995). Time from egg deposition to emergence of fry may surpass 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, Ratliff and Howell 1992).

Migratory forms of the bull trout appear to develop when habitat conditions allow movement between spawning and rearing streams and larger rivers or lakes where foraging opportunities may be enhanced (Frissell 1993). 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 and lakes, 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 (Rieman and McIntyre 1993, MBTSG 1998, Frissell 1993). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbance makes local habitats temporarily unsuitable, the range of the species is diminished, and the potential for enhanced reproductive capabilities are lost (Rieman and McIntyre 1993).

C. Current and Historic Distribution

Bull trout are found throughout the northwestern United States and in British Columbia and Alberta in western Canada (Rieman and McIntyre 1993; USDI Fish and Wildlife Service 2002a). Within Montana and Alberta, Canada bull trout also exist in the headwaters of the South Saskatchewan River basin and further north in drainages along the east side of the Continental Divide. In the Klamath River basin, only isolated, resident bull trout are found in higher elevation headwater streams of the Upper Klamath Lake, Sprague River, and Sycan River watersheds (Goetz 1989; Light et al. 1996). In the state of Washington, bull trout are found in coastal drainages of the Olympic Peninsula and in streams surrounding Puget Sound (USDI Fish and Wildlife Service 2002b). In Montana, bull trout occur in the headwaters of the Columbia River basin in the Clark Fork and the Kootenai subbasins.

The historic range of bull trout was restricted to North America (Cavender 1978; Haas and McPhail 1991). Bull trout were historically recorded from the McCloud River in northern California, the Klamath River basin in Oregon and throughout the Columbia River basin in much of interior Oregon, Washington, Idaho, northern Nevada, and western Montana. They also occurred in coastal and interior Canada in much of British Columbia, with populations extending along the east slopes of the Rockies in Alberta and including a small area in northern Montana (Rieman et al. 1997).

Bull trout distribution has probably contracted and expanded periodically with natural climate change (Williams et al. 1997). Genetic variation (presence of unique alleles) suggests an extended and evolutionarily important isolation between populations in the Klamath basin and those in the Columbia River basin (Leary et al. 1993). Populations within the Columbia River basin are more closely allied and are thought to have expanded from at least two common glacial refugia in recent geologic time (Williams et al. 1997; Haas and McPhail 1991; Whitesel et al. 2004).

Despite bull trout occurring widely across a major portion of the historic potential range, many areas support only remnant populations of bull trout. Bull trout were reported present in 36 percent and unknown or unclassified in 28 percent of the subwatersheds within the potential historic range. Strong populations were estimated to occur in only 6 percent of the potential historic range (Rieman et al. 1997). Bull trout are now extirpated in California and only remnant populations are found in portions of Oregon (Ratliff and Howell 1992). A small population still exists in the headwaters of the Jarbidge River, Nevada, which represents the present southern limit of the species' range.

Though bull trout may move throughout entire river basins seasonally, spawning and juvenile rearing appear to be restricted to the coldest streams or stream reaches. The downstream limits of habitat used by bull trout are strongly associated with gradients in elevation, longitude, and latitude, which likely approximate a gradient in climate across the basin (Goetz 1994). The patterns indicate that spatial and temporal variation in climate may strongly influence habitat occupancy by bull trout. While temperatures are probably suitable throughout much of the northern and mountainous portions of the range, predicted spawning and rearing habitat are restricted to increasingly isolated high elevation or headwater "islands" toward the south (Goetz 1994; Rieman and McIntyre 1995).

Range-wide, local populations of bull trout within their respective core areas are often isolated and remnant. Migratory life histories have been lost or limited throughout major portions of the range (Ratliff and Howell 1992; Pratt and Huston 1993; Rieman and McIntyre 1993, 1995; Goetz 1994; Jakober et al. 1998; MBTSG 1998; USDI Fish and Wildlife Service 2002a, 2005a, b) and fluvial bull trout populations in portions of the upper Columbia River basin appear to be nearly extirpated (USDI Fish and Wildlife Service 2002b, 2005a).

At this time, the Service recognizes 118 bull trout core areas range-wide in Idaho, Montana, Oregon, Nevada and Washington (USDI Fish and Wildlife Service 2002a). This represents a partial consolidation of some of the 188 local populations originally described in the various bull trout listing documents (USDI Fish and Wildlife Service 1999), and is based on the use of more consistent and updated terminology as well as specific information regarding connectivity and consolidation between some populations previously considered autonomous. For example, radio telemetry information from some recent studies has been particularly useful in further describing the movements of bull trout. Core areas were previously defined as approximating interacting biological units for bull trout. Hence, as more information is obtained and recovery proceeds, we would anticipate the number of core areas and the boundaries that describe them will continue to be somewhat fluid.

D. General Status and Conservation Needs of Bull Trout

In recognition of available scientific information on bull trout relating to their uniqueness and significance, five segments of the coterminous United States population of the bull trout are considered essential to the survival and recovery of this species and are identified as interim recovery units: (1) Jarbidge River; (2) Klamath River; (3) Columbia River; (4) Coastal-Puget Sound; and (5) St. Mary-Belly River. Each of these segments 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.

A summary of the current status and conservation needs of the bull trout within these units is provided below. A comprehensive discussion of these topics is found in the Service's draft recovery plan for the bull trout (USDI Fish and Wildlife Service 2002a, 2004a, b). The term conservation means the terms "conserve," "conserving" and "conservation" mean to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to [the] Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking. [ESA §3(3)]

Generally, the conservation needs of the bull trout are often generally expressed as the need to provide the four “C’s”: 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 at multiple scales ranging from the coterminous to local populations.

The recovery planning process for the bull trout (Fish and Wildlife Service 2002a, p. 49) has identified the following conservation needs (goals) for bull trout recovery: (1) maintain the current distribution of bull trout within core areas as described in recovery unit chapters, (2) maintain stable or increasing trends in abundance of bull trout as defined for individual recovery units, (3) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies, and (4) conserve genetic diversity and provide opportunity for genetic exchange.

The draft bull trout Recovery Plan (Fish and Wildlife Service 2002a, p. 62) identifies the following tasks needed for achieving recovery: (1) protect, restore, and maintain suitable habitat conditions for bull trout, (2) prevent and reduce negative effects of non-native fishes, such as brook trout, and other non-native taxa on bull trout, (3) establish fisheries management goals and objectives compatible with bull trout recovery, (4) characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout, (5) 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, (6) use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats, (7) assess the implementation of bull trout recovery by management units, and (8) revise management unit plans based on evaluations.

Central to the survival and recovery of the bull trout is the maintenance of viable core areas (USDI Fish and Wildlife Service 2002a, 2005a, b). A core area is defined as a geographic area occupied by one or more local bull trout populations that overlap in their use of rearing, foraging, migratory, and overwintering habitat, and in some cases in their use of spawning habitat. Each of the interim recovery units listed below consists of one or more core areas. A total of 118 core areas are recognized across the United States range of the bull trout (USDI Fish and Wildlife Service 2005a).

Jarbidge River

This interim recovery unit currently contains a single core area with six local populations. Less than 500 resident and migratory adult bull trout, representing about 50 to 125 spawners, are estimated to occur within the core area. The current condition of the bull trout in this interim recovery unit is attributed to the effects of livestock grazing, roads, angler harvest, timber harvest, and the introduction of non-native fishes (USDI Fish and Wildlife Service 2005b). The draft bull trout recovery plan (USDI Fish and Wildlife Service 2002a) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout within the core area; maintain stable or increasing trends in abundance of both resident and migratory bull trout in the core area; restore and maintain suitable habitat conditions for all life history stages and forms; and conserve genetic diversity and increase natural opportunities for genetic exchange between resident and migratory forms of the bull trout. An estimated 270 to 1,000 spawning fish per year are needed to provide for the persistence and viability of the core area and to support both resident and migratory adult bull trout (USDI Fish and Wildlife Service 2005b).

Klamath River

This interim recovery unit currently contains 3 core areas and 12 local populations. The current abundance, distribution, and range of the bull trout in the Klamath River Basin are greatly reduced from historical levels due to habitat loss and degradation caused by reduced water quality, timber harvest, livestock grazing, water diversions, roads, and the introduction of non-native fishes (USDI Fish and Wildlife Service 2002a). Bull trout populations in this unit face a high risk of extirpation (USDI Fish and Wildlife Service 2002b). The draft bull trout recovery plan (USDI Fish and Wildlife Service 2002a) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout and restore distribution in previously occupied areas; maintain stable or increasing trends in bull trout abundance; restore and maintain suitable habitat conditions for all life history stages and strategies; conserve genetic diversity and provide the opportunity for genetic exchange among appropriate core area populations. Eight to 15 new local populations and an increase in population size from about 3,250 adults currently to 8,250 adults are needed to provide for the persistence and viability of the 3 core areas (USDI Fish and Wildlife Service 2002a).

Columbia River

This interim recovery unit currently contains about 90 core areas and 500 local populations. About 62 percent of these core areas and local populations occur in central Idaho and northwestern Montana. The condition of the bull trout within these core areas varies from poor to good but generally all have been subject to the combined effects of habitat degradation, fragmentation and alterations associated with one or more of the following activities: dewatering; road construction and maintenance; mining, and grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species. The draft bull trout recovery plan (USDI Fish and Wildlife Service 2002a) identifies the following conservation needs for this unit: maintain or expand the current distribution of the bull trout within core areas; maintain stable or increasing trends in bull trout abundance; maintain/restore suitable habitat conditions for all bull trout life history stages and strategies; and conserve genetic diversity and provide opportunities for genetic exchange.

Coastal-Puget Sound

Bull trout in the Coastal-Puget Sound interim recovery unit exhibit anadromous, adfluvial, fluvial, and resident life history patterns. The anadromous life history form is unique to this unit. This interim recovery unit currently contains 14 core areas and 67 local populations (USDI Fish and Wildlife Service 2004a). Bull trout are distributed throughout most of the large rivers and associated tributary systems within this unit. With limited exceptions, bull trout continue to be present in nearly all major watersheds where they likely occurred historically within this unit. Generally, bull trout distribution has contracted and abundance has declined especially in the southeastern part of the unit. The current condition of the bull trout in this interim recovery unit is attributed to the adverse effects of dams, forest management practices (e.g., timber harvest and associated road building activities), agricultural practices (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation), livestock grazing, roads, mining, urbanization, angler harvest, and the introduction of non-native species. The draft bull trout recovery plan (USDI Fish and Wildlife Service 2004a) identifies the following conservation needs for this unit: maintain or expand the current distribution of bull trout within existing core areas; increase bull trout abundance to about 16,500 adults across all core areas; and maintain or increase connectivity between local populations within each core area.

St. Mary-Belly River

This interim recovery unit currently contains 6 core areas and 9 local populations (USDI Fish and Wildlife Service 2002a). Currently, the bull trout is widely distributed in the St. Mary River drainage and occurs in nearly all of the waters that it inhabited historically. Bull trout are found only in a 1.2-mile reach of the North Fork Belly River within the United States. Redd count surveys of the North Fork Belly River documented an increase from 27 redds in 1995 to 119 redds in 1999. This increase was attributed primarily to protection from angler harvest (USDI Fish and Wildlife Service 2002a). The current condition of the bull trout in this interim recovery unit is primarily attributed to the effects of dams, water diversions, roads, mining, and the introduction of non-native fishes (USDI Fish and Wildlife Service 2002a). The draft bull trout recovery plan (USDI Fish and Wildlife Service 2002a) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout and restore distribution in previously occupied areas; maintain stable or increasing trends in bull trout abundance; restore and maintain suitable habitat conditions for all life history stages and forms; conserve genetic diversity and provide the opportunity for genetic exchange; and establish good working relations with Canadian interests because local bull trout populations in this unit are comprised mostly of migratory fish, whose habitat is mostly in Canada.

E. Local Status and Distribution

Status of Bull Trout in the Columbia River Basin

Within the Columbia River basin, a total of 90 core areas are described (USDI Fish and Wildlife Service 2002b). Generally, where status is known and population data exists, bull trout populations throughout the Columbia River basin are at best stable and more often declining (Thomas 1992; Schill 1992; Pratt and Huston 1993; USDI Fish and Wildlife Service 2005a,b). Bull trout in the Columbia basin have been estimated to occupy about 45 percent of their historic range (Quigley and Arbelbide 1997). Many of the bull trout core areas occur as isolated watersheds in headwater tributaries, or in tributaries where the migratory corridors have been lost or restricted. Few bull trout core areas are considered strong in terms of relative abundance and core area stability (USDI Fish and Wildlife Service 1998b, 2005a, b). Strong core areas are generally associated with large areas of contiguous habitat.

Within the Clark Fork subbasin of western Montana and northern Idaho, the Draft Bull Trout Recovery Plan describes 38 bull trout core areas (now 35 core areas, memorandum to the ARD, Ecological Services, Region 1, Portland, OR, from Field Supervisor, Montana Ecological Services, Helena, MT., July 14, 2006) and at least 152 local populations (USDI Fish and Wildlife Service 2002a). Within the Kootenai River Basin Management/Recovery Unit, four core areas and ten local populations are described.

Five-Year Bull Trout Status Review

In 2005, the Service initiated a 5-year review on the status of bull trout and in 2008 concluded the listing status as "threatened" should remain unchanged (USDI Fish and Wildlife Service 2008). This finding was based on an assessment of the conservation status of bull trout and the vulnerability for each of 121 bull trout core areas (USDI Fish and Wildlife Service 2005b). Review of the Bull Trout Core Area Conservation Assessment (USDI Fish and Wildlife Service 2005b) indicated that the original threats to bull trout still existed for the most part in all core areas, but no substantial new and widespread threats were discovered during this review or in the review of previous biological opinions on bull trout. This finding indicates the baseline conditions overall range-wide had not changed substantially in the last five years and that the trend and magnitude of the range-wide population had not worsened nor did it improve measurably.

The risk assessment or ranking portion of the status review was modeled to assess the relative status of each of the 121 core areas. The model used to rank the relative risk to bull trout was based on the Natural Heritage Programs' NatureServe Conservation Status Assessment Criteria, which had been applied in previous assessments of fish status, including bull trout (Master et al. 2003; MNHP 2004). The model integrated four factors: population abundance, distribution, population trend, and threats. For a complete understanding of the ranking process, a more thorough review of the report which describes the model and the output (USDI Fish and Wildlife Service 2005b) is required.

Results of the most recent status assessment (USDI Fish and Wildlife Service 2005b) indicate that two of the four core areas in the Kootenai River Basin Management Unit, including the Kootenai River Core Area, are considered to be "at risk" because of very limited and/or declining numbers, range, and/or habitat, making the bull trout in this core area vulnerable to extirpation. The Bull Lake Core Area is also considered to be "at risk". The Lake Koocanusa Core Area is considered to be at "low risk" because bull trout are common or uncommon, but not rare, and usually widespread through the core area. The Sophie Lake Core Area is considered to be at "high risk" because of extremely limited and/or rapidly declining numbers, range, and/or habitat, making the bull trout in this core area highly vulnerable to extirpation.

Results of the most recent status assessment (USDI Fish and Wildlife Service 2005a) indicate that within the Clark Fork River Basin Management Unit, the Lower Clark Fork River Core Area is considered to be "at high risk" because of very limited and/or declining numbers, range, and/or habitat, making the bull trout in this core area vulnerable to extirpation.

F. Status of Bull Trout Critical Habitat (General Overview and Legal Status)

The Service published a final revised critical habitat designation for the coterminous United States population of the bull trout on October 18, 2010 (USDI Fish and Wildlife Service 2010a). This final rule updated and replaced the previous bull trout critical habitat designation (USDI Fish and Wildlife Service 2005c). The scope of the new designation includes 18,975 miles of streams and 488,252 acres of lakes and reservoirs in Idaho, Oregon, Washington, Montana and Nevada (Table 1). In Washington, 754 miles of marine shoreline were designated. In addition, the final rule identifies 32 critical habitat units clustered into six recovery units (RU) where recovery efforts will be focused. Recovery units include: Mid-Columbia recovery unit; Saint Mary recovery unit; Columbia Headwaters recovery unit; Coastal recovery unit; Klamath recovery unit; and Upper Snake recovery unit. Conserving each RU is essential to conserving the listed entity as a whole.

Table 1. Stream/shoreline distance and acres of reservoir or lakes designated as bull trout critical habitat by state.

State	Stream/Shoreline Miles	Acres of Lakes or Reservoirs
Idaho	8,772	170,218
Montana	3,056	221,471
Oregon	2,836	30,256
Nevada	72	
Washington	3,793	66,308
Washington (marine)	754	

Conservation Role and Description of Designated Critical Habitat

The conservation role of bull trout critical habitat is to support viable core area populations (70 FR 56212). Core areas reflect the metapopulation structure of the coterminous United States population of the bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. Critical habitat units (CHU) generally encompass one or more core areas and may include foraging, migration, and overwintering areas, outside of core areas, that are important to the survival and recovery (i.e., conservation) of the bull trout.

The primary function of individual critical habitat units 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 (Rieman and McIntyre 1993; MBTSG 1998); (3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (Rieman and McIntyre 1993; Hard 1995; Healey and Prince 1995; MBTSG 1998); and (4) are distributed throughout the historic range of the species to preserve both genetic and phenotypic adaptations (Rieman and McIntyre 1993;

Hard 1995; MBTSG 1998; Rieman and Allendorf 2001).

Within designated critical habitat areas, the Primary Constituent Elements (PCEs) for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. The PCEs of bull trout critical habitat are as follows:

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 departure 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 non-native 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.

Critical habitat includes the stream channels within the designated stream reaches, the shoreline of designated lakes, and the inshore extent of marine near shore areas, including tidally influenced freshwater heads of estuaries.

In freshwater areas, critical habitat includes the stream channels within the designated stream reaches and a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. If bankfull elevation is not evident on either bank, the ordinary high-water line determines the lateral extent of critical habitat. The lateral extent of critical habitat in lakes may initially be defined by the perimeter of the waterbody as mapped on standard 1:24,000 scale topographic maps.

Critical habitat for bull trout applies only to waterways. However, the rule recognizes that associated flood plains, shorelines, riparian zones and upland habitat are important to critical habitat areas and that activities in these areas may affect bull trout critical habitat. About 63.7 percent of designated critical habitat stream and shoreline water bodies occur adjacent to federal land, 33.2 percent occurs adjacent to private land, 1.8 percent occurs adjacent to state land and 0.7 percent is adjacent to tribal land. Less than one percent is adjacent to land that includes a mix of ownerships.

Current Range-Wide Condition of Bull Trout Critical Habitat

The condition of 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 population status is a reflection of the degraded habitat condition of bull trout range-wide.

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 (Rieman and McIntyre 1993; Dunham and Rieman 1999); (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 species as a result of fish stocking and facilitated by degraded habitat conditions, particularly for brook trout and lake trout, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary et al. 1993; Kanda et al. 2002; Horn and Tholl 2008); (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 near shore foraging and migration habitat due to urban and residential development; and (5) degradation of foraging, migration, and overwintering habitat resulting from reduced prey base, roads, agriculture, development and dams.

G. Bull Trout Consultation and Recovery

For purposes of consultation and recovery for bull trout the Service considers biological effects and project related impacts of proposed actions at several nested spatial levels (i.e., hierarchal relationships), that include the local population, core areas, management units, and interim recovery units (USDI Fish and Wildlife Service 2002a). In the Draft Bull Trout Recovery Plan (USDI Fish and Wildlife Service 2002a), twenty-seven major watersheds were referred to as recovery units; that terminology has since been revised and they are now referred to as management units. The following definitions are from the Draft Bull Trout Recovery Plan:

- Local population: A group of bull trout that spawn within a particular stream or portion of a stream system. Multiple local populations may exist within a core area. A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit. In most areas a local population is represented by a single headwater tributary or complex of headwater tributaries where spawning occurs. 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.

- Core area: The combination of core habitat (i.e., habitat that could supply all elements for the long-term security of bull trout) and a core population (a group of one or more local bull trout populations that exist within core habitat) constitutes the basic unit on which to gauge recovery. Core areas require both habitat and bull trout to function, and the number (replication) and characteristics of local populations inhabiting a core area provide a relative indication of the core area's likelihood to persist. A core area represents the closest approximation of a biologically functioning unit for bull trout. Local populations within a core area have the potential to interact because of connected aquatic habitat.

- Recovery unit / management unit: Management units are the major units for managing recovery efforts; management units were described (as recovery units) in separate chapters in the draft recovery plan (USDI Fish and Wildlife Service 2002a). Most management units, as proposed, consisted of one or more major river basins. Several factors were considered in our identifying management units, for example, biological and genetic factors, political boundaries, and ongoing conservation efforts. In some instances, management unit boundaries were modified to maximize efficiency of established watershed groups, encompass areas of common threats, or accommodate other logistical concerns. Some proposed management units included portions of mainstem rivers (e.g., Columbia and Snake rivers) when biological evidence warranted such inclusion.

Within each recovery/management unit, there are one or more core areas, which are intended to reflect the metapopulation structure of bull trout. By definition, a core area contains all of the necessary constituent elements for the long-term security of bull trout. Each core area represents the closest approximation of a biologically functioning unit for bull trout and is the geographic scale at which the Service is gauging the status of bull trout. The Draft Bull Trout Recovery

Plan recognizes core areas as the population units that are necessary to provide for bull trout biological needs in relation to genetic and phenotypic diversity, and spreading the risk of extinction caused by stochastic events. Peer review of the Draft Bull Trout Recovery Plan supported this approach. Furthermore, in the October 18, 2010, Final Rule Designating Revised Critical Habitat for Bull Trout (USDI Fish and Wildlife Service 2010a), additional guidance was given on the appropriate use of terminology to promote consistency in carrying out Service consultation responsibilities with respect to bull trout.

In this BO, we describe the biological effects and project impacts at each of the following scales: local population, core area, management unit, and interim recovery unit.

H. Jeopardy Determination

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 (Appendix B). 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 interim recovery unit(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."

Survival is defined as the condition in which a species continues to exist into the future while retaining the potential for recovery. This condition is characterized by a species with a sufficient population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, which exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter. Recovery is defined as improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act. [50 CFR §402.02]. For the purposes of bull trout recovery, an emphasis is placed on the adult (migratory) life history forms. Benefits of migratory bull trout include 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 (Rieman and McIntyre 1993, MBTSG 1998, Frissell 1999). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbance makes local habitats temporarily unsuitable, the range of the species is diminished, and the potential for enhanced reproductive capabilities are lost (Rieman and McIntyre 1993).

The approach to the jeopardy analysis for the proposed action addressed by this biological opinion follows a hierarchal relationship between units of analysis (i.e., geographical subdivisions) that characterize effects at the lowest level or smallest scale (local population) aggregated to the highest level or largest scale (Columbia River Interim Recovery Unit) of analysis. Table 2 shows the hierarchal relationship between units of analysis that was used to determine whether the proposed action is likely to jeopardize the survival and recovery of bull trout. If the adverse effects of the proposed action do 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 would result in a no-jeopardy finding. However, if the proposed action causes adverse effects that are determined to appreciably reduce both survival and recovery of the species at a lower scale of analysis, then further analysis is warranted at the next higher scale.

Table 2. Hierarchy of units of analysis for bull trout jeopardy analysis for the Montanore Project.

Name	**Hierarchical Relationship**
Coterminous United States	Range of the species within the coterminous United States (i.e., the listed ESA entity)
Columbia River Interim Recovery Unit	One of 5 interim recovery units in the coterminous United States
Kootenai River Basin Management Area	One of 23 management units in the Columbia River Interim Recovery Unit
Kootenai River Core Area	One of 6 core areas in the mgmt unit
Libby Creek local population	One of 8 local populations in core area
West Fisher Creek local population	One of 8 local populations in core area
Clark Fork River Management Area	One of 23 management units in the Columbia River Interim Recovery Unit
Lower Clark Fork River Core Area	One of 42 core areas in the mgmt unit
Rock Creek local population	One of 14 local pops in core area
East Fork Bull River local population	One of 14 local pops in core area

Based on the information that is analyzed and described in this biological opinion, this project will not jeopardize the survival and recovery of bull trout at the scale of the listed entity (i.e., coterminous United States range wide distribution). More detailed rationale and discussion for this conclusion is provided below.

I. Analysis of Adverse Modification Determination to Designated Critical Habitat

For purposes of the adverse modification determination, the effects of the federal action on bull trout critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account 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 (Appendix C).

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

This BO does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this BO 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 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 that will influence the recovery role of affected critical habitat units or sub-units; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

Within the Columbia River basin, the Service has designated 32 critical habitat units (CHUs) as critical habitat for bull trout (USDI Fish and Wildlife Service 2010a). The conservation role of bull trout CHUs is to support viable core area populations.

The Montanore Project affects critical habitat in two CHUs, Lower Clark Fork River Basin and Kootenai River Basin. The Clark Fork River Basin CHU is essential for maintaining bull trout distribution within the unique geographic region of the Columbia Headwaters Recovery Unit in large part because it represents the evolutionary heart of the migratory adfluvial bull trout life history form (USDI 2009a). The Kootenai River Basin CHU is essential to bull trout recovery because it contains the strongest adfluvial core area population across the range of the species and also supports the single largest spawning run of adult bull trout in the Wigwam River, British Columbia (USDI 2009 p.815).

Within the Lower Clark Fork River Basin, the Montanore Project affects critical habitat in 1 of 14 core areas – the Lower Clark Fork River core area – and within the Lower Clark Fork River core area, the Montanore Project affects designated bull trout critical habitats in two streams (local bull trout populations), including Rock Creek (including East Fork Rock Creek) and East Fork Bull River (Table 3). Within the Kootenai River Basin, the Montanore Project affects critical habitat in 1 of 8 core areas - the Kootenai River core area - and within the Kootenai River core area, the Montanore Project affects designated bull trout critical habitat located in three streams (local bull trout populations), including Libby Creek, Bear Creek, and West Fisher Creek (see Table 3).

The Service identified listed aquatic species and their designated critical habitat that are known or suspected to occur on the KNF, which includes the action area (USDI Fish and Wildlife Service 2010a, FWS 2011a). Bull trout occur in streams that are near or are crossed by roads that would be used for the proposed action, in the mine area where surface activities would occur, on the east and west side of the Cabinet Mountains Wilderness Area where changes to streamflow could occur, and in streams that would be crossed by the transmission line (see

Figure 2).

Within the action area, bull trout critical habitat has been designated in Libby Creek, Bear Creek, West Fisher Creek, Rock Creek (mainstem), East Fork Rock Creek, and East Fork Bull River (USDI Fish and Wildlife Service 2010a). These 2010 designations removed short segments of critical habitat in Ramsey Creek and Poorman Creek that were designated in 2005. Segments in Libby Creek, West Fisher Creek, and Fisher River covered by the Plum Creek Timberlands LP (Plum Creek) Native Fish Habitat Conservation Plan (HCP) are considered essential excluded habitat and are not considered in the conclusion of this BO pertaining to designated critical habitat. Within the action area, in addition to the streams listed above, bull trout also occur in Big Cherry Creek, Cable Creek, Midas Creek, and West Fork Rock Creek.

The Lower Clark Fork CHSU is essential to bull trout conservation because it provides an important portion of the spawning and rearing habitat for Lake Pend Oreille, as well as an essential migratory corridor for bull trout from Lake Pend Oreille to be able to access productive watersheds upstream of this CHSU. Historic fragmentation of the CHSU due to three privately owned mainstem hydroelectric dams (Cabinet Gorge, Noxon Rapids, and Thompson Falls) seriously compromised access and productivity of this habitat for bull trout for nearly a century. However, ongoing fish passage efforts (both fishways and trap and transport programs) have improved the longer-term prognosis for bull trout connectivity, and this CHSU is expected to provide a critical linkage to recovering bull trout in the entire Clark Fork River CHU in the future (USDI 2009).

Table 3. Hierarchy of units of analysis for bull trout adverse modification analysis for this biological opinion. Critical habitat segments affects by the action are italicized

Name/Units of scale	Hierarchical Relationship
Coterminous United States	Range of bull trout/Critical Habitat 32 Units
Clark Fork River Basin Unit 31 Kootenai River Basin Unit 30	Two of 32 Units, defined as essential for the survival and recovery of the species across the range of the species. Based on the seven guiding principles for the conservation (USDI 2009a p.1-3).
Lower Clark Fork River Sub-Unit	One of 11 Sub-Units within the Clark Fork Basin Unit. This Sub-Unit is essential for conservation of the species as one of the several occupied major watershed in the Clark Fork Basin Critical Habitat Unit.
Kootenai River Sub-Unit	One of 2 Sub-Units within the Kootenai River Basin Unit. This Sub-Unit is essential for conservation of the species as one of the several occupied major watershed in the Kootenai River Basin Critical Habitat Unit.
Designated Stream Segments and Water Bodies: Cabinet Gorge Reservoir, McDonald Lake, Mission Reservoir, Noxon Rapids Reservoir, Saint Mary's Lake, Clark Fork River, Cooper Gulch, Crow Creek, Dry Lake Creek, *East Fork Bull River*, East Fork Crow Creek, Fishtrap Creek, Flathead River, Graves Creek, Jocko River, Mission Creek, North Fork Jocko River, Post Creek, Prospect Creek, *Rock Creek*, South Fork Bull River, South Fork Jocko River, Swamp Creek, Thompson River, Vermilion River, West Fork Fishtrap Creek, West Fork Thompson River.	These water bodies contain the habitats that support local populations that in turn support the conservation of the species for the *Lower Clark Fork River* CHSU, CHU, core area, and Interim Management Unit.
Designated Stream Segments and Water Bodies: *Bear (Libby) Creek*, Bull Lake Callahan Creek, East Fork Pipe Creek, Fisher River, Keeler Creek, Kootenai River, Lake Creek, North Callahan Creek, North Fork Keeler Creek, O'Brien Creek, Pipe Creek, Quartz Creek, South Callahan Creek, South Fork Keeler Creek, *West Fisher Creek*, West Fork Quartz Creek	These water bodies contain the habitats that support local populations that in turn support the conservation of the species for the *Kootenai River* CHSU, CHU, core area, and Interim Management Unit.

In summary, the scales of analysis are as follows; *local population, core area, management unit, and interim recovery unit* for the purposes of consultation and recovery. The core area scale is an appropriate unit of analysis by which threats to bull trout and recovery should be measured (FR 70, No 185). Similarly the geographical scales for critical habitat are as follows; stream segment or water body, CHSU, CHU and the range of bull trout. Generally in the Kootenai River and Clark Fork River management units, core areas are similar in geographical scale to

CHSU. The proposed action will affect the Kootenai River core area, Kootenai River CHSU, Lower Clark Fork River core area, and Lower Clark Fork River Sub-Unit. For the purposes of this BO all designated critical habitat supports and is occupied by a local population. These relationships and scales of analyses are illustrated in Tables 2 and 3 above.

IV. ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have already undergone section 7 consultations and the impacts of State and private actions which are contemporaneous with the consultations in progress. The environmental baseline below characterizes the effects of past and ongoing human factors leading to the current status of the species, their habitats, and ecosystem within the action area.

Baseline conditions for bull trout were assessed using information in the Bull Trout Core Area Templates (USDI 2005a), Consistency Check with the 5-year Bull Trout Review (USDI 2008), draft recovery plan (USDI 2002a; USDI 2002b), Final Rule for Bull Trout Critical Habitat, and other sources of information.

A. Status of Bull Trout within the Action Area

The action area encompasses local bull trout populations in two core areas, the Kootenai River and Lower Clark Fork River core areas in the Columbia River Interim Recovery Unit. The Kootenai River core area has 8 local bull trout populations (6 of those are in Montana) with 2 local populations in the action area (Libby Creek and West Fisher River). The Lower Clark Fork River core area has 14 local bull trout populations; 7 of those reside in tributaries to the mainstem Clark Fork River or its reservoirs near the action area, and 7 reside in tributaries to the Flathead River which enters the Clark Fork River further upstream. Two local bull trout populations in the Lower Clark Fork core area reside in the action area, Rock Creek and Bull River. Details pertinent to the baseline conditions of the core areas and affected local populations follow.

Within the action area of the Montanore Project, the KNF BA (2013) describes the baseline population and habitat conditions for local bull trout populations within the Kootenai River and Lower Clark Fork River core areas. The baseline descriptions included analyses of 4 population and 19 habitat indicators which are based on consistent categories, metrics, and terminology described in the Service's *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (USDI Fish and Wildlife Service 1998a; hereafter referred to as the Service matrix). The Service matrix indicators only apply to "local bull trout populations" (individual streams), not to larger scale (i.e. core area) population status. A summary of the assessment of matrix indicators describing the baseline conditions for 13 streams affected by the proposed action is presented in Table 4 below.

Table 4 Baseline conditions of affected streams in the Montanore Project area (adapted from KNF BA 2013).

Indicator		Libby Cr	Bear Cr	Cable Cr	Midas Cr	Poorman Cr	Ramsey Cr	Big Cherry	Fisher R	W Fisher Cr	Rock Cr	E Fork Rock	W Fork Rock	E Fork Bull R
		B	B	B	B	B	B	B	B	B	B	B	B	B
RMO	Pool frequency	U	R	R		R	R	U	U	R	R	R	R	R
	Temperature	RU	R	A		A	R	RU	U	R	A	A	A	R
	Large woody debris	R	A	A	A	A	A	R	R	R	R	R	R	A
	Wetted width/depth	R	R	R		R	R	R	A		R	R	R	R
PCE	Influences of subsurface water	U	R	Not Critical Habitat	Not Critical Habitat	Not Critical Habitat	Not Critical Habitat	Not Critical Habitat	Not Critical Habitat	M	R	D	R	D
	Migratory habitats	U	R							M	R	D	R	D
	Food base	U	R							M	R	M	R	M
	Aquatic environment complexity	U	R							M	R	M	R	M
	Temperature	U	R							M	R	D	R	D
	Substrate	R	R							DI	R	DI	R	M
	Natural hydrograph	U	R							M	R	D	R	D
	Water quantity and quality	U	R							M	R	D	R	D
	Detrimental non-native fish species	R	R							D	R	I	R	M
	Integrated	U	R							DI	R	D	R	D
MPI Subpop	Subpopulation size	R	R			U	R	R	R	R	R	R	R	AF
	Growth and survival	R	A			U	R	R	R	R	U	U	U	R
	Life history diversity and isolation	R	R			U		R	R	R	U	U	U	R
	Persistence and genetic integrity	R	R	R	R	U		R	R	R	U	U	R	R
MPI Habitat	Temperature	RU	R	A		A	R	RU	U	R	A	A	A	R
	Sediment	U	U			RU	RU		U	U	R	R	R	R
	Chemical contaminants/nutrients	U	R	R	A	R	A	U	RU	RU	A	A	A	R
	Man-made physical barriers	R	A	R	R	R	A	R	R	R	R	R	R	A
	Substrate embeddedness	R	R			A	A	R	R	R	A	A	A	R
	Large woody debris	R	A	A	A	A	A	R	R	R	R	R	R	A
	Pool frequency and quality	U	R			R	R	U	U	R	R	R	R	R
	Large pool frequency	U	R			R	R	U	U	R	R	R	R	A
	Off-channel habitat	R	R			A	A	R	R	R	R	R	R	A
	Refugia	U	R			R			R		U	U	U	R
	Scour pool avg width/max depth	R	R			R	R	R	A		A	A	R	A
	Streambank stability	R	R	A	A	A	A	R	R	R	R	R	R	R
	Floodplain connectivity	U	R		I	A	A	U	U	R	R	R	R	R
	Peak and base flows	U	U	R	R	R	R	U	U	U	U	U	U	R
	Drainage network length	RU	R	A	A	A	A	RU	U	U	R	R	R	R
	Road density/location	U	U	U	U	U	U	U	U	U	R	R	R	R
	Disturbance history	U	R	R	R	U	U	U	U	U	R	R	R	R
	Riparian conservation areas	U	R	A	A	U	U	U	U	U	R	R	R	R
	Disturbance regime	U	R	R	R	R	R	U	U	U	R	R	R	R
MPI Integrated	Individual Stream	U	R	R	R	U	R	U	U	R	U	U	U	R

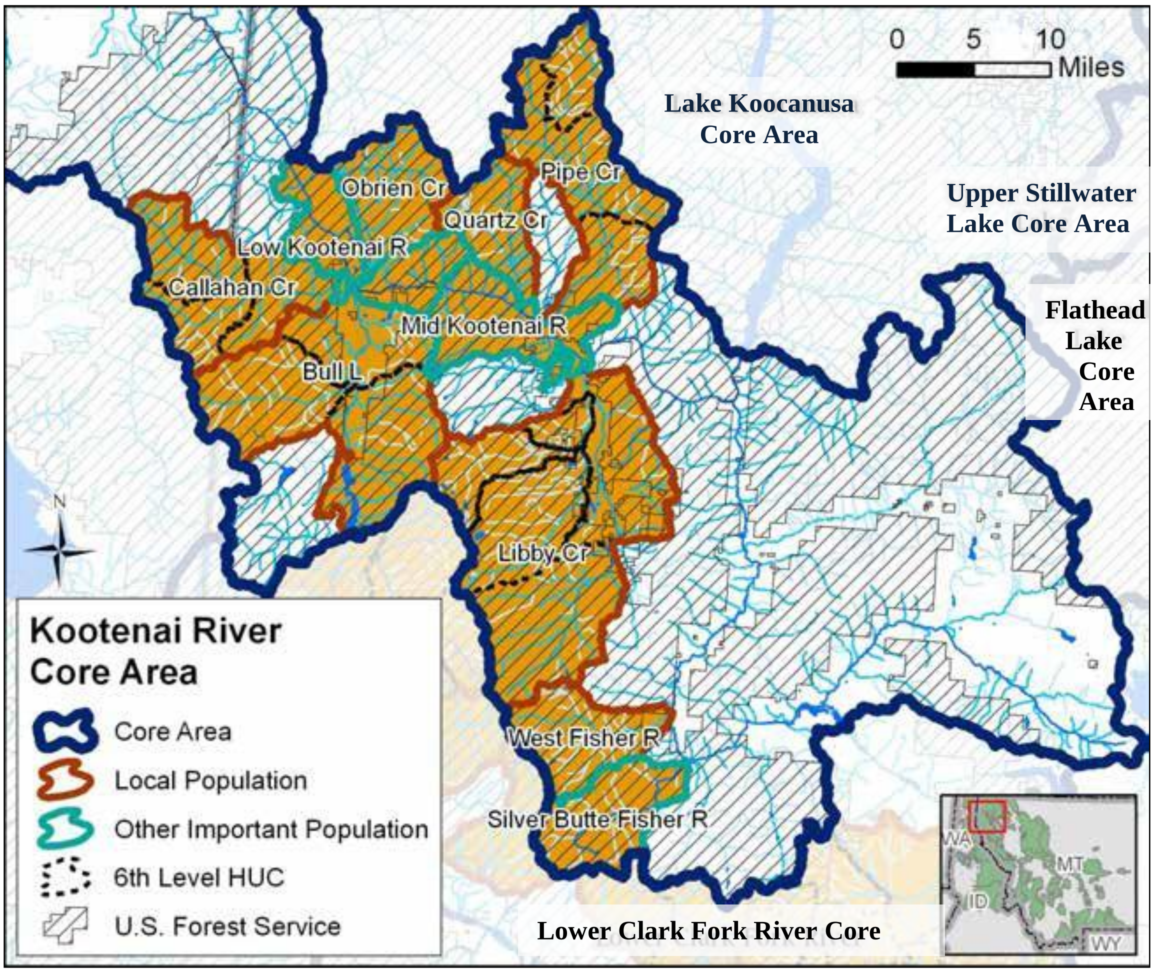
B = Baseline

Code	Baseline
	Functioning Appropriately (A)
	FA/FAR (AF)
	Functioning at Risk (R)
	FAR/FUR (RU)
	Functioning at Unacceptable Risk (U)
	Insufficient Information

B. Status of Bull Trout in the Kootenai River Core Area

The Kootenai River core area in the United States (bounded by Libby Dam with no fish passage on the upper end and the international border on the lower end) has the capability to exchange bull trout from its headwater spawning and rearing streams with downstream waters in Kootenay Lake in British Columbia (Fredenberg et al. 2005; Figure 6).

Figure 6. Kootenai River Core Area and adjacent Core Areas for bull trout (Adapted from USFS Bull Trout Conservation Strategy 2013).



Kootenay Lake is a large natural lake with several large tributaries entirely in Canada, including the Duncan River and Lardeau River. Kootenay Lake is a productive bull trout system, but the available evidence indicates most of the bull trout in Kootenay Lake spawn in tributaries in Canadian portions of the Kootenai River. It may be that the historic conditions of the Kootenai River upstream of Kootenay Lake prior to Libby Dam were less suitable for bull trout, or there were limited opportunities to navigate Kootenai Falls to access the best spawning and rearing habitat in the U.S. portions of the Kootenai River system. Regardless, there is limited evidence that bull trout from Kootenay Lake routinely migrate to United States portions of the Kootenai River system, or vice versa, either currently or historically. While the connectivity that does occur may be important, it is not a major migratory route.

Bull trout densities in the Kootenai River core area may have historically been somewhat higher than they are today, but have experienced nowhere near the reductions observed in other western Montana Core Areas (Bull Trout Conservation Strategy, USFS 2013).

Impacts to bull trout populations in the Kootenai River core area began in the late 19th century with extensive habitat destruction due to gold mining in Libby Creek, agricultural land conversion , and the development of riparian railroads, however more significant changes in bull trout populations likely occurred in the middle part of the century when development pressures in the form of timber harvest and road construction began to occur over relatively large areas of spawning and rearing habitat, including the upper Fisher River.

A major event affecting populations in the core area occurred with the construction of Libby Dam in 1974. This dam effectively severed much of the upper watershed, including productive habitat in Grave Creek, the Wigwam River and other river systems in Canada. Movement patterns of fluvial bull trout in the Kootenai River core area are therefore significantly restricted from historical patterns. Kootenai Falls also bisects this core area, which (because of the falls) was originally considered to be two separate core areas, but radio telemetry has demonstrated that at least partial upstream passage occurs over the falls. Fluvial populations in the truncated system are, however, geographically distributed throughout the core area, which increases the potential for recovery.

The proportion of fluvial to resident forms as it compares to historic proportions is uncertain. The only known resident bull trout population is found in Libby Creek above an impassable waterfall. There has been some loss of smaller populations, as in Parmenter Creek. The primary cause of loss of the Parmenter Creek bull trout population was irrigation withdrawals and irregular flows over the last 75 years. Another bull trout population in Flower Creek became isolated with the development of the Libby municipal water supply and associated dams which isolated the once migratory population. Only hybrids of bull trout and brook trout have been collected from Flower Creek recently. The Kootenai River provides abundant deep water foraging, migrating, and overwintering (FMO) habitat and there does appear to be a relatively strong fluvial component remaining in index spawning reaches, including individuals from the West Fisher Creek and Libby Creek local populations. However, the strength of the Kootenai River population is somewhat misleading, as recent genetic testing has indicated that the population appears to be heavily supported by entrainment (one-way, downstream movement) of Lake Koocanusa Core Area bull trout through Libby Dam.

Gas bubble disease may be a key factor affecting bull trout in the Kootenai River core area. Reduced nutrient flow past the dam (due to the reservoir acting as a sink) and reduced phosphate spill in the Canadian portion of the Kootenai River may also be significant. These three issues appear to be key contributors to mainstem rearing capacity limitations. Conversely the dam provides an abundant food source for bull trout directly downstream. Kokanee salmon entrained by the dam are discharged at the base of the dam. Opportunistic species such as bull trout have benefitted from this condition and bull trout in excess of 20 pounds are occasionally observed in the Kootenai River core area as a result of the enhanced food supply below Libby Dam.

Forest Service biologists estimate that as many as 300 to 400 fluvial redds may have been present in the Kootenai River core area historically (Bull Trout Conservation Strategy, USFS 2013). As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns.

Bull trout populations in the Kootenai River core area were first exposed to significant human-caused impacts in the late 1800's. Timber harvest and road construction impacted most spawning tributaries and cumulatively impacted rearing habitats in the mainstem Kootenai River. The construction of Libby Dam in 1974 was the single-most significant impact to bull trout in this core area during the current era.

Numerous smaller scale impacts to bull trout gradually occurred throughout the Kootenai River valley in the middle part of the 20th century. These included grazing, subdivision, and agricultural development along many of the important low gradient streams, road and energy corridor development in riparian areas, and logging and road development in tributary streams. These all had impacts to bull trout and their habitats; however, not of the same magnitude as Libby Dam.

Changes in fish species composition within the Kootenai River system, brought about by intentional and illegal stocking programs, have created an additional impact to the system. Brook trout are the main non-native species threat; they exist in numerous tributary streams that contain bull trout and are of particular concern in the O'Brien Creek drainage.

The 1950's-80's saw a rapid expansion of road construction and logging, especially on the upper watersheds of this core area. Further downstream, the climate is more maritime and dominated by rain on snow events. Steep slopes in the middle and upper portions of many Cabinet Mountain drainages produce high bedload levels as a result of their flashy nature. In some cases, this bedload has been exacerbated by road construction and logging. These loads have exceeded the transport capacity of some streams resulting in cobble and boulder dominated systems.

This period of management and heavy road construction also resulted in fragmentation of bull trout populations at undersized culvert crossings in some areas. Most of these barriers have been addressed in recent years and connectivity, aside from Libby Dam, is not a significant issue (Bull Trout Conservation Strategy, USFS 2013).

In recent years, some past impacts, such as culvert barriers, have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Logging and road construction have decreased considerably and hundreds of road miles have been removed from the landscape in key bull trout watersheds such as Quartz, Pipe, Callahan, and O'Brien creeks. Fishing regulation changes do not allow people to keep, or intentionally fish for bull trout, but poaching was an issue in this core area after angling was closed in 1994 and likely remains.

Overall, current bull trout numbers in the Kootenai River core area appear to be relatively stable. Bull trout distribution is relatively good and fluvial components exist in all local populations. Biologically, if nonnative brook trout threats can be controlled, and headwater spawning and rearing habitat can be improved and connectivity maintained, there is potential for this core area to rebound. However, the apparent population strength, as reflected by adult bull trout captured in the Kootenai River, is misleading as a significant proportion of the large bull trout routinely encountered downstream of Libby Dam appear (verified by genetic testing) to have originated from upstream of Libby Dam.

Status of Kootenai River Core Area Local Populations within the Action Area

The Kootenai River core area lies entirely within the boundary of the Kootenai National Forest (Bull Trout Conservation Strategy, USFS 2013). Two local populations are located in the state of Idaho (Boulder & Long Canyon Creek), and the Bull Lake bull trout population is designated as a "simple core area", not included as a "local population" in the Kootenai River core area. The six remaining local bull trout populations (see Figure 6) in the Kootenai River core area are: Libby Creek, West Fisher River, Pipe Creek, Quartz Creek, O'Brien Creek, and Callahan Creek. The Libby Creek and West Fisher River local populations are within the action area and are further described below.

Libby Creek Local Bull Trout Population

Libby Creek is a 150,000-acre watershed with its beginnings in numerous tributaries in the Cabinet Mountains Wilderness and its' mouth at the confluence with the Kootenai River near the town of Libby (Figures 7 and 8). The lower portion of the drainage is separated into an east and west division by Highway 2. Those drainages on the east portion are situated in drier pine/fir habitats with most of the tributaries being intermittent. Those streams on the west side originate in the Cabinet Mountains, flood frequently, and are prone to rain on snow events.

Figure 7. Libby Creek local bull trout population (Adapted from KNF BA 2013).

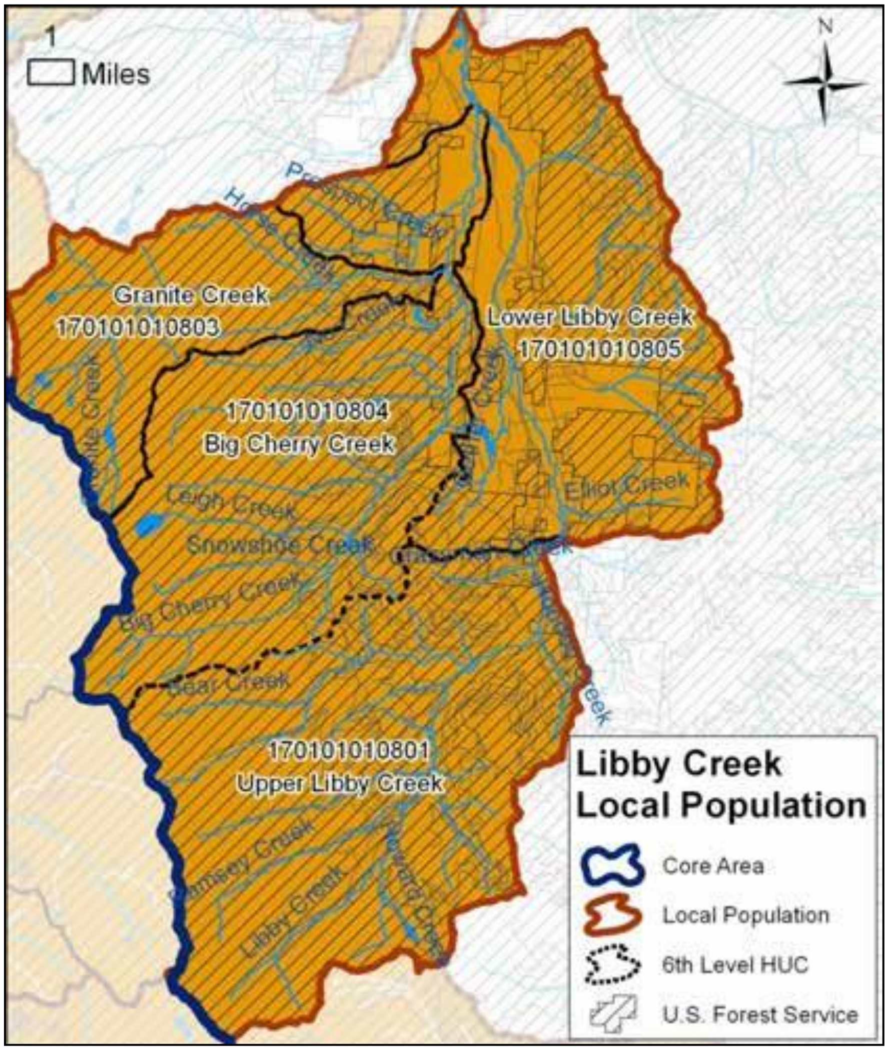
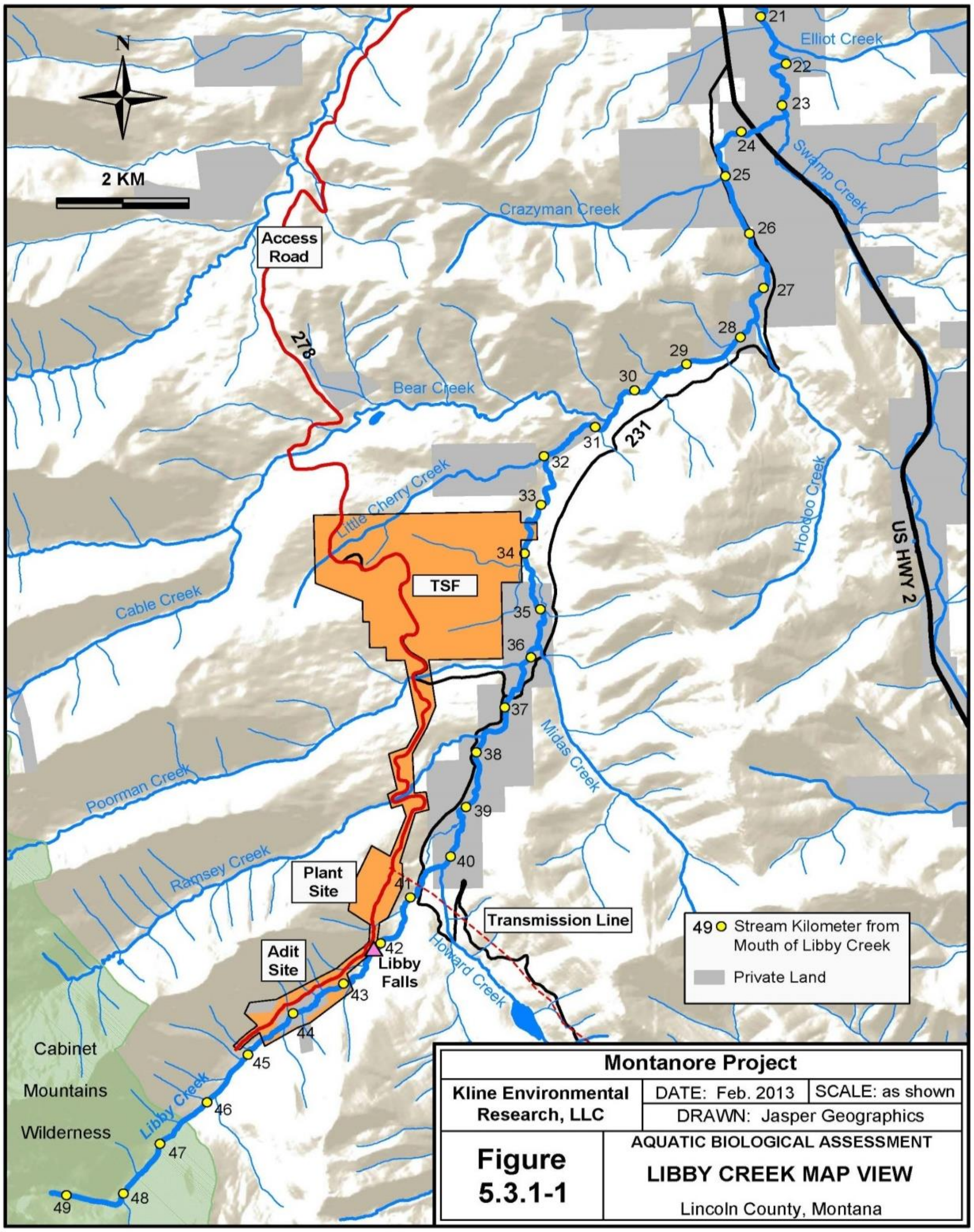


Figure 8. Upper Libby Creek in proximity to the Montanore Project proposed mine facilities (Adapted from KNF BA 2013).

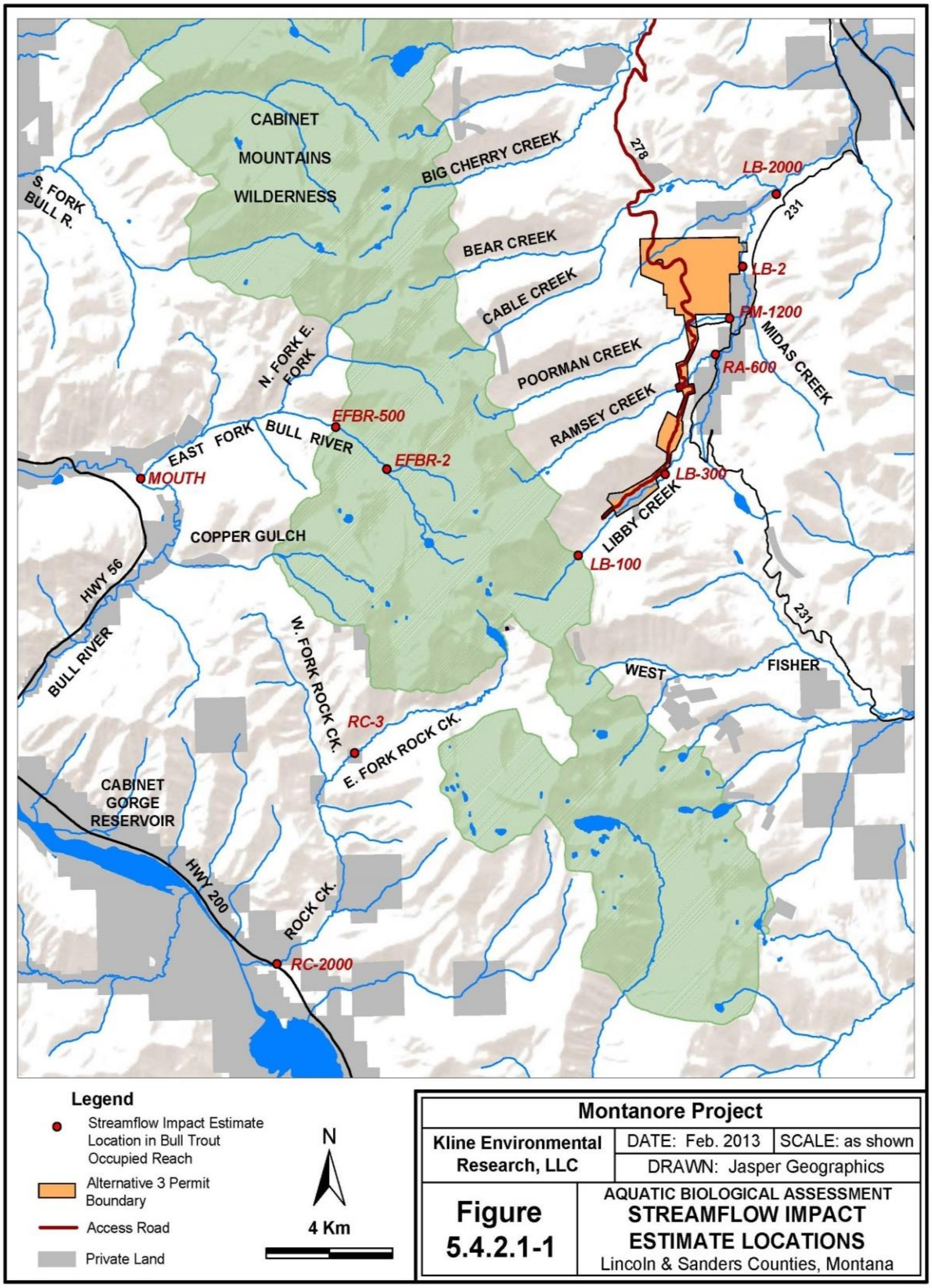


Land development has impacted the entire length of the mainstem Libby Creek and the lower reaches of all of the tributaries in the drainage. Major tributaries entering the lower portion of Libby Creek include Granite/Big Cherry and Swamp Creeks. Highway construction and land development have impacted the entire length of Swamp Creek with reaches being channelized. A highway reconstruction project, including rechannelization of several miles of Swamp Creek is currently under construction (2013). Other tributaries entering the drainage further upstream include Bear Creek (and its tributary Cable Creek), Little Cherry Creek, Poorman Creek, Midas Creek, and Ramsey Creek (see Figure 8 and Figure 9).

Landtypes in the Cabinet Mountains are very steep, contain a large quantity of rock, have high delivery efficiency, and a low water holding capacity. Precipitation rates are high with a lot of snow and moisture, most of which runs off into stream channels and downstream. Rain on snow events with high volume runoffs is frequent in this watershed. The KNF BA (2013) adequately describes stream fish habitat conditions in mainstem Libby Creek resulting from these geologic and precipitation conditions.

Libby Creek is considered "occupied" by bull trout from its confluence with the Kootenai River upstream to the Cabinet Mountains Wilderness boundary (See Figure 2 in KNF BA 2013). Libby Creek Falls creates a barrier to upstream fish movement at a location near the proposed mine adit. Fish habitat in surveyed sections of this reach ranged from low gradient riffle/run complexes, to relatively steep riffles, to more diversified habitat. Bull trout are the only species of fish that have been reported in this reach. The average bull trout density in a reach between LB-300 and the natural fish barrier is 0.031 fish per square yard or 0.037 fish per square meter (see Figure 8 and Figure 9).

Figure 9. Location sites where streamflow impact estimates were predicted to occur due to the Montanore Project (Adapted from KNF BA 2013).



A fish survey conducted upstream of the Cabinet Wilderness Area boundary during 1988 reported no fish. Bull trout are the only species of fish that have been reported upstream of the Falls. The KNF has determined, using the FWS Framework to Assist in Making Endangered

Species Act Determinations of Affect for Individual or Group Actions at the Bull Trout Subpopulation Watershed Scale [(hereafter referred to as the “ FWS Matrix population and habitat parameters (USDI 1998a)], that overall (integrated rating) Libby Creek is “Functioning at Unacceptable Risk.” This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Big Cherry Creek - Big Cherry Creek flows 19.2 miles before entering Libby Creek approximately two miles upstream of the Kootenai River confluence. Big Cherry Creek is considered “occupied” by bull trout from its confluence with Libby Creek upstream to approximately mile15.5 (KNF BA 2013, see Figure 2). Four bull trout were captured in 2012, all in the upper reach of Big Cherry Creek which was downstream of FSR 4785. Through genetic analyses, the largest bull trout collected from Big Cherry Creek was determined to have originated from West Fisher Creek as its most likely population of assignment; this indicates that the migratory-sized fish (much larger than the smaller resident-sized fish found in streams) had likely originated from the Libby Creek drainage and had reared to adulthood in the Kootenai River.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Big Cherry Creek is “Functioning at Unacceptable Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Bear Creek - Bear Creek is 8.2 miles in length. Disturbances in the Bear Creek watershed include two road crossings, logging, and past mining activities. No fish barriers occur between the Libby Creek confluence and the road crossing at stream mile 3.8, and none have been reported upstream of the road crossing. Bear Creek is considered “occupied” by bull trout from its confluence with Libby Creek upstream to its source (KNF BA 2013, see Figure 2). The Bear Creek fish population includes *Oncorhynchus* sp. (rainbow, westslope cutthroat, redband trout or hybrids), brook trout, and bull trout (MFISH). The average bull trout density in Bear Creek, near and downstream of FSR 278 bridge, is 0.045 fish per square yard or 0.054 per square meter (n = 13, 1999-2010). This is the highest reported average bull trout density of all steams in the action area.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Bear Creek is “Functioning at Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Cable Creek - Cable Creek flows 4.2 miles to Bear Creek, and is considered “occupied” by bull trout for approximately 2.2 miles upstream from its confluence with Bear Creek (KNF BA 2013, see Figure 2). Resident and migratory bull trout are considered to be incidental.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Cable Creek is “Functioning at Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Midas Creek - Midas Creek flows 3.3 miles to Libby Creek, and is considered “occupied” by bull trout for its entire length (Figure 2 in KNF BA 2013). Bull trout are considered rare and primarily migratory. The KNF removed a culvert barrier, allowing greater use by bull trout. The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Midas Creek is “Functioning at Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Poorman Creek - Poorman Creek originates in a steep, glacial cirque and flows 5.5 miles before entering Libby Creek. No fish have been documented in the upper half of Poorman Creek, above the barriers.

The lower half of Poorman Creek includes two partial impediments to upstream fish movement. One is subsurface flow near the Libby Creek confluence during low flows. The other is a culvert (FSR 278) that creates a partial barrier. During year 2012 electrofishing surveys, rainbow trout or rainbow trout hybrids were captured upstream and downstream of the FSR 278 culvert (Kline and Savor 2012). Poorman Creek is considered “occupied” by bull trout from its confluence with Libby Creek upstream to approximately mile 4.5 (Figure 2 in KNF BA 2013). It is possible that the FSR 278 culvert forms a barrier to bull trout.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Poorman Creek is “Functioning at Unacceptable Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Ramsey Creek - Ramsey Creek originates in a steep, glacial cirque and flows 6 miles before entering Libby Creek. A partial barrier occurs near the middle of Ramsey creek, and a complete barrier to fish is located approximately four miles upstream of the Libby Creek confluence. No fish occur upstream of the complete barrier, however, bull trout are reported to occur downstream of the barriers. Ramsey Creek is considered “occupied” by bull trout from its confluence with Libby Creek upstream to approximately mile 3.2 (Figure 2 in KNF BA 2013). The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Ramsey Creek is “Functioning at Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

West Fisher River Local Bull Trout Population

Fisher River - Although bull trout occurrence is rare in the mainstem Fisher River, primarily a migratory population, it is considered “occupied” by bull trout from its confluence with the Kootenai River upstream to the confluence of West Fisher Creek (River) (see Figure 5). Brook trout, rainbow trout, longnose dace, and mountain whitefish commonly occur along the entire mainstem river. Bull trout occur in the mainstem a short distance downstream of the confluence of West Fisher Creek. The majority of bull trout use and the only known spawning occurs in the West Fisher and Silver Butte/Fisher River tributaries.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Fisher River is “Functioning at Unacceptable Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

West Fisher Creek - West Fisher Creek originates on the east slope of the Cabinet Mountains (Figure 10) (Adapted from the Bull Trout Conservation Strategy, USFS 2013).

Brook trout, bull trout, redband trout, mountain whitefish, rainbow trout, sculpin, and westslope cutthroat trout occur in West Fisher Creek. Surveys of this stream were conducted in 1987, 1993, and 2002-2004, and documented the collection of rainbow trout, brook trout, bull trout, and mountain whitefish (KNF BA 2013). Only bull trout were collected from the surveys conducted about 3.7 miles upstream of the confluence. The average bull trout density in West Fisher Creek, near FSR 231 bridge, is 0.011 fish per square yard or 0.013 per square meter (n = 10, 2002-2010).

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) West Fisher Creek is “Functioning at Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Brook trout, bull trout, redband trout, mountain whitefish, rainbow trout, sculpin, and westslope cutthroat trout occur in West Fisher Creek. Surveys of this stream were conducted in 1987, 1993, and 2002-2004, and documented the collection of rainbow trout, brook trout, bull trout, and mountain whitefish (KNF BA 2013). Only bull trout were collected from the surveys conducted about 3.7 miles upstream of the confluence. The average bull trout density in West Fisher Creek, near FSR 231 bridge, is 0.011 fish per square yard or 0.013 per square meter (n = 10, 2002-2010).

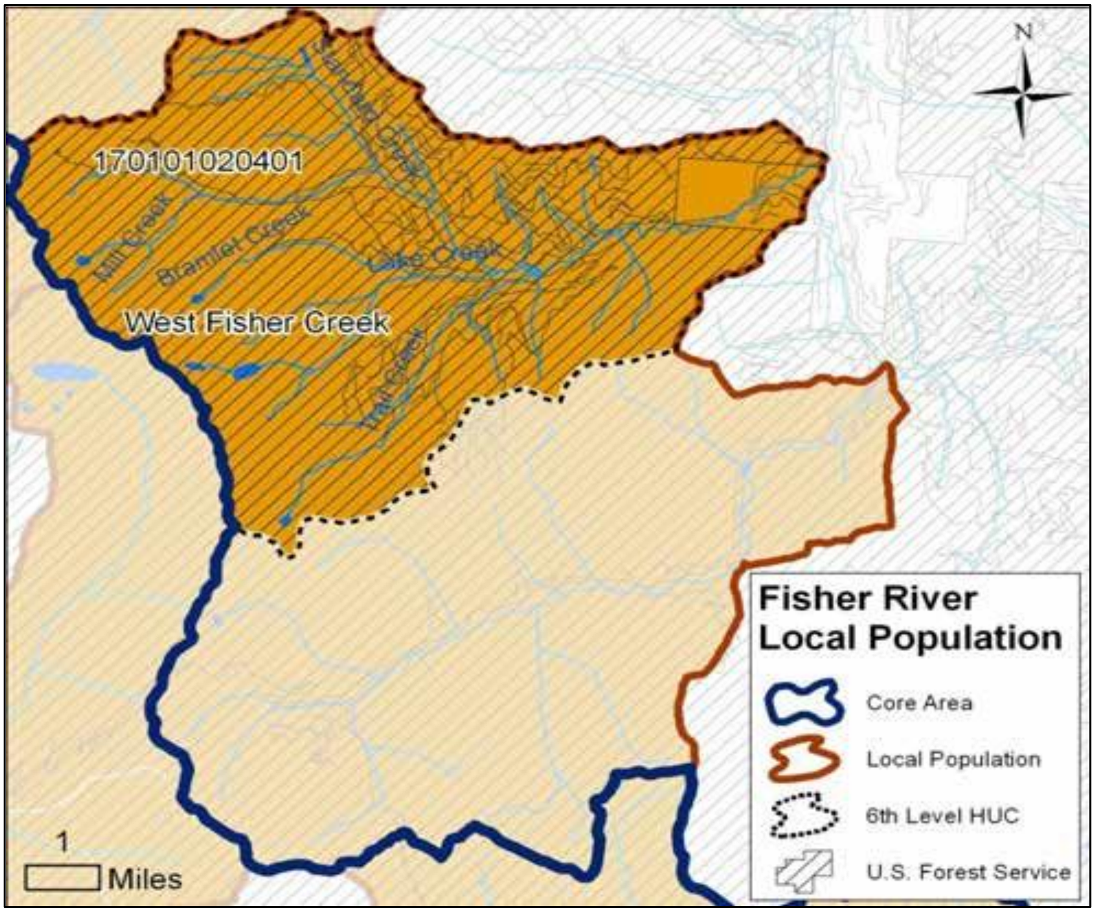
The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) West Fisher Creek is “Functioning at Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Flower Creek Bull Trout Population

Flower Creek flows approximately 13 miles to the Kootenai River (see Figure 2 in KNF BA 2013). Headwater tributaries begin in a series of small lakes. The lower portion flows through the city of Libby, Montana. Two man-made dams are present in the lower half of Flower Creek. The lower dam is used as a diversion point for a water intake that feeds by gravity to a water treatment plant. Upper Flower Creek Dam is operated by the city as part of their water supply storage system. The 58-foot high concrete arch dam was completed in 1945. The Upper Flower Creek reservoir has a normal capacity of 221 acre-feet. The upper dam is substandard with regard to failure risk. The City of Libby has begun the process to replace the upper dam. The stream is considered to have substantial fisheries resource value above the dams. Bull trout are known to have occurred in Flower Creek. Prior to 2012, the only salmonids captured in recent surveys have been brook trout and hybridized westslope cutthroat trout (MFISH 2012). During 2012, one bull trout/brook trout hybrid was captured below the lower reservoir and one was captured upstream of the upper reservoirs (Kline and Savor 2012). This indicates that bull trout are or recently were present but are not common.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Flower Creek is “Functioning at Unacceptable Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Figure 10. West Fisher Creek local bull trout population. (Adapted from KNF BA 2013).

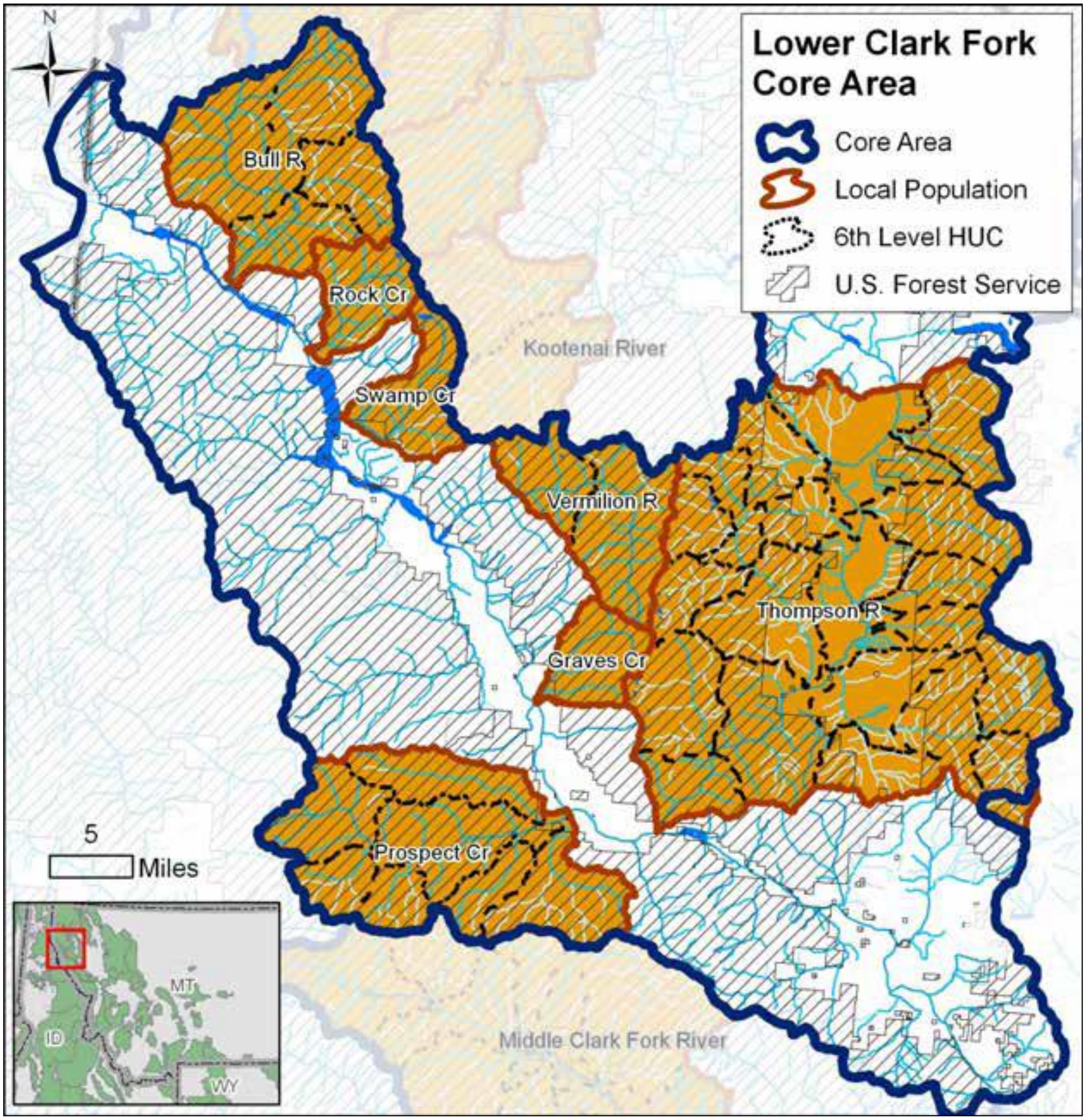


C. Status of Bull Trout in the Lower Clark Fork River Core Area

The Lower Clark Fork River core area (LCFR) has 14 local bull trout populations designated with 7 located in tributaries of the Flathead River and 7 located in tributaries to the Clark Fork River or its reservoirs impounded by Cabinet Gorge, Noxon Rapids, and Thompson Falls dams (Figure 11).

The seven local populations that are tributaries to the Clark Fork River include: Rock Creek, Bull River, Swamp Creek, Vermilion River, Graves Creek, Prospect Creek, and Thompson River (see Figure 11). Over the last 12 years (2001 – 2012), these 7 bull trout populations have averaged 109 bull trout redds per year. An unknown number of additional bull trout redds are constructed in the 7 tributaries with designated local bull trout populations in the Flathead River drainage. Copper Creek (Gulch) lies in the LCFR core area (Bull River tributary) and mitigation activities for bull trout are proposed for that drainage, because it formerly supported a bull trout population it is included in the following discussion.

Figure 11. Lower Clark Fork River Core Area. (Adapted from the Bull Trout Conservation Strategy, USFS 2013). The KNF BA (2013)



Bull trout densities in the LCFR core area were historically much higher than they are today. Impacts to bull trout populations in the LCFR began in the early part of the 20th century, and have continued through the present time (Bull Trout Conservation Strategy, USFS 2013). Distributions of bull trout populations are significantly restricted from historical patterns. At least two large streams (Pilgrim Creek and Elk Creek) that once likely supported strong fluvial populations now contain few, if any bull trout. Remaining fluvial populations, however, are geographically distributed throughout the core area which increases the potential for recovery. The proportion of fluvial to resident forms is likely much different than historical, due to the low numbers of fluvial fish in the population. Resident populations are generally isolated by natural conditions.

Bull trout populations in the LCFR core area were first exposed to significant human-caused impacts approximately 100 years ago with the construction of Thompson Falls Dam (1916). This dam blocked upstream migration of bull trout from Lake Pend Oreille, and effectively cut off all upstream spawning habitat affecting hundreds of miles of bull trout populations in core areas upstream of the Lower Clark Fork River. Within the Lake Pend Oreille core area, Thompson Falls Dam cut off the Thompson River from the rest of the core area. This was a significant impact to bull trout in the core area.

Numerous smaller scale impacts to bull trout gradually occurred throughout the Lower Clark Fork River valley in the early part of the 20th century as well (Bull Trout Conservation Strategy, USFS 2013). These included grazing and agricultural development along many of the important low gradient spawning streams, road and energy corridor development in riparian areas, and logging and road development in tributary streams. These activities had impacts to bull trout and their habitats; however, they were not of the same magnitude as construction of Thompson Falls Dam.

In 1952 and 1958, respectively, Cabinet Gorge and Noxon dams were constructed. These dams also blocked bull trout from upstream access to spawning streams, resulting in only a few smaller tributaries remaining to support the entire Lake Pend Oreille bull trout population. Bull trout continued to move downstream through the dams and reservoirs to Lake Pend Oreille, thus maintaining partial connectivity within the population. With the completion of these two dams, combined with Thompson Falls Dam, the impacts to bull trout in the LCFR were significant. The once robust population was now effectively isolated into four distinct units (Lake Pend Oreille, Cabinet Gorge Reservoir and tributaries, Noxon Reservoir and tributaries, and tributaries upstream of Thompson Falls Dam). As a result, the upper-most populations, isolated above Thompson Falls Dam, were affected the most in the short-term.

Over the next several decades, changes in fish species composition within the LCFR, brought about by stocking programs and some illegal introductions, brought an additional impact to the system. Brown trout, brook trout, northern pike, walleye, smallmouth and largemouth bass, and a host of other non-native species became established in the reservoirs and tributaries, creating predation, competition, and hybridization pressures that most likely impacted bull trout populations.

The 1970's and 1980's saw a rapid expansion of road construction and logging in areas that were, up to this time, refugia for bull trout populations. Steep slopes in the middle and upper portion of many drainages were logged, resulting in high sediment loads that exceeded the transport capacity of streams. The sediment eventually settled out in lower gradient spawning reaches and larger streams and rivers, causing systemic changes in the stream systems and aquatic communities they supported. Chronic erosion and sediment addition from the extensive road network constructed during this period still occurs today. This period of heavy road construction also resulted in extensive fragmentation of bull trout populations at undersized culvert crossings (Bull Trout Conservation Strategy, USFS 2013).

Bull trout populations had been eliminated or severely reduced throughout much of the LCFR core area by the 1990's. Small fluvial populations still existed in many of the larger, less developed watersheds. However, chronic impacts from existing developments, combined with climate change and a drought that caused low flows and warm water, further impacted populations.

Some of the past impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Logging and road construction have decreased considerably, but the effects of the existing road networks throughout many watersheds are still prevalent. The drought seems to have subsided. Fishing regulation changes do not allow people to keep, or intentionally fish for bull trout.

Overall, current bull trout numbers in the LCFR core area are very low. Since 2001, Avista Utilities Corp. has implemented both upstream and downstream fish passage programs at its two dams, Cabinet Gorge and Noxon Rapids. The upstream fish passage program captures and transports about 35 adult bull trout annually from downstream of Cabinet Gorge Dam to upstream release sites above all three dams. The downstream fish passage program traps juvenile bull trout in Montana tributaries and annually transports and releases several hundred bull trout into the Clark Fork River downstream of Cabinet Gorge Dam (these fish then swim about 9 miles downstream to Lake Pend Oreille where they grow to maturity in 3 – 4 years. These temporary fish passage programs have re-established both upstream and downstream connectivity (albeit at a limited level) to the LCFR core area. The overall objective of the Avista Utilities fish passage programs is to eventually restore upstream and downstream fish passage at both dams with permanent fish passage facilities. A permanent fish ladder has been installed at Thompson Falls Dam by PPL – Montana (electric utility); this ladder facilitates upstream migrations of bull trout.

There are seven local bull trout populations on lands administered by the Forest Service in the LCFR core area. They are: 1) Thompson River, 2) Prospect Creek, 3) Graves Creek, 4) Vermillion River, 5) Swamp Creek, 6) Rock Creek, and 7) Bull River. The streams in the action area that are on the west side of the Cabinet Mountains, East Fork Bull River and Rock Creek, flow to the Cabinet Gorge Reservoir in the LCFR core area of the Clark Fork River (see Figure 11 and 12).

This is Montana's largest river, with an average annual stream flow of 21,960 cfs at the Montana/Idaho border. The total drainage area is 22,073 square miles (FS 2000). There are three hydroelectric dams within the LCFR drainage. The most upstream of these dams, the Thompson Falls Dam, was completed in 1916 and is owned and operated by PPL Montana. The most downstream of these dams, the Cabinet Gorge Dam, was completed in 1952 and is just downstream of the Montana\Idaho border. It currently operates as a re-regulating facility for Noxon Rapids Dam, which was completed in 1958, and inundates that portion of the Clark Fork River between the backwaters of Cabinet Gorge Reservoir and the tailwaters of Thompson Falls Dam. Avista Corporation (Avista) owns and operates the Cabinet Gorge and Noxon Rapids dams.

Prior to construction of the dams, a number of adfluvial fish species, including bull trout and westslope cutthroat trout, utilized the Clark Fork River as a migratory corridor between Lake Pend Oreille and upstream tributary spawning, nursery, and rearing habitat. A fish ladder was opened at the Thompson Falls Dam during 2011 to allow upstream fish passage (Jourdonnais et al. 2011). The lower two dams are impassable barriers that block access to approximately 58 miles of the Clark Fork River and the associated tributaries for adfluvial fish in Lake Pend Oreille. The decline of bull trout in the LCFR core area has been attributed, in part, to fragmentation of historically larger, more interconnected populations, and isolation of the remaining populations.

The relicensing application process for the Avista facilities resulted in the Clark Fork Settlement Agreement (CFSA) in 1999, which addressed fisheries management and mitigation, including an evaluation of methods for accomplishing fish passage. Permanent fishways have been designed for the Cabinet Gorge Dam and Noxon Rapids Dam (GEI 2009), although plans have not been finalized and the timeline remains uncertain (FWS 2011b). Upstream passage efforts for adult bull trout began in 2001. Fish are captured downstream of the Cabinet Gorge dam in the Clark Fork River by electrofishing, hook-and-line, and a fish ladder trap, transported, and tracked through Passive Integrated Transponder (PIT) tagging, radio tagging, and genetic analysis (Hintz and Lockard 2007). Adult bull trout were transported to Cabinet Gorge Reservoir beginning in 2001 and to their region of origin based on genetic or previous capture history criteria beginning in 2005 (DeHaan et al. 2011, Bernall and Duffy 2012). The juvenile trap and transport program traps out-migrating juvenile bull trout from tributaries, including East Fork Bull River and Rock Creek, and transports them below Cabinet Gorge Dam (DosSantos 2012, McCubbins et al. 2012, Moran 2012).

The following italicized text is from Moran (2012) and refers to the Avista Montana Project Area, defined as the Cabinet Gorge Reservoir and tributaries, Noxon Reservoir and tributaries, and the Thompson River drainage upstream of Thompson Falls Dam. Areas of genetically identified origin in relation to dams on the LCFR are: Region 1 - Below Cabinet Gorge Dam; Region 2 - Between Cabinet Gorge and Noxon Rapids dams; Region 3 - Between Noxon Rapids and Thompson Falls dams; Region 4 - Above Thompson Falls Dam. These quotes provide additional context for the role of East Fork Bull River and Rock Creek in contributing to the LCFR bull trout population.

Recapture analysis, a bull trout life history and age and growth thesis, remote sensing data, redd surveys, and genetic findings illustrate the bull trout of the Montana Project Area exhibit variability in terms of life history and movement patterns. Examples include: juveniles captured *in one tributary that genetically assigned to tributaries of upstream regions, juveniles captured in the lower reaches of tributaries that do not support a bull trout population, adult bull trout transported and/or genetically assigned to one region having entered and spawned in tributaries of downstream regions, resident-sized bull trout observed on redds, and one fish genetically determined to have contributed to recruitment in the East Fork Bull River prior to being recaptured below Cabinet Gorge Dam (i.e. matured in Cabinet Gorge Reservoir, spawned at least once, and passed downstream as an adult). Some of these movement patterns are most likely attributable to the fragmented habitat of the LCFR.*

From 2001 – 2011, the total annual number of bull trout redds observed in Montana Project Area tributaries averaged 108; and 20, 58, and 30 for Regions 2, 3, and the Thompson River drainage, respectively. The East Fork Bull River (15), Vermilion River (27), and the Fishtrap Creek drainage (14) have the highest annual averages for Regions 2, 3, and the Thompson River drainage, respectively.

Trends in bull trout redd numbers in the Montana Project Area have exhibited year-to-year variability for tributary and for Region, with the lowest and the three highest annual totals occurring from 2006 – 2011. The higher 2001 – 2003 totals for Region 2 were in response to the experimental transport of an average of 33 adult bull trout to this Region during this time. The 2011 total of 118 for Region 3 tributaries was much higher due to the record numbers of redds observed in five bull trout tributaries of this Region.

Trends in juvenile bull trout captured electrofishing in Montana Project Area tributary monitoring sections and trapping catch per unit effort indicated that juvenile numbers in Cabinet Gorge reach tributaries have been variable, decreased markedly in the upper Bull River, and may have recently increased in the East Fork Bull River and Rock Creek. Similar data from Noxon Reservoir and Thompson River tributaries have also been variable and, with the possible exception of Vermilion River, have not exhibited recent increases.

East Fork Bull River and Rock Creek contributed 21 percent and 9 percent, respectively, of the total bull trout PIT tag capture events for the combined data from Lake Pend Oreille tributaries and LCFR tributaries during 1998 through 2011. During 2001-2011, 89 transported adult bull trout were determined to be in spawning reaches during the potential spawning period in East Fork Bull River, and 14 potential spawning bull trout were in Rock Creek during 2003-2011. Based on a genetic parentage study, an average of 17 percent of juvenile bull trout sampled during 2008-2010 from East Fork Bull River originated from a transported parent (Moran 2012). From 2004 through 2011 a total of 370 adult bull trout have been captured downstream of Cabinet Gorge Dam and were genetically assigned to one of four regions on the lower Clark Fork River. Over this eight-year period the lowest average number of fish assigned to Region 2 (n = 8) and the highest average number of fish assigned to Region 3 (n = 13). East Fork Bull River and Rock Creek are the only current bull trout spawning populations in Region 2, which may limit recruitment in comparison to Regions 3 and 4 (Bernall and Duffy 2012).

Status of Lower Clark Fork Core Area Local Populations within the Action Area

Rock Creek

The following was taken from the most recent Watershed Baseline for the Lower Clark Fork River (FS 2000).

Rock Creek is a 4th order drainage that has its headwaters in the southwestern end of the Cabinet Mountains (see Figure 13). This watershed drains approximately 21,162 acres. The mainstem Rock Creek consists of C and D Rosgen channel types through much of its lower reaches (Rosgen 1996). The lower section is typified by low gradient, approximately 2 percent, though much of its length. The watershed contains several areas of sensitive landtypes that are presently a chronic sediment source, particularly in the West Fork Rock and Engle Creeks. This has resulted in a large volume of bedload and reduced transport efficiency. The trophic condition of the watershed is characterized by low overall primary and secondary productivity. No metal toxicity to aquatic life has been documented in the Rock Creek.

The East and West Forks of Rock Creek have gradients of 10.4 and 7.3 percent, respectively. Rubble and gravel are the codominant substrate in the lower reaches (WWP 1996). The stream channel and its banks are relatively stable and there is considerable bedload movement. Spawning habitat is limited to isolated pockets of gravel behind stable debris or boulders.

The mainstem Rock Creek contains a relatively small amount of LWD relative to other watersheds in the Lower Clark Fork River drainage (WWP 1996). The potential for future recruitment of LWD is greatly reduced due to past riparian harvest and the location of existing roads. Little of the large woody material that enters the active channel is retained. Historic information indicates there was never a strong migratory component in the Rock Creek subpopulation (Pratt and Huston 1993).

The FS (2000) baseline describes the subpopulation for the entire Rock Creek drainage as functioning at risk, due primarily to the absence of a migratory component. More recent information indicates this is not correct. The presence of downstream migrating juvenile bull trout, migratory-sized adult bull trout, the ongoing Avista upstream fish passage transport program, and genetic information from bull trout captured downstream of the Cabinet Gorge Dam provide evidence that migratory bull trout are present and functioning in the Rock Creek drainage (see description of Lower Clark Fork Core Area above).

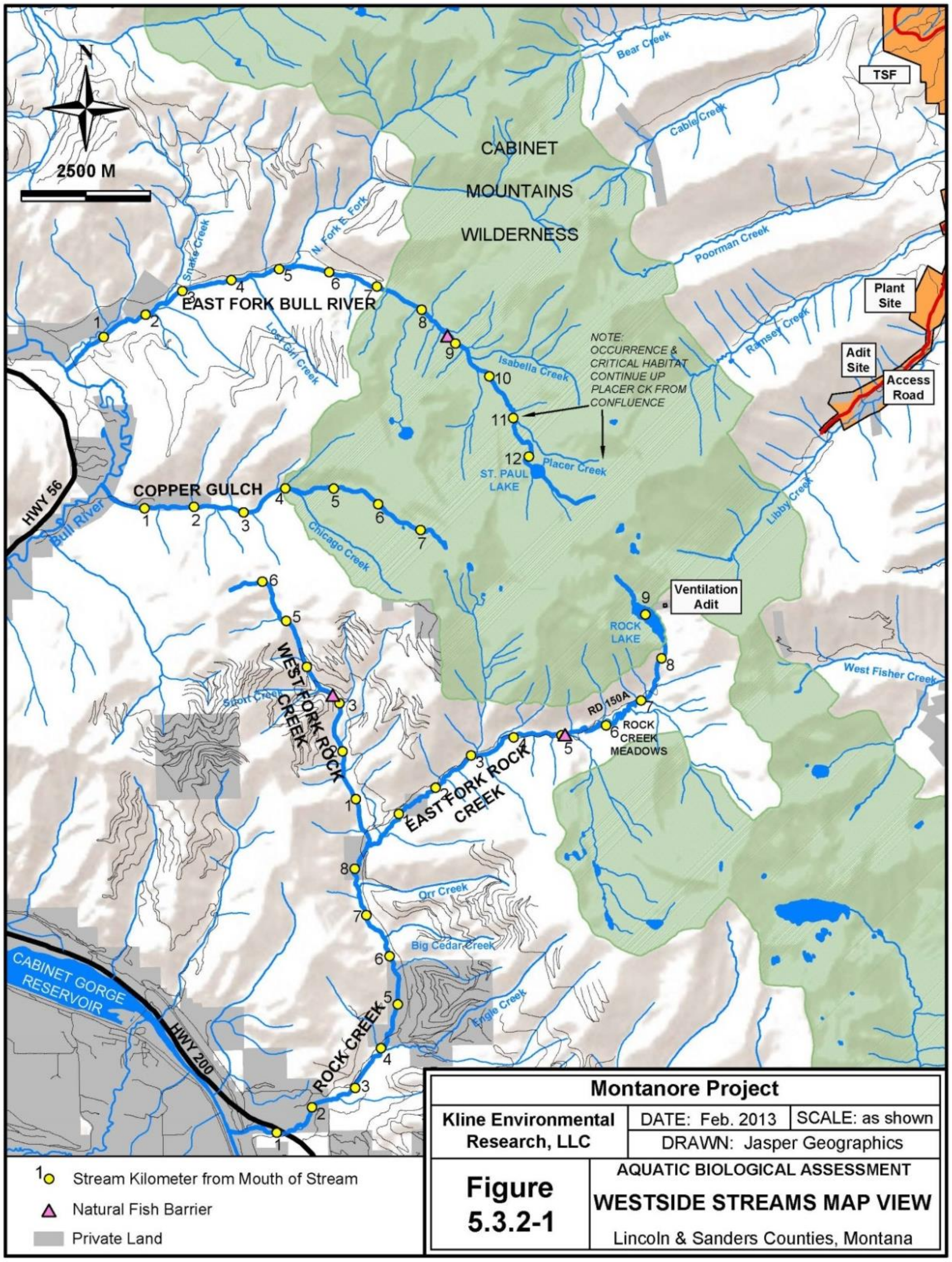
The following was taken from McCubbins et al. (2012). *The total number of juvenile bull trout captured and catch per unit effort (CPUE) in 2010, was the second highest observed in upper Rock Creek since trapping began in 2001. The average CPUE for upper Rock Creek from 2001 – 2011 (0.36 juvenile bull trout per trap day) was consistently higher than the average of all traps at all sites from 2001 – 2011 (0.13). The higher average catch rates at this site are due to both the comparatively high numbers of juvenile bull trout in upper Rock Creek and the relatively high efficiency at the trapping site. As has been observed for other bull trout tributaries in the Avista – lower Clark Fork River Project Area, the pattern of catch rates in upper Rock Creek traps appears to be influenced by the number of bull trout redds from three years previous. In the case of Rock Creek this relationship has only become apparent over the last four years of trapping (2008 – 2011). This is likely due to the difficulty in accurately identifying bull trout redds in this tributary where suitable spawning substrate is comparatively rare and the more recent practice of including upstream areas in bull trout redd surveys. If this* *trend continues, captures at this site should increase in 2012, as the redd count in 2009 (6) was the highest yet recorded.*

During the two years (2010-2011) of trapping at (the lower Rock Creek site), westslope cutthroat trout were the most commonly capture species, comprising 58 and 55% of all trout captured. Bull trout were uncommonly captured at this location with four and five being captured combined in screw and weir traps in 2010 and 2011 respectively. Notable were the three adult bull trout captured moving downstream in the lower Rock Creek weir trap in 2011 which were not captured in the upper Rock Creek weir trap. One of these adults, which was 658 mm in length, had never before been captured, but genetically assigned to this tributary. Higher than average stream-flow in 2011 resulted in perennial stream-flow in the channel between the two trapping sites; this area typically becomes intermittent during base stream-flow conditions. Electrofishing and bull trout redd surveys have not been conducted in this middle reach of Rock Creek since 2001 and 2004 respectively; therefore it is unknown whether viable bull trout spawning has occurred in this area during years with higher than average stream-flow. It is anticipated that future trapping efforts at this lower trapping location will provide the best opportunity to capture any out-migrating juvenile bull trout that may have reared in this area.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Rock Creek is "Functioning at Unacceptable Risk". This determination was made with the qualification that "insufficient information" was available. The "Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

East Fork Rock Creek - The following was modified from Horn and Tholl (2011) and refers to resident bull trout. See above for a description of migratory bull trout that applies to the Rock Creek drainage. East Fork Rock Creek represents a functioning stream in good physical condition with a native fish assemblage (Figure 12). A seasonally dewatered reach has kept brook trout from colonizing to date. Fish populations appear generally stable. This suggests that physical and chemical conditions are stable enough to allow fish populations to regulate themselves through biological mechanisms. If physical factors were annually driving fish populations down, then a trend of substantially varying population estimates would be expected as these influences varied in intensity. This has not been observed in East Fork Rock Creek over the sample period, especially for bull trout which are generally more sensitive to physical stream changes. It may be that recruitment is high enough that stochastic factors play a minor role in population regulation, and biological factors and habitat availability steer fish numbers to the consistent level observed. The consistently observed fish population and biomass estimates may represent a measure of carrying capacity in this stream. In short, East Fork Rock Creek harbors an intact and stable native fish community. This should remain the case unless some outside disturbance occurs. For all fish survey results that were located for East Fork Rock Creek and reported bull trout density per unit area, the average bull trout density was 0.023 fish per square yard or 0.027 fish per square meter (n = 12, 1992-2010).

Figure 12. Montanore Project influence area with affected west side streams identified in bold (Adapted from KNF BA 2013).



The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) East Fork Rock Creek is “Functioning at Unacceptable Risk”. This determination was made with the qualification that “insufficient information” was available. The

"Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

West Fork Rock Creek - West Fork Rock Creek flows approximately four miles (6.5 km) to Rock Creek (see Figure 12). The lower 1,050 feet (320 meters) is seasonally dry. A natural barrier to upstream movement of fish occurs two miles (3.2 kilometers) from the confluence with Rock Creek. Fish habitat consists primarily of high gradient riffles and pools. Substrate is dominated by gravel and small cobble, with high amounts of fine sediment. The riparian zone is functional, providing moderate amounts of large woody debris. The drainage is subject to high flow events (WWP 1996, FS data reported in Salmon Environmental Services 2012 and in Kline and Savor 2012). Fish surveys were conducted during 1996 using multiple pass electrofishing and snorkel counts. Cutthroat trout and bull trout were reported to occur at densities of approximately 200 and 300 fish per 1,000 m, respectively, throughout the reach that is below the fish barrier. The habitat was estimated to accommodate 22 adfluvial or 50 resident salmonid redds (WWP 1996). During 2012, 2,500 feet (762 meters) in the central portion of the same reach was electrofished using a single pass, resulting in the capture of 42 cutthroat trout and 6 bull trout (FS data reported in Kline and Savor 2012). While the difference in effort during the 1996 and 2012 do not allow direct comparison of results, they do indicate that bull trout abundance was lower during 2012 compared to 1996. In comparing the two species, the number of cutthroat trout that were captured during 2012 was approximately 25 percent of the 1996 cutthroat trout density estimates, whereas the number of bull trout that were captured was approximately 3 percent of the 1996 bull trout density estimates. This indicates a substantial reduction in bull trout abundance relative to cutthroat trout.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) West Fork Rock Creek is "Functioning at Unacceptable Risk". This determination was made with the qualification that "insufficient information" was available. The "Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

East Fork Bull River (Bull River local population)

Refer to the above section on the Lower Clark Fork Core Area for descriptions that illustrate the relationship of the East Fork Bull River bull trout population to the Core Area population.
The following paragraph was modified from Horn and Tholl (2011). The East Fork Bull River drains ~71 km^2 from the Cabinet Mountains Wilderness Area to the mainstem Bull River (WWP 1996) (see Figure 12). It supports the highest densities of bull trout in the Bull River drainage (WWP 1996) as well as pure westslope cutthroat trout. Increased sedimentation and decreased channel stability within the drainage have been caused by roads, timber harvest, flooding, and other natural events. Problem areas were identified in 1999 (Watershed Consulting 1999) and 2000 (Land and Water Consulting 2001) for potential restoration. In 2001 a ~ 1,200 foot (366 meters) reach (the Stein property) on lower portion of the stream was modified via

rechannelization, revegetation and large woody debris installation (Horn 2011). Periodic vegetation enhancement has occurred along the reach since 2002 to maintain riparian condition. In spring 2008 an avulsion caused flows to return to a historic channel on the opposite side of the valley from the restored Stein reach. Fish surveys have continued in that reactivated channel, known as the south channel. Additionally, a major rechanneling project occurred about one thousand feet (several hundred meters) upstream of the Stein reach (site 1) in 2008, known as the east fork slide project. Active suppression of non-native salmonids also occurs in the stream, and began in 2007. Electrofishing was used for three consecutive years to remove non-native trout from the lower 1.9 miles (3 kilometers) of the stream. Over that period several thousand fish were removed from the system (Moran and Storaasli 2009). Formal monitoring of the project will continue through 2013, although general monitoring of the stream is likely to continue for many years.

The following was modified from Washington Water Power (1996). The East Fork Bull River flows approximately 6.3 miles from St. Paul Lake in the Cabinet Mountains Wilderness Area to the Bull River. Average elevation drop is ~3.5%. Fish habitat in the lower portion of the stream is characterized by low gradient riffles and pools, and transitions to high gradient riffles and pools in the central and upper reaches. Substrate is dominated by cobble and rubble in high gradient reaches, with some minor amounts of sand and silt in low gradient reaches. There are generally low amounts of fine sediment. Riparian habitat is altered but functional and contributes to moderately high amounts of large woody debris, although low-cover, non-woody riparian vegetation is common. Compared with the average for the Lower Clark Fork River tributaries, fish densities in East Fork Bull River are high for cutthroat trout and brown trout, similar for bull trout, and relatively low for brook trout. In general, salmonid populations are limited by a combination of low amounts of spawning and rearing habitat and low habitat complexity. Bull trout growth and survival was lower than the average for Lower Clark Fork River tributaries. Genetic samples collected during 1993 indicated that bull trout in East Fork Bull River were not hybridized. Avista genetics data for the Lower Clark Fork Core Area indicate that this remains true.

The following was taken from Bernall and Duffy (2012). *A total of 214 adult bull trout have been transported and released in Cabinet Gorge Reservoir or its tributaries since 2001, including fish transported in multiple years. Between 2001 and 2010 transported bull trout constituted a large proportion, between 27 % and 73 %, of all adult bull trout captured in the East Fork Bull River. This trend continued in 2011, two of three (67 %) adult bull trout (> 400 mm) captured in weir traps in the East Fork Bull River being fish transported from Idaho. Weir traps are ineffective at capturing all adult bull trout moving into the drainage, so these numbers do not represent the entire spawning population for each year. But, results from a bull trout parentage study in East Fork Bull River showed that of 923 juvenile bull trout captured from 2008 through 2010, 17.2 % of these offspring assigned to at least one parent that had been transported upstream from below Cabinet Gorge Dam.*

The following was taken from McCubbins et al. (2012). *When comparing 2010 and 2011 catch data to previous years, the number of juvenile bull trout captured was quite variable and peaked in 2010. Catch-per-unit-effort (CPUE) in the East Fork Bull River, monitored since 2005, peaked for both westslope cutthroat and bull trout in 2009 and 2010, but decreased to nearer* *baseline in 2011. As was noted previously, juvenile bull trout CPUE tends to mirror trends in redd counts with a 3-year lag. The most notable exception to this pattern occurred in 2010, in which CPUE was much greater than may have expected based on previous redd counts. This bump in CPUE was believed to be caused by an increase in young-of-the-year and age one bull trout survival facilitated by three consecutive years (2007 – 2009) of non-native salmonid suppression and expanded habitat due to higher flows and cooler water in 2008 and 2009 in this tributary.*

Capture trends at the weirs, despite inefficiencies noted, have depicted some of the contribution of transported adult bull trout to the reproductive potential of the East Fork Bull River. Prior to the adoption of genetically based transport protocols to upstream areas, an annual average of 37 adult bull trout were transported to the Cabinet Gorge Reservoir reach from 2001 to 2003; which resulted in a spike in transported adult captures and redds in the East Fork Bull River during this period. The relative proportion of upstream transported adults to the total number of adults captured during the time period in which sampling was conducted for a genetic parentage study (2004 – 2010) ranged from 0 – 73% with an average of 35%. These percentages of transported adults from weir captures may have overestimated the potential contribution of such fish when compared to the genetic analysis for 923 juveniles captured in the East Fork Bull River from 2009 – 2011; which documented that an average of 17% of these fish had at least one upstream transported parent. Or conversely, the genetic analysis may have underestimated the contribution of transports, due to sampling anomalies or other factors.

Over the eleven year record (2001 through 2011) of trapping adult bull trout in the East Fork Bull River, a total of 65 captures of non-transported adult bull trout have been recorded and 28 of these fish had been captured in previous years at an East Fork Bull River weir.

For all fish survey results that were located for East Fork Bull River and reported bull trout density per unit area, the average bull trout density was 0.011 fish per square yard or 0.013 per square meter (n = 85, 1992-2010).

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) East Fork Bull River is “Functioning at Risk”. This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

D. Factors Affecting Species Environment within the Action Area

The Draft Bull Trout Recovery Plan (USDI 2002a) identified impacts to bull trout in the Lower Clark Fork River and Kootenai River core areas to include past forest management practices and poorly constructed roads that have destabilized channel conditions in a number of tributaries supporting local populations, mining operations, illegal fishing harvest, non-native fish, and habitat isolation. More recently the threats were re-assessed to include fish passage/dewatering issues, introduced species (e.g., brook trout, brown trout, and northern pike), angling and harvest (legal or illegal), forest management practices and forest roads, and residential development and urbanization along the lower reaches of several streams supporting local bull trout populations

(USDI Fish and Wildlife Service 2008).

In the Lower Clark Fork River core area, surveys of the West Fork Thompson River and Fishtrap Creek drainages have been conducted under the Plum Creek Native Fish HCP program. Habitat protection and improvements to important bull trout spawning and rearing reaches are being evaluated on a case-by-case basis under this program.

Extensive survey of the Prospect Creek drainage in 2003 led to a determination that bull trout habitat and use of this drainage was more extensive than previously known (Moran 2004). The investigator concluded that despite seasonal dewatering of some reaches, the drainage represents a significant contribution to the migratory bull trout population of the interconnected Lower Clark Fork – Lake Pend Oreille system. More effort will be expended in passage and evaluation of movement patterns of fish passed upstream over Noxon Rapids Dam, beginning in 2005. The Avista studies have also collected extensive habitat information as part of an overall evaluation of many portions of the Bull River, Rock Creek, and other watersheds.

Extensive bull trout restoration activities are presently occurring in the Jocko River watershed (L. Evarts personnel communication 2011).

Horn and Tholl (2008) systematically examined fish population data accrued over a 9-year period (1999-2007) in 12 tributary drainages to the Lower Clark Fork River core area. At some locations, changes in distribution or abundance are positively correlated with habitat restoration or improvement measures such as culvert passage improvements and sediment reduction. A TMDL for sediment reduction has been completed on Prospect Creek. Work also continues to identify causes and alleviate concerns about high levels of total dissolved gases that accrue through the hydropower system of the Lower Clark Fork River core area. Detailed measurements of ecosystem habitat quality are not generally available, but the weight of evidence indicates an overall improvement in habitat conditions (e.g., Gillin 2005).

Permitting and development of a proposed hard rock mine on Rock Creek is continuing. Concerns regarding impacts to water quality (sediment or spills) and dewatering were assessed in a biological opinion (USFWS 2006).

The Plum Creek Native Fish Habitat Conservation Plan (NFHCP), and Stimson HCP cover approximately 985,000 acres within western Montana. Lands within these HCPs occur adjacent to several miles of stream reaches, including substantial holdings that were identified as important bull trout habitat in the Kootenai River and Lower Clark Fork River core areas. Through implementation of the HCPs, proactive management is occurring to protect and restore important bull trout habitat on private lands, while at the same time allowing the companies to manage and harvest their timber base, construct and maintain roads, and manage other resources such as grazing allotments and recreational properties. An active monitoring strategy is being applied to track compliance and measure important habitat and population parameters. Implementation is being achieved, and it appears there is success in protecting and restoring bull trout and their habitat.

Since the time of listing, ongoing habitat conservation and bull trout monitoring activities in western Montana have continued or increased and new projects have been initiated in many watersheds. These activities, which are often conducted by MFWP but frequently involve other agencies, Tribes, and private partners, now include: regular redd count monitoring in over 100 streams, core and substrate sampling in about 30 streams, juvenile and adult bull trout surveys (electrofishing or snorkeling) in over 100 streams, over 100 habitat improvement and fish passage projects, a dozen or so trapping and telemetry projects, and gill netting efforts to assess fish community composition in about 20 lakes (MFWP 2004). Projects are funded by a variety of public and private sources, including EPA Superfund, Clark Fork Natural Resource Damage Program, AVISTA Native Salmonid Restoration Program, Kerr Mitigation, other FERC-related projects, Bonneville Power Administration, MFWP license revenue, Montana's Future Fisheries Improvement Program of 1995, Montana Bull Trout and Cutthroat Trout Enhancement Program of 1999, Federal FRIMA funds, ESA partnership and stewardship grants, USFWS Partners for Fish and Wildlife funding, Bring Back the Natives and other sources of USFS funding, and many others not specifically mentioned.

In 2000, the State of Montana adopted a Bull Trout Restoration Plan, developed through the collaborative efforts of the Montana Bull Trout Restoration Team and the Bull Trout Scientific Group (MBTRT 2000). The Plan was designed to guide voluntary State restoration efforts and complement the Federal recovery process. The emphasis of the plan focused on protecting and restoring the best remaining spawning and rearing habitat, maintaining genetic diversity represented by the remaining local populations, and reestablishing and maintaining historical connectivity. Much has been achieved, as described above, particularly in the areas of habitat restoration and protection, restoration of migratory connectivity, and promotion of bull trout public education and outreach. However, the original promise of the Montana Bull Trout Restoration Plan remains unfulfilled. Since the adoption of the plan in 2000, little or no progress has been made in implementing some of the cornerstone commitments set forth in the plan. These include commitments to spearhead watershed groups to implement bull trout conservation activities; appoint an interdisciplinary steering committee to meet annually to guide restoration efforts and provide progress reports; appoint a Bull Trout Scientific Group to adaptively modify strategies, review core area structure, and assess scientific rigor of projects; develop a scientifically valid population monitoring program (to monitor half of all core areas by the end of 2004 and to document stable to increasing populations in at least two-thirds of core areas); appoint an ad hoc Technical Advisory Committee (TAC) to review and make recommendations on projects involving hatchery/transplant or suppression/removal of nonnative species; and overall coordination of implementation of the Bull Trout Restoration Plan. Some of these activities are occurring, but they have been mostly internalized within MFWP. Without many of these actions occurring in a collaborative forum between State, Tribal, Federal, and private managers it is difficult to determine whether adequate progress is being made on addressing existing threats, identifying new threats and recovering bull trout.

Conservation measures are conducted entirely by CSKT in the Lower Flathead River portions of the Lower Clark Fork River core area on reservation lands. Bull trout restoration efforts are funded primarily by the Clark Fork Natural Resource Damage Program, Kerr Dam Mitigation, Federal FRIMA funds, USFWS Partners for Fish and Wildlife funding, and other internal sources of Tribal funding.

A significant new acquisition of private land in the headwaters of the Bull River Drainage will provide long-term habitat protection of this important watershed. Some Plum Creek lands in the drainage remain in play for either long-term protection opportunities or potential residential development.

Management activities or outcomes that induce limiting factors that represent the greatest threats to bull trout in this core area (regardless of severity, scope, or immediacy of the impacts) are presented in rank order (USDI Fish and Wildlife Service 2005b):

- Fish passage issues (artificial barriers to migration)
- Introduced species/fisheries management
- Forest management practices and forest roads

Others, currently ranking lower in importance:

- Entrainment (hydropower and diversions)
- Water quality impairment from multiple sources (temperature and TDG)
- Dewatering

Major fish passage barriers in the Clark Fork River core area (Cabinet Gorge Dam, Noxon Rapids Dam, and Thompson Falls Dam) are being gradually reduced or eliminated as Milltown Dam was removed in 2008 and a fishway for fish passage was installed at Thompson Falls Dam in 2010. Cabinet Gorge and Noxon Rapids Dams have temporary upstream and downstream fish passage programs (trap and transport strategies) to reduce fish passage blockage impacts. As a result, fragmentation is being reduced and connectivity restored, diminishing the highest ranking threat. However, nonnative species (brook trout, brown trout, lake trout, northern pike, walleye, etc.) are increasingly impacting efforts to recover bull trout and habitat in the reservoirs favors many of those populations over native species. Thus, the combined impact of dams on the Clark Fork River is expected to remain the highest ranking threat into the future.

The Kootenai River core area is isolated from the upper Kootenai River watershed by the construction of Libby Dam in 1972. The level of bull trout abundance is lower than historical natural levels in this core area, which is largely due to dramatic ecological changes and the decoupling of this core area from the upper watershed as a result of Libby Dam construction (USDI Fish and Wildlife Service 2008). Fragmentation has been less of a concern since it has been established that Kootenai Falls is not a complete barrier to upstream migration by bull trout.

Status of Kootenai River streamflow, discharge patterns, spill, and other parameters are in constant flux in this heavily regulated riverine system downstream of Libby Dam. In addition, constraints are applied due to power needs, Endangered Kootenai River white sturgeon, downstream ESA concerns (salmon and steelhead flows), water quality (gas supersaturation), reservoir levels, and recreation. The combined effects lead to sometimes erratic and often unpredictable water flows. Some of these actions may benefit bull trout and some may not. An attempt is made to balance these concerns, but impacts of flow regulation on bull trout are not well documented.

A spill event was conducted at Libby Dam for 20 days in June and July 2002, as a result of unexpectedly high runoff exceeding inflow forecasts to the reservoir. Monitoring downstream of the dam indicated gas bubble disease (caused by nitrogen supersaturation) developed rapidly in captive fish held for observation and 80 percent of wild bull trout collected by electrofishing below the dam exhibited symptoms (Dunnigan et al. 2003). Fish with radio tags did not exhibit avoidance behavior, and investigators continue to express concern over the impacts of spill events on the resident fish population.

In recent years, a fish screen has been installed on a major irrigation diversion in Libby Creek, reducing or eliminating entrainment. The USFS has conducted a number of habitat restoration projects in Pipe Creek, West Fisher Creek, and O'Brien Creek as well as road decommissioning in Callahan Creek. Countering these positive impacts to habitat are potential negative impacts associated with the anticipated expansion of Montanore Mine activities and increased suction dredge activity in the Libby Creek watershed. The overall habitat condition trend is considered to be stable to slightly improved (J. Dunnigan, personal communication, 2008).

The U.S. Fish and Wildlife Service's Biological Opinion on the operations of the Federal Columbia River Power System (USFWS 2000) assesses impacts of system operations at Libby Dam on endangered Kootenai River white sturgeon, threatened bull trout, and nonlisted but diminished Kootenai River burbot stocks. The operations of the dam are reviewed on a regular basis and the Service is routinely consulted on operational changes that are constantly needed in an attempt to balance species needs against other downstream ESA concerns (salmon and steelhead), hydropower demand, flood control and storage, and other factors. Management strategies and operational scenarios are in a constant state of flux. Multiple aspects of bull trout recovery are incorporated into (and funded through) the BPA Fish and Wildlife Program guided by the Northwest Power and Conservation Council. The most recent effort in that regard includes the current subbasin planning effort for the Kootenai (KTOI and MFWP 2004).

Status and trend of bull trout in two Kootenai River core areas were both considered "unknown" based on information available at the time of listing (USFWS 1998b). Recent information, documenting upstream passage of bull trout over Kootenai Falls, which bisects this core area, led to reclassification of this as a single core area population. The level of bull trout abundance is lower than historical natural levels in this core area, which is largely due to dramatic ecological changes and the decoupling of this core area from the upper watershed as a result of Libby Dam construction. Because this core area has been artificially decoupled from robust upstream populations of bull trout by the presence of Libby Dam, and is now functioning as a separate stand-alone unit, some of the threats may have greater magnitude and imminence than what occurred in the system naturally. The condition of mainstem habitat in this core area is strongly tied to Libby Dam operations. Despite the fairly large expanse of this core area, the status of the bull trout population is tied to a few spawning and rearing streams. The effectiveness of the Plum Creek HCP in protecting and restoring bull trout in the heavily degraded Fisher River drainage is an important element of recovery in this core area.

As discussed, it appears brook trout hybridization is having serious impacts on approximately half of the local populations. These impacts may already be manifested in recent short-term declines and an apparent dearth of juvenile bull trout in the spawning and rearing habitat. The greater relative stability of bull trout juvenile populations and lack of apparent influence by brook trout to date in Quartz Creek and Libby Creek indicate that the problem may be somewhat tributary-specific and should preclude a complete collapse of all spawning and rearing populations for the near future.

Regarding climate change**,** and considering the current extent of occupied bull trout habitat, predicted summer maximum water temperature increases in spawning and rearing habitat of 33.8° to 37.4° F would have profound impacts on the bull trout populations (USDI Fish and Wildlife Service 2008). Headwater bull trout streams in this region are typically groundwater-influenced, but climate change is expected to have a larger impact in this region than many other places in western Montana, due in part to lower elevations and precipitation patterns that appear conducive to high frequency of rain-on-snow conditions. In addition, there's already major concern with mainstem Clark Fork River water temperatures that are marginally suitable for bull trout during midsummer and a shrinking amount of habitat suitable for bull trout in the mainstem reservoirs. Combined, these factors favor introduced species and increase fragmentation of bull trout.

E. Environmental Baseline of Designated Critical Habitat

The Montanore Project lies within the Columbia Headwaters RU (1 of 6 bull trout RUs, above) and occupies portions of 2 of the 4 CHUs within that RU; e.g. the Kootenai River Basin CHU and the Clark Fork River Basin CHU. The Kootenai River Basin CHU contains 324.7 miles (522.5 kilometers) of streams and 29,873 acres (12, 089 hectares) of lakes/reservoirs. The Clark Fork River Basin CHU contains 3,328 miles (5,356 kilometers) of streams and 295,587 acres (119,620 hectares) of lakes/reservoirs. Note that the final rule designating critical habitat for bull trout adopts the use of *local population, core area, and major genetic group* (as defined in the memorandum consistent with the draft recovery plan) (page 36258 in FR 70, No.185, 56211-56311).

Agency biologists use the four biological/population indicators and the 19 physical habitat indicators in the Matrix of Diagnostics/Pathways and Indicators (Framework) for bull trout to assess the environmental baseline conditions and determine the likelihood of take per interagency guidance and agreement on section 7 consultations on the effects of actions to bull trout (USDI Fish and Wildlife Service 1998a). Analysis of the 19 matrix habitat indicators provides a very thorough analysis of the existing habitat condition and potential impacts to bull trout habitat.

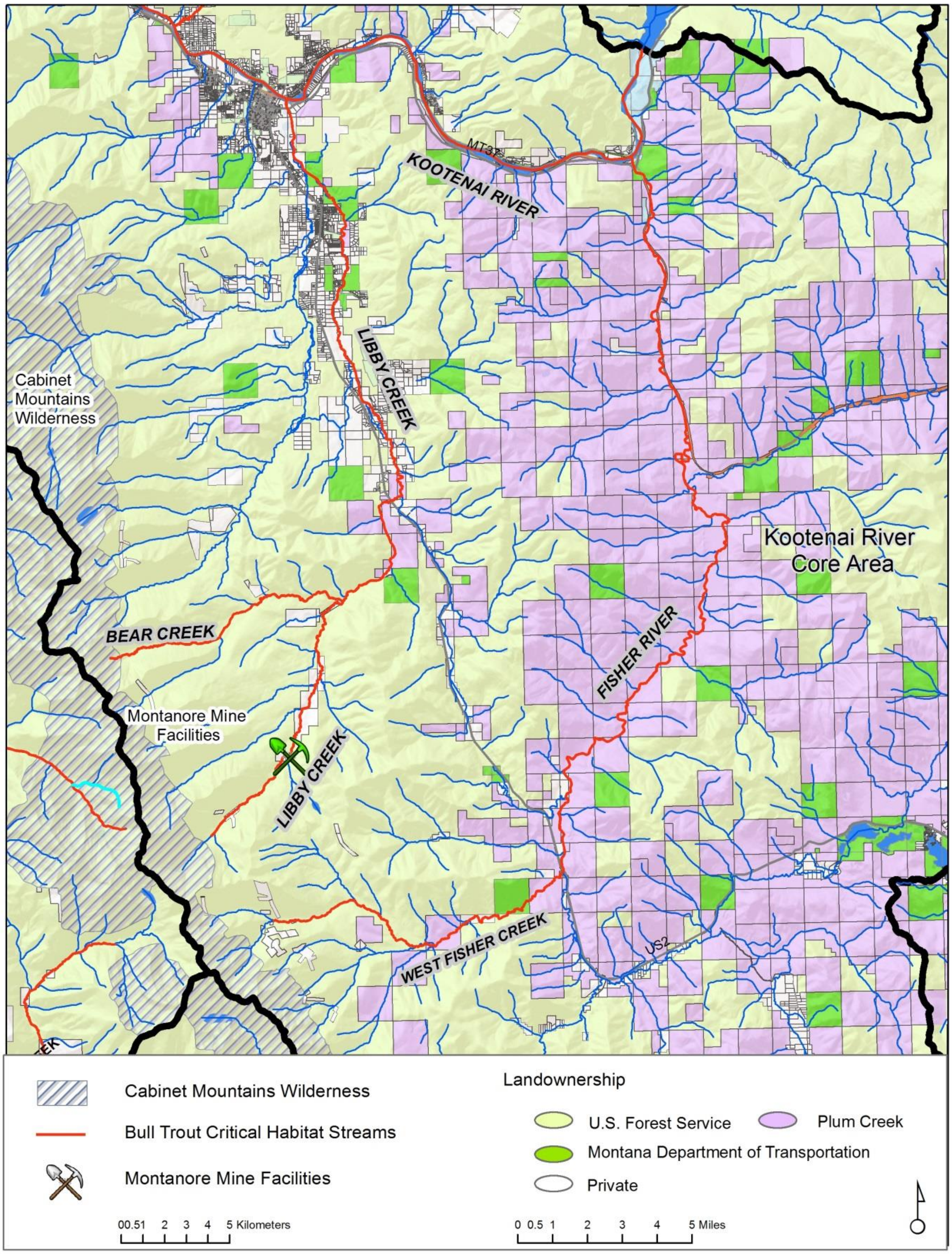
Kootenai River Basin Critical Habitat

The Montanore Project action area lies within the Columbia Headwaters Interim Recovery Unit which contains the Kootenai River Basin CHU and the Clark Fork River Basin CHU. Within the Kootenai River Basin CHU, the proposed action would occur in a portion of the Kootenai River Core Area that contains 269 miles of designated critical habitat for bull trout and of that total Libby Creek contains 24.2 stream miles, its tributary Bear Creek contains 8.2 miles, and West Fisher Creek contains 8.3 miles (Figure 13). Both Libby Creek and West Fisher Creek are tributaries to the Kootenai River. The Kootenai River provides foraging, migratory, and overwintering habitat for bull trout from both drainages (Pratt and Huston 1993); the Kootenai River within the Kootenai River Basin CHU is designated as critical habitat and contains 114.3 stream miles. Libby Creek above Libby Creek Falls (a barrier to upstream fish movement) provides spawning and rearing habitat for an isolated population of "resident" bull trout. Portions of Rock Creek downstream of the barrier falls and Bear Creek also provide spawning and rearing habitat for bull trout including migratory bull trout that mature to adulthood in the Kootenai River. The overall baseline condition of critical habitat was determined by integrating individual PCE rankings (KNF BA 2013). The integrated baseline condition of bull trout critical habitat in Libby Creek was rated as "functioning at unacceptable risk" with seven of the nine PCEs receiving this rating (see Table 4). This indicates that the degraded condition of critical habitat impedes the ability of this CHU to provide the biological and physical features (PCEs) essential for conservation and recovery of the species. However, despite the absence of bull trout from historical habitat, or that bull trout are rare or being maintained at a low population level, the condition of the critical habitat is such that it can still function well enough to maintain bull trout at very low population levels. Note that the degraded condition of critical habitat dictates that active restoration is needed to recover the species (USDI Fish and Wildlife Service 2010a).

The integrated baseline condition of bull trout critical habitat in Bear Creek was rated as "functioning at risk" with all nine PCEs receiving this rating. This indicates that the subject critical habitat in Bear Creek, although degraded, provides enough function from PCEs for persistence of bull trout but in more isolated populations, and that the habitat condition may not promote recovery of bull trout or its habitat without active or passive restoration efforts. The integrated baseline condition of bull trout critical habitat in West Fisher Creek was rated as a combined rating of "functioning at risk" and "functioning at unacceptable risk" with all nine PCEs receiving this combined rating. The "functioning at-risk" and "functioning at unacceptable risk" environmental baseline conditions in Libby, Bear, and West Fork Fisher creeks for the bull trout PCEs indicate the deficient environmental baseline conditions for designated critical habitat in the respective drainages.

Based on the site specific environmental baseline habitat conditions (in the action area) of bull trout (Table 4) and linkage to the PCEs considering those habitat indicators described in Appendix C and other factors as necessary, all PCEs are in less than optimal condition for all designated critical habitat for bull trout.

Figure 13. Map of Designated Bull Trout Critical Habitat in the Libby Creek and Fisher River watersheds. (USDI Fish and Wildlife Service 2010a)



Clark Fork River Basin Critical Habitat

Within the Clark Fork River Basin, the proposed action would occur in a portion of the Lower Clark Fork River core area that contains 283 stream miles of designated critical habitat for bull trout. Of the total miles of critical habitat within the Lower Clark Fork River core area, Rock Creek (including East Fork Rock Creek) contains 8.4 miles and East Fork Bull River contains 7.9 miles (Figure 14). Both Rock Creek and East Fork Bull River are tributaries to Cabinet Gorge Reservoir. The reservoir provides foraging, migratory, and over-wintering habitat for bull trout from both drainages (Pratt and Huston 1993) and is designated as critical habitat (USDI Fish and Wildlife Service 2010a).

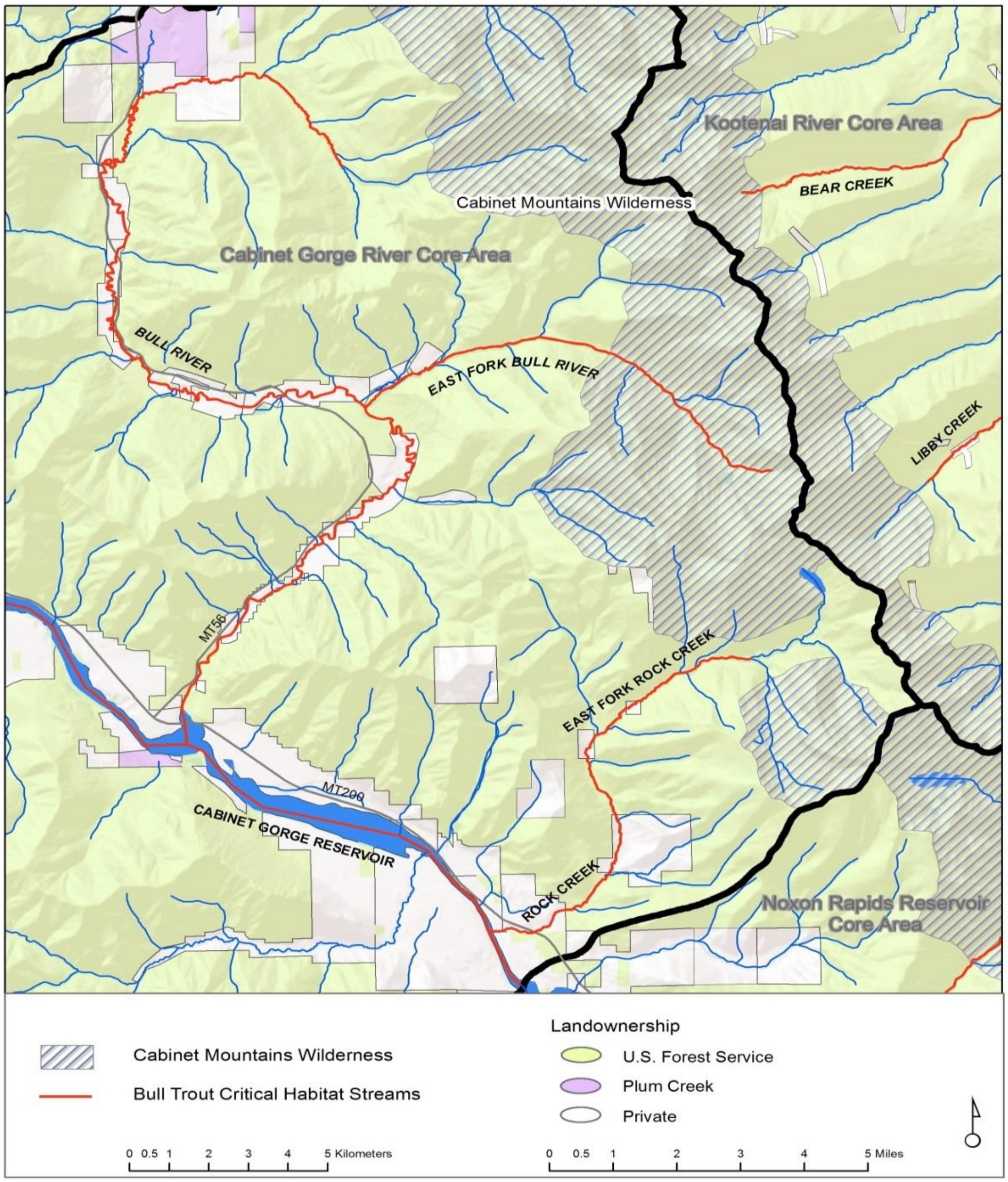
Rock Creek from its confluence with Cabinet Gorge Reservoir upstream 8.4 miles to a natural barrier provides spawning and rearing habitat for bull trout. All designated bull trout critical habitat identified in the Rock Creek watershed contains some, or all, of the PCEs that support bull trout. The extent of critical habitat area that is functional for bull trout annually depends on year-round stream flow conditions. In most years all PCEs are negatively impacted to some degree due to the seasonal lack of connectivity preventing upstream movement of adult migratory bull trout. Annual sub-surface stream flow conditions in summer and early fall severely impact the ability of these fish to find suitable spawning areas. Consequently, it is likely that reproduction in most years is confined to areas upstream of the West Fork Rock Creek confluence.

The overall baseline condition of critical habitat was determined by integrating individual PCE rankings (KNF BA 2013). The integrated baseline condition of bull trout critical habitat in Rock Creek (including East Fork Rock Creek) was rated as "functioning at risk" with all nine PCEs receiving this rating. This indicates that the degraded condition of critical habitat impedes the ability of this CHU to provide the biological and physical features (PCEs) essential for conservation and recovery of the species. However, despite the absence of bull trout from historical habitat, or that bull trout are rare or being maintained at a low population level, the condition of the critical habitat is such that it can still function well enough to maintain bull trout at very low population levels. Note that the degraded condition of critical habitat dictates that active or passive restoration is needed to recover the species (USDI Fish and Wildlife Service 2010a). The integrated baseline condition of bull trout critical habitat in East Fork Bull River was also rated as "functioning at risk" with all nine PCEs receiving this rating. The "functioning at-risk" environmental baseline conditions for the bull trout habitat indicators in the matrix analysis confirm the deficient environmental baseline conditions for designated critical habitat in Rock Creek (see Table 4).

Based on the site specific environmental baseline habitat conditions of bull trout (see Table 4) and linkage to the PCEs considering those habitat indicators (USDI Fish and Wildlife Service 2010a) and other factors as necessary, all PCEs are in less than optimal condition for all designated critical habitat for bull trout. Furthermore, not all the stream area designated as critical habitat in the Rock Creek mainstem contain all the PCEs as indicated by the overlap of critical habitat sections and the annually dewatered areas. Only in those years where stream flows in the mainstem exist year-round do PCEs (albeit degraded) function to provide for one or more of the two life history functions (resident and migratory) of bull trout.

The proposed Rock Creek Mine, when under development is anticipated to result in a degradation of PCEs related to sediment levels in Rock Creek. The sediment levels would initially rise and then after about 7 years decline to pre-development levels. This condition (temporary increase in sediment delivery to bull trout habitat) was considered as a baseline condition when PCE ratings were determined for the proposed Montanore Mine project. Adverse effects on bull trout habitat due to development of the Montanore Mine are considered additive to the adverse effects caused by the Rock Creek Mine.

Figure 14. Map of Designated Bull Trout Critical Habitat in the Rock Creek and Bull River watersheds (USDI Fish and Wildlife Service 2010a).



V. EFFECTS OF THE ACTION

The effects of the action are considered along with the status of the species, the environmental baseline, and cumulative effects (defined below) for purposes of preparing a biological opinion on a proposed Federal action (USFWS and NMFS 1998). This section will describe and analyze the effects of the Montanore Project on bull trout and its critical habitat.

"Effects of the action" refers to 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 that will be added to the environmental baseline. 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. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consultation.

This section analyzes the potential direct and indirect effects of the proposed action, excluding measures proposed by KNF in the Bull Trout Mitigation Plan. As discussed earlier in this biological opinion, the Service does not consider it likely the Bull Trout Mitigation Plan will be implemented in its entirety or in a timely manner. Consequently, this analysis centers on the Montanore Project's effects of only those actions that are reasonably certain to occur.

A. General Effects of Mining Operations

The U.S. Congress passed the Mining Laws Act of 1872, granting top land-use priority to mineral extraction on all public lands not specifically withdrawn from mineral development. As a result, some 741 million acres (68 percent of all public land) are open to mining (Sheridan 1977 in Nelson et al. 1991). Extraction of minerals in the United States has deleteriously affected fishery resources in the western United States, and continues to degrade salmonid habitat in many areas (Nelson et al. 1991).

Underground mining and the associated above ground development can potentially have negative effects on bull trout should water quality and quantity be altered. The five specific habitat factors that could be affected are the following: 1) stream flow, 2) stream temperature and dissolved oxygen, 3) sediment, 4) large woody debris, and 5) water chemistry. Several studies have shown that underground mining operations and their facilities can increase stream temperatures, create acid discharge, and mobilize toxic heavy metals, produce sediment, create barriers to fish movement, alter stream channel morphology, and alter stream flow (Nelson et al. 1991; Lee et al.1997; Harvey and Lisle 1998).

Stream Flow

Water quantity can be affected by direct removal of water during off-stream operations (Martin and Platts 1981) and by disruption of groundwater sources that supply water to surface stream flows (KNF BA 2013). The amount of water (quantity) flowing in a stream may influence a number of habitat factors that determine the success of bull trout reproduction and survival of early bull trout life stages. Specific effects on bull trout from predicted flow depletions during baseflow conditions are described below.

Water Temperature and Dissolved Oxygen

Water temperature can be altered by activities associated with mining, such as flow augmentation to streams from waters excess from the mining operation. Stream temperature is also affected by eliminating stream-side shading, disrupted subsurface flows, reduced stream flows, and morphological shifts toward wider and shallower channels with fewer deep pools. Loss of streamside vegetation reduces the input of material to the stream that would become or create cover for fish and their prey in the future as well as result in changes in water temperature regulation (Lee et al. 1997). Dissolved oxygen can be reduced by low stream flows, elevated temperatures, and increased fine inorganic and organic materials that have infiltrated into stream gravels retarding intergravel flows (Chamberlain et al. 1991).

Sediment

Soil and site disturbance that may occur during mill construction and use and other underground mining activities are often responsible for increased rates of erosion and sedimentation to streams (Martin and Platts 1981; Lee et al. 1997). The site disturbance is associated with many activities including vegetation removal from the site, vehicular access to the site, installation of stream crossing structures, removal of overburden from the site, re-routing or diversion of streams, construction of settling ponds, and removal and processing of valuable minerals. The amount of sediment actually delivered to streams will depend on site specific factors. The deposition of fine sediments in salmonid spawning and rearing habitat increases mortality of bull trout embryos, alevins, and fry by decreasing the amount of suitable habitat and by impairing the delivery of oxygen and food to the early life stages fish (Shepard et al. 1984; Pratt 1984; Fraley and Shepard 1989; Rieman and McIntyre 1993). Sedimentation effects on salmonids can vary significantly depending on salmonid species, stream channel morphology, and stream flows (Harvey and Lisle 1998). For a substrate oriented salmonid like juvenile bull trout, deposition of fine sediments filling spaces between rubble could have a very negative effect on survival, especially overwinter survival. This could reduce the amount of rearing habitat available to juvenile and subadult bull trout as well as adult bull trout. Suspended sediment also can have both acute and sublethal effects on salmonids (Sigler et al. 1984). Suspended sediment levels have to be very high to cause lethal effects by impairing oxygen delivery through gill membranes, so sublethal effects such as reduced growth caused by restricted feeding behavior are much more likely to occur. Reduction in growth in various salmonid species caused by physiological effects on the fish and restricted feeding behavior has been found to occur at suspended sediment concentrations of 100 to 300 mg/l (Sigler et al. 1984; McLeay et al. 1987) (see specific detailed effects of sediment on bull trout below). Additionally, “fine substrates”, which may result from fine sediment deposition in streams, have been associated with brook trout invasions (Shepard 2004) which could negatively effect bull trout populations.

Many mining projects involve road construction, re-construction and use, which results in further adverse effects. Roads built in forested watersheds can cause mass soil movement and surface erosion, resulting in soil creep, slumping, earthflows, and debris avalanches (Meehan 1991).

Roads are recognized as a long-term source of sediment for extended periods even after erosion control measures have been implemented (Furniss et al. 1991; Belt et al. 1992). Ground disturbance from road blading, particularly where the road is immediately adjacent to streams and at both intermittent and perennial stream crossings can result in elevated levels of sediment introduction. Ditch maintenance is another source of sediment delivery to streams. Increased erosion occurs within the ditch as a function of cleaning, pulling, or heeling, increased rate of slides in the cut slope (if the cut slope is undercut), and long-term risk of increased sedimentation from vegetation or ditch rock removal within the ditch. Delivery of available sediment to streams can vary substantially depending on the level of best management practices in effect on a given road (Belt et al. 1992). Installation of cross drainage structures and maintenance of buffers between the roads and the streams reduce sediment delivery to streams.

Other activities associated with road activities such as ditch maintenance, culvert cleaning, riprapping, crossing structure activities also may increase sediment delivery to streams. Snowplowing can result in increased erosion of the road surface and fill slopes as thawing occurs in the spring. Water flowing down ruts in plowed roads and water flowing off the road onto fill slopes are the primary cause of increased sediment delivery. Installation of new cross drainage features as well as cleaning existing ones can result in some short term increases in sediment delivery, but will help reduce long-term sediment delivery to streams during road maintenance activities.

Large Woody Debris

Because the supply of large woody debris to stream channels is typically a function of the size and number of trees in riparian areas, it can be profoundly altered by mining activities that remove vegetation in preparation for mining activities. Removal of streamside trees can greatly alter the amount of woody debris in streams over time (Sedell et al. 1988). Shifts in the composition and size of trees within the riparian area affect the recruitment potential and longevity of large woody debris within the stream channel. Large woody debris influences channel morphology, especially in forming pools and instream cover, retention of nutrients, and storage and buffering of sediment. Any reduction in the amount of large woody debris within streams, or within the distance equal to one site-potential tree height from the stream, can reduce instream complexity (Ralph et al. 1994). Large woody debris increases the quality of pools and provides hiding cover, slow water refuges, shade, and deep water areas (Hauer et al. 1999). Ralph et al. (1994) found instream wood to be significantly smaller and pool depths significantly shallower in intensively logged watersheds. The size of woody debris in a watershed subjected to streamside tree removal in Idaho was smaller than that found in a relatively undisturbed watershed (Overton et al. 1993). The consequence to bull trout of reduced large woody debris in a stream channel is a reduced capacity of the stream to support those habitat functions necessary for bull trout survival and reproduction, such as pools, undercut banks, channel stability, and hydraulic complexity all of which improve feeding opportunities for various life stages of bull trout (Murphy 1995).

Water Chemistry and Contamination

Exposing rock strata to weathering and erosion through removal of vegetation and overburden can result in higher levels of metals in streams (Martin and Platts 1981). Metals such as arsenic, cadmium, zinc, copper, and mercury all pose risks for aquatic organisms depending on site-specific water chemistry. Combinations of several metals may pose greater risks despite concentrations for each being below its own toxicity threshold (Wels and Wels 1991). Generally, severe metal contamination is more associated with erosion from milled tailings and waste rock, or acid mine discharge associated with either open pit or underground mines.

Laboratory studies have shown that trout and salmon can detect low levels of metals and actively select lower metals concentrations when given the choice. Woodward et al. (1997) documented that Snake River cutthroat trout will avoid mixtures of cadmium, lead, and zinc. Additional tests documented avoidance behavior in cutthroat trout for copper (6 □g/l) and zinc (28 □g/l). Woodward et al. (1995) showed that brown trout avoided mixtures where copper and zinc were present in concentrations as low as 6.5 and 32 □g/l, respectively. Further, fish acclimated for 90 days to zinc at 55 □g/l, preferred lower concentrations (28 □g/l), when given the choice.

Field studies also have documented the avoidance of metal concentrations by wild fish. Spawning Atlantic salmon in New Brunswick displayed avoidance behavior of metals (primarily copper and zinc) at thresholds of 17-21 □g/l for copper mixed with 210-258 □g/l zinc originating from hardrock mining activities (Sprague et al. 1965; Saunders and Sprague 1967 both in Henry and Atchison 1991).

There may be effects to bull trout related to the various petroleum products commonly used in mining operations. Petroleum can cause environmental harm by toxic action, physical contact, chemical and physical changes within the soil or water medium, and habitat alteration. Oil spills have caused major changes in local plant and invertebrate populations lasting from several weeks to many years. Effects of oil spills on fish have been difficult to determine beyond the immediate losses in local populations. Drilling fluids, sometimes used in great quantities at mining sites, were found to be toxic to rainbow trout at concentrations less than 100 mg/L (Sprague and Logan 1979 in Nelson et al. 1991). Chemicals used in processing and recovery of metalliferous deposits may be toxic. Webb et al. (1976) reported the flotation reagents sodium ethyl and potassium amyl xanthate were highly toxic to rainbow trout.

While it is unlikely large numbers of fish inhabiting large, deep bodies of water would be killed by the toxic effects of spilled petroleum, fish kills may be caused by large amounts of oil moving rapidly in shallow waters such as shallow streams. Oil and petroleum products vary considerably in their toxicity, and the sensitivity of fish to petroleum varies among species. The sublethal effects of oil on fish include changes in heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine system, and a variety of biochemical, blood, and cellular changes, and behavioral responses (Weber et al. 1981). Therefore, a fuel spill into the stream related to a mining operation could directly poison bull trout or indirectly affect bull trout by poisoning invertebrate or vertebrate prey species.

B. Specific Effects of the Montanore Proposed Action to Bull Trout

While the general effects of mining projects described above (and others) apply to the Montanore

Project to different degrees, the following describes the more significant effects of the proposed project on bull trout. The effects of the Montanore Proposed Action on baseline conditions are described in the KNF BA (2013). Some of that information is summarized or directly excerpted below; other analyses are included where the Service concluded further explanation of effects was needed to clarify effects to bull trout populations or to bull trout habitat. In some instances, the Service did not concur with the KNF assessment of impacts or assumed beneficial effects predicted in the KNF BA (2013). In those cases both perspectives were included.

Streamflow

The Proposed Action is predicted to affect flow in bull trout occupied streams (Table 5). The type and extent of impact to streamflow depends on the project phase and the location. The ore deposit to be mined as part of the Proposed Action lies under the Cabinet Mountains Wilderness Area near Rock Lake and the upper reach of East Fork Rock Creek, and extends under the upper reach of East Fork Bull River (see Figure 3). Disruption of groundwater inflow to streams that would occur due to development of the underground mine workings would create the potential for baseflow reductions in Libby Creek, Poorman Creek, and Ramsey Creek on the east side of the Cabinet Mountains, and East Fork Rock Creek, mainstem Rock Creek, and East Fork Bull River on the west side of the Cabinet Mountains. Streamflow changes may also occur due to pumpback well system operation around the Tailings Storage Facility impoundment, water appropriations from the Libby Creek watershed during high flows, discharges from the Water Treatment Plant, vegetation clearing, and potable water use. Predicted changes in streamflow were modeled within each affected watershed including predicted changes to baseflow (see Table 5).

Regarding potential effects on bull trout, the model results depicted in Table 5 are most relevant at stream baseflow conditions which occur during that time period when run-off from precipitation and groundwater interconnection components are at the lowest point. The hydrogeological model used for the project predicts that depletion of groundwater due to mining activities would reduce stream baseflow conditions. Baseflow conditions or extended dry periods typically occur during mid-August to October and again during late December through March. These time periods coincide with the most sensitive time periods for bull trout; spawning activity generally occurs in September, and egg incubation occurs throughout the December – March time period.

Predicted Streamflow Depletion Effects

The KNF used the following models to analyze the potential effects on streamflows (KNF BA 2013: the Forest Service Region 1 WATSED model, ECAC model, estimated or 3D model-derived existing low flow, and 3D model-derived impacts to baseflow). With the data currently available, the model results provided a potential range of dewatering and pumping rates and streamflow impacts. They are the best currently available estimates of impacts and associated uncertainty that can be obtained using groundwater models. As part of the proposed action, both 3D groundwater flow models would be refined and rerun after data from the evaluation phase were incorporated into the models. Following this evaluation phase the KNF proposes additional data collection and modeling, the predicted impacts on surface water resources in the project area would likely change and would have greater certainty. However, in most cases the actual observable flow depletions affecting bull trout aren't predicted to occur until well after mining is completed. Therefore, for this effects analysis, based on the model predictions, the Service has concluded that mining activities will cause some level of streamflow depletion as described in Table 5 that will adversely affect bull trout for an extended period of time.

Table 5. Estimated Proposed Action effects on stream flow and bull trout habitat by life stage (% change) during baseflow conditions in action area streams. (Adapted from KNF BA 2013)

Stream	Upstream Location Description or Baseflow Estimation Location	Stream Meter (1 meter = 3.28 feet)		Reach Length (m)	Baseflow (cfs)					Baseflow (% change)				Maximum Change in Habitat Availability at Baseflow**		
		Up-stream	Down-stream		Existing	Const-ruction	Oper-ations	Closure	Post-Closure	Const-ruction	Oper-ations	Closure	Post-Closure	Adult	Juvenile	Spawn
Libby Cr	CMW bdry near LB-100, KNF upper limit of bull trout	46450	42430	4020	0.54*	0.49*	0.43	0.44	0.47*	-9.3	-20.4	-18.5	-13.0	-8	-10	-20
	LB-300	42430	42081	349	1.22*	2.18	2.74	2.08	1.76**	78.7	124.6	70.5	44.3**	50	62	125
	Natural barrier	42081	36683	5399	ne	Ne	ne	ne	ne	ne	Ne	Ne	ne			
	Midway between nearest flow predictions	36683	30935	5748	ne	Ne	ne	ne	ne	ne	Ne	Ne	ne			
	LB-2	30935	30786	150	8.62	Ne	ne	9.27	8.62	ne	Ne	7.5	0.0	3	4	8
	Midway between nearest flow predictions	30786	30636	150	ne	Ne	ne	ne	ne	ne	ne	Ne	ne			
	LB-2000	30636	23730	6906	8.99	9.95	9.64	8.99	8.99	10.7	7.2	0.0	0.0	4	5	11
Ramsey Cr	KNF upper limit of bull trout	4971	4286	685	ne	Ne	ne	ne	ne	ne	ne	Ne	ne			
	Natural barrier	4286	192	4094	ne	Ne	ne	ne	ne	ne	ne	Ne	ne			
	RA-600	192	0	192	2.07	2.05	2.03	2.04	2.05	-1.0	-1.9	-1.4	-1.0	-1	-1	-2
Poorman Cr	KNF upper limit of bull trout	7162	1674	5488	ne	Ne	ne	ne	ne	Ne	ne	Ne	ne			
	FSR 278 culvert	1674	326	1348	ne	Ne	ne	ne	ne	Ne	ne	Ne	ne			
	PM-1200	326	0	326	1.55	1.60	1.39	1.40	1.37	3.2	-10.3	-9.7	-11.6	-5	-6	-12
E. Fork Rock Cr	Natural barrier, KNF upper limit of bull trout	5140	1461	3679	ne	ne	ne	ne	ne	Ne	ne	Ne	ne			
	RC-3	1461	0	1461	5.70	ne	ne	5.64	5.19	Ne	ne	-1.1	-8.9	-4	-4	-9
Rock Cr	Confluence E and W Fork	8539	6269	2270	ne	ne	ne	ne	ne	ne	ne	Ne	ne			
	Midway between nearest flow predictions	6269	4500	1769	ne	ne	ne	ne	ne	ne	ne	Ne	ne			
	Perennial flow below	4500	1500	3000	ne	ne	ne	ne	ne	ne	ne	Ne	ne			
	Seasonally dry below	1500	1269	231	ne	ne	ne	ne	ne	ne	ne	Ne	ne			
	RC-2000	1269	300	969	8.80	8.78	8.74	8.59***	8.12***	-0.2	-0.7	-2.4	-7.7	-3	-4	-8

Table 5. Continued

Stream	Upstream Location Description or Baseflow Estimation Location	Stream Meter (1 meter = 3.28 feet) Up-stream	Down-stream	Reach Length (m)	Baseflow (cfs) Existing	Const-ruction	Oper-ations	Closure	Post-Closure	Baseflow (% change) Const-ruction	Oper-ations	Clos ure	Post-Closure	Maximum Change in Habitat Availability at Baseflow** Adult	Juvenile	Spawn
	Perennial flow below	300	0	300	ne	ne	ne	ne	ne	ne	ne	Ne	ne			
East Fork Bull R	Confluence with Placer Cr.	11091	9384	1707	ne	ne	ne	ne	ne	ne	ne	Ne	ne			
East Fork Bull R	EFBR-2	9384	8278	1106	2.93	ne	ne	2.86	2.62	ne	ne	-2.4	-10.6	-5		-11
East Fork Bull R	Midway between nearest flow predictions	8278	7172	1106	ne	ne	ne	ne	ne	ne	ne	Ne	ne			
East Fork Bull R	EFBR-500	7172	3586	3586	3.71	3.71	3.64	3.55	3.23***	0.0	-1.9	-4.3	-12.9	-6		-13
East Fork Bull R	Midway between nearest flow predictions. baseflow values are at mouth.	3586	0	3586	7.97	ne	ne	7.87***	7.61***	ne	ne	-1.3	-4.5	-2		-5

ne = no estimate
* Standard model baseflow from AMEC Geomatrix 2011
** Assumed to be short-term increase for purposes of impact assessment.
*** Cumulative estimated impact on baseflow of Montanore Mine and Rock Creek Mine.

[shaded box] = maximum flow change

Impacts to stream baseflows were predicted at selected locations using the 3D model (KNF BA 2013) and at additional stream locations to improve the ability to assess impacts to bull trout. Maximum baseflow reductions were predicted to occur at the end of mining on the east side of the Cabinet Mountains (Libby Creek, Ramsey Creek, and Poorman Creek) and 16 years after closure on the west side (East Fork Rock Creek and East Fork Bull River). Potential baseflow reductions in other streams in the action area were considered to be negligible and beyond the capability and calibration of the model (KNF BA 2013). The greatest percentage of baseflow reductions were predicted in the upper reaches of these streams. The KNF used the standard model run as the basis of the impact analysis in the BA. The most significant predicted reductions in the groundwater contribution to surface stream flows occurred during periods of baseflow conditions (mid-August to October and again during late December through March) in Libby Creek, Poorman Creek, Ramsey Creek, East Fork Rock Creek, mainstem Rock Creek, and East Fork Bull River. Local bull trout populations that support the core area populations (Kootenai River and Lower Clark Fork River core areas) currently exist in the areas of predicted streamflow depletion in all these streams except Poorman Creek and Ramsey Creek which are considered “bull trout occupied streams” (KNF BA 2013). Minor baseflow reductions in other streams in the action area were modeled, but considered to be “negligible” because of the unmeasurable and likely indiscernible impacts to bull trout and its habitat (KNF BA 2013).

Water meeting effluent limits would be discharged to Libby Creek through the permitted MPDES outfalls during all mine project phases. The Forest Service has an instream water right of 40 cfs in Libby Creek at the confluence of Bear Creek with a 2007 priority date. Any new water right obtained by MMC would be junior to the Forest Service right, and, consequently, MMC would curtail Libby Creek groundwater appropriations whenever the flow in Libby Creek at the confluence of Bear Creek was 40 cfs or less, which typically occurs between August and March. Up to 2.5 cfs would be diverted from Libby Creek upstream of Little Cherry Creek between April and July during operations for mill water use. Whenever flow in Libby Creek at LB-2000 was less than 40 cfs, stored water would be treated at the Libby Adit Water Treatment Plant, and discharged to Libby Creek. The rates would vary, depending on actual precipitation and the total pumping rate of the pumpback wells. Because of the discharges, flow in Libby Creek downstream of the Libby Adit would increase. There would likely be some continued discharge of treated water from the Tailings Storage Facility pond and pumpback wells after mine closure for an indefinite period until treatment of water is no longer necessary. The mine design includes the construction of bulkheads that were not included in the model results. The bulkheads would be expected to reduce flows in Libby Creek below the discharge point (near LB-2000, see Figure 9) to pre-mine levels.

Results that are summarized above for what has been termed the standard 3D model were used to assess impacts to bull trout and bull trout critical habitat. Water capture, use, and discharges of water were also used to provide a conservative assessment of potential impacts of changes to streamflow during low flow conditions in bull trout occupied streams.

Predicted peak flow increases that would be attributable to the Proposed Action were less than 2 percent for all east side streams that are occupied by bull trout (KNF BA 2013). Predictions for west side streams indicated there would be no impacts to peak flows. Impacts of the Proposed Action to peak flow were considered minor or negligible (KNF BA 2013).

Fish Passage Effects

Based on the assessment approach described above (and in more detail in the KNF BA 2013), all of the stream reaches that could potentially be impacted by decreases to baseflows caused by the Proposed Action are currently unlikely to be passable by adult migratory bull trout during baseflows. The predicted changes to baseflows that could result from the Proposed Action do not change this assessment for any of the reaches. The result of the attempt to quantitatively assess impacts to bull trout passage is, therefore, summarized by the following statements. Adult migratory bull trout are currently likely to encounter passage restrictions in all of the stream reaches that could potentially be impacted by stream flow changes (decreases) during baseflows. The impact of a reduction of baseflows cause by the Proposed Action is an increase in the stream length, duration, or frequency of the existing passage restrictions. This impact to fish passage (and access to upstream spawning areas) would be less severe for resident bull trout which are generally smaller and therefore able to pass through narrower and shallower restrictions.

Habitat Effect

Stream habitat effects from predicted baseflow depletions would vary by stream reach and mine phase (see Table 5). Maximum estimated changes to bull trout habitat would occur to the Weighed Usable Area (WUA) index for spawning habitat (available adult spawning habitat at various flows), while estimated changes to adult, sub-adult and juvenile rearing habitats would be less severe changes in availability of these habitats at various flows (see Table 5).

Assessment of the potential impacts of streamflow reductions to bull trout and bull trout critical habitat in the action area requires consideration of bull trout distribution, known spawning areas, and the relation of channel geometry to stream discharge. Using species specific habitat modeling (Physical Habitat Simulation System, PHSS) developed by the U.S. Geological Survey (USGS), projected effects were assessed from streamflow reductions based on habitat/discharge relationships for adult bull trout passage and the Weighed Usable Area (WUA) for adult bull trout habitat, spawning habitat, and juvenile habitat (see Table 5). Data from bull trout streams in Idaho provided by USGS were used to provide estimates of habitat impacts to WUA in the action area streams. The Idaho information was determined to be the best available KNF BA 2013). A quantitative relationship does not exist between the WUA metric and bull trout population metrics (for example, number of fish by age class per square meter of stream). Therefore, extrapolation of habitat impacts (changes in WUA) to predict bull trout population changes was not attempted.

In addition to the PHSS analyses above, data collected by MMC in Libby Creek provided a further assessment of the discharge/habitat relationship (KNF BA 2013). This information indicated that the USGS depth criterion for fish passage was a conservative estimate of minimum passage depth, particularly for resident adult bull trout which are smaller than migratory adult bull trout and may be capable of passage at shallower depths.

Three locations were analyzed (LB-2, RC-3, EFBR-2, see Figure 9) in the action area to assess the relationship between stream discharge and wetted area (KNF BA 2013). During August through October 2012, KNF hydrologists collected stream cross-section measurements and determined stream discharge during various flow regimes. The wetted area-discharge relationship for each site was used to estimate changes in the wetted cross-sectional area of the stream at these locations that would be attributable to the Proposed Action by subtracting modeled baseflow reductions. The predicted percent reductions in wetted area determined by this method were approximately half the percent reduction in the WUA indices determined by the PHSS analyses, above. Although the results are not directly comparable, the reductions in wetted area calculated to be attributable to modeled baseflow reductions caused by the Proposed Action add weight to the projected reductions in the WUA index and potential negative impacts to spawning and juvenile bull trout survival, especially near data collection sites in the East Fork Bull River and East Fork Rock Creek which are located where bull trout spawning has been documented to occur (Storraasli 2013).

Reductions in streamflow during low flow conditions are likely to have the following effects on bull trout and designated critical habitat:

- Reduce the availability of bull trout habitat, including spawning habitat, in some stream reaches during low flow conditions resulting in lowered bull trout reproductive potential and lowered bull trout population levels;

- Create or extend the length of low flow barriers and reaches where stranding occurs resulting in reduced access to spawning areas, especially of migratory fish, and increased frequency of mortality to stranded bull trout, both situations resulting in lowered bull trout population levels;

- Reduce the availability of groundwater upwelling areas (hyporheric flows) that are preferred spawning habitat resulting in lowered quantity and availability of preferred spawning habitat and reduced survival of early life stages (eggs through fry) of bull trout due to reduction of high quality groundwater infiltrating the spawning and incubating gravels resulting in lowered bull trout population levels;

- Reduce the moderating effect of groundwater inflow on stream temperature resulting in less desirable water temperatures for attracting spawning fish and increase risk of freezing of spawning/incubating gravels during winter, resulting in lowered bull trout survival and population levels.

For the west side streams, maximum potential reductions in the spawning habitat WUA index would be 5 to 13 percent in East Fork Bull River depending on the stream reach, and 8 to 9 percent in the Rock Creek drainage (see Table 5). On the east side, maximum potential reductions in the spawning habitat WUA index would be a temporary 20 percent reduction in the reach of Libby Creek upstream of LB-300 (see Figure 10) where an isolated resident bull trout population occurs. In time, this maximum potential reduction would be followed by a long-term potential reduction in WUA of spawning habitat of 13 percent (see Table 5). A 125 percent increase in WUA of spawning habitat is predicted downstream of LB-300 (due to mine Adit water inflows) which includes a small portion (approximately 1,145 feet or 349 meters) of the isolated reach above Libby Creek Falls where a resident bull trout population exists. This increase in baseflows at LB-300 (a 125 percent increase in WUA for adult bull trout spawning habitat downstream of the discharge point, see Figure 9) would decrease to 44 percent after mine closure (see Table 5). Long-term streamflow changes at baseflow were not estimated for locations in Libby Creek immediately downstream of LB-300, however, some undetermined amount of downstream influence would be expected based on the predicted long-term increase in flows at LB-300. Predicted baseflow depletions and resultant decreases of spawning and egg incubation habitats in Libby Creek, East Fork Bull River, and the Rock Creek drainage constitute a significant impact to bull trout populations in the affected streams.

Water Temperature Effects

The Proposed Action may affect stream temperatures by discharge of treated water from the Water Treatment Plant (Libby Creek), vegetation clearing, decreased streamflow due to direct diversions, and changes in groundwater discharge to streams.

The temperature of the discharge of mine and adit water during the evaluation, construction and operations phases is expected to be between 56° and 65°F (KNF BA 2013) which exceeds the temperature thresholds of bull trout spawning, egg incubation, and rearing, and for generally preferred water temperatures of bull trout (see BO section III. B., Habitat Characteristics). Discharges would be to either groundwater or surface water from the Water Treatment Plant at the Libby Adit Site (KNF BA 2013). These relatively warm water inflows would occur at the "existing outfall" (see Figure 3) near LB-300 (see Figure 9) where a significant volume of water augmentation is predicted (see Table 5) to occur at baseflow conditions at a known bull trout spawning location. This water temperature impact in addition to predicted reductions in baseflows poses a serious threat to the viability of the Libby Creek bull trout population residing upstream of Libby Creek falls.

The removal of all riparian vegetation for road construction and reconstruction and riparian vegetation taller than 10 feet for the transmission line along streams would increase direct solar radiation to streams (KNF BA 2013). Vegetation clearing would occur at stream crossings and clearing would be up to 200 feet wide. Clearing may increase stream temperature at and for a short distance below the stream crossings, but it is difficult to predict the magnitude of the effect due to other factors affecting stream temperature and the constantly changing stream temperature regime.

The pumpback wells and any other diversions, such as make-up wells, would reduce streamflow. The reduction streamflow and bedrock groundwater inflows to analysis area streams due to mine inflows may increase stream temperatures where bedrock groundwater is the major component of streamflow during low flow conditions. Reduced baseflows that could result from groundwater drawdown could reduce the buffering effect that near-constant groundwater temperatures have on stream temperature. A valid assumption is that stream temperature changes toward ambient air temperature as it travels downstream. It could also be assumed that temperature change with distance would occur more quickly at reduced flow rates because the thermal capacity of a stream reach would decrease if the water volume decreased. Reduced baseflow could thus result in wider daily and annual stream temperature ranges which could negatively affect bull trout by reducing the attractiveness of spawning reaches resulting in less reproductive potential and by increasing the risk of mortality due to freezing of early life stages of bull trout which are present in spawning gravels during baseflow conditions.

Sediment Effects

Potential sediment sources from the Proposed Action are discussed below. The primary cause of changes to existing sediment inputs would be attributable to road use and road status changes.

The following summary of potential impacts was taken from a literature review on the effects of sediment on bull trout and their habitat (USDI Fish and Wildlife Service 2010b).

The introduction of sediment in excess of natural amounts can have multiple adverse effects on bull trout and their habitat. The effect of suspended and deposited sediment beyond natural background conditions can be fatal at high levels. Embryo survival and subsequent fry emergence success have been highly correlated to percentage of fine material within the streambed. Low levels of suspended sediment may result in sublethal and behavioral effects such as increased activity, stress, and emigration rates; loss or reduction of foraging capability; reduced growth and resistance to disease; physical abrasion; clogging of gills; and interference with orientation in homing and migration. The effects of increased suspended sediments can cause changes in the abundance and/or type of food organisms, alterations in fish habitat, and long-term impacts to fish populations. Although no absolute threshold has been determined at which fine-sediment addition to a stream is harmless, even at low concentrations, fine-sediment deposition can decrease growth and survival of juvenile salmonids. Sediment deposition in streams can result in habitat modification (fine substrates) which has been associated with brook trout invasion (Shepard 2004); see “Non-native fish species effects”, below.

Mine facility construction and associated vegetation clearing would predominantly occur in the Libby Creek watershed as well as in unnamed tributaries that do not support fish populations. Sediment and runoff from all disturbed areas would be minimized through the use of BMPs developed in accordance with the Forest Service’s National Best Management Practices for Water Quality Management on National Forest System Lands (USDA Forest Service 2012). The KNF concluded that the effect of sediment from facility construction and operation on bull trout and designated critical habitat would be negligible because of application of BMPs (KNF BA 2013). However, indirect effects of temporary sediment increases (2 years or more) may occur that suggest impacts are likely to be greater due to the habitat degradation that would potentially favor expansion of non-natives already present in significant numbers in the affected streams (see non-native fish species effects below).

Sediment impacts from roads required to implement the Proposed Action and those proposed to be closed under the Wildlife Mitigation Plan were modeled by KNF and DEQ (2013) using the Water Erosion Prediction Project (WEPP) (Elliot 2004). The modeled results represent an estimate of delivery potential from each road based on regional and project-specific variables that were incorporated into the model (Table 6). All streams, with the exception of East Fork Bull River, would be adversely impacted by sediment before the benefits of the Proposed Action were realized. Sediment input would increase during the evaluation phase only (2 years) in Libby Creek, Bear Creek, Cable Creek, Midas Creek, Poorman Creek, and West Fisher Creek.

Sediment input would increase during the evaluation phase and the first two years of construction (4 years) in Big Cherry Creek, Ramsey Creek, and Fisher River. Sediment input would increase in East Fork Rock Creek and Rock Creek (mainstem) during the first two years of construction.

Table 6. Predicted road sediment input modeled by year and stream (adapted from the KNF BA 2013)

		Sediment Input by Project Phase and Year Relative to Existing Inputs																					No Change (from baseline)						Decrease		Increase		
		Eval-uation		Construc-tion		Operation																					Closure		Post- Closure			
BMP	Stream	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Stream Net
With Best Management Practices	Libby Creek																															
	Big Cherry Creek																															
	Bear Creek																															
	Cable Creek																															
	Midas Creek																															
	Poorman Creek																															
	Ramsey Creek																															
	Fisher River																															
	W. Fisher Creek																															
	Rock Creek*																															
	E. Fork Rock Creek																															
	Annual Net																															
	Cumulative																															

Non-Native Fish Species Effects

Non-native brown trout, rainbow trout, Yellowstone cutthroat trout, and brook trout occur in bull trout occupied streams and tributaries in the Montanore Mine Action Area. Some of these species compete with bull trout for habitat and forage. Brook trout and brown trout may prey on juvenile bull trout; brown trout redd superimposition on bull trout redds has also been reported (Moran 2003); and brook trout are genetically similar enough to bull trout to permit hybridization. Offspring of the bull trout/brook trout cross are likely to be infertile, but the loss of a spawning opportunity by creating infertile hybrids reduces the reproductive output of bull trout. While it has the same effect on brook trout, brook trout have a higher fecundity rate and lower age at first reproduction, so when they co-occur, brook trout can become numerically dominant which may eliminate local bull trout populations.

Some stream improvement projects on the west side of the Cabinet Mountains have shown a correlation of increased abundance of non-native fish species, concurrent with decreased abundance of bull trout, following stream habitat improvement. One report showed species-specific responses to habitat improvements were generally proportional to their relative abundance prior to restoration work (Horn and Tholl 2011).

Stream habitat improvement is proposed by U.S. Army Corps of Engineers for Swamp Creek and Libby Creek under the mitigation plan for lost wetlands and impacts to Waters of the U.S. (NewFields and Kline 2012). The mitigation consists of instream habitat structures (Libby Creek) and channel re-routing and habitat structures for Swamp Creek. These actions will likely increase brook trout populations in their near vicinity, but that in itself will not necessarily be detrimental to bull trout because of the distance and habitat conditions where potential overlap of the species would occur. Any benefit to non-native fish species from in-stream habitat or water quality mitigation on Swamp Creek is unlikely to be detrimental to bull trout because the nearest bull trout population is approximately 6 river miles downstream of the proposed Waters of the U.S. mitigation site. Additionally, brook trout are already abundant in Swamp Creek between the mitigation site and Libby Creek (Kline and Savor 2012), and the reach of Libby Creek near the Swamp Creek confluence provides poor conditions overall for bull trout because the reach exhibits channel shifting and braiding, and maximum water temperatures in excess of 70^{o} F (based on the nearest upstream station in Kline 2007a).

It is well established that the non-native fish species found in the action area are generalists with regard to habitat and prey base. As such, both brook trout and brown trout tend to replace bull trout when habitat conditions change, for better or worse. Based on the projection that there would be changes in baseflow and sediment delivery associated with implementing the Proposed Action, it is probable there would be an increase in numbers of non-native fish who can exploit these types of habitat. The potential for interspecific competition and hybridization would be increased resulting in an adverse impact to bull trout if non-native fish abundance were to increase. Warnock and Rasmussen (2013) conclude that regardless of the mechanisms at work in a stream aiding brook trout occupation (invasion), the result may be a biotic obstacle for recolonization by recovering native bull trout; and, that integrated efforts that strive to recover bull trout populations in areas currently dominated by brook trout would benefit from strategic removal programs if they are to have the highest chance of success.

Non-native fish (brook trout) impacts to bull trout are expected to occur in most action area streams because bull trout and brook trout co-occupy most streams. However the non-native fish effect does not exist for Libby Creek upstream of the barrier falls because non-native fish species are blocked and do not occur. This potential effect is also less likely to occur in Poorman Creek and East Fork Rock Creek than for other streams in the action area because non-native fish species are partially blocked by seasonal dewatering and do not currently co-occur with bull trout.

Kootenai River Core Area Overall Effects

The Kootenai River Core Area bull trout population is not expected to benefit from the Proposed Action, including long-term reductions in sediment inputs to numerous streams. As stated in the preceding section, this conclusion is based on the following: 1) short-term sediment increases to bull trout streams will not be fully minimized by measures to assure the long-term decreases in sediment levels, 2) it is unlikely that all bull trout populations would survive and respond favorably to the improving conditions, and 3) non-native fish may expand their distribution in response to degraded habitat conditions for bull trout during the period of sediment increases. Additionally, significant adverse impacts to bull trout and bull trout critical habitat will occur from the warm water augmentation of flows in upper Libby Creek during baseflow conditions (when bull trout are attempting to spawn and bull trout eggs are incubating in the substrate). Furthermore, it is likely that sediment reductions would benefit brook trout to the detriment of bull trout in streams where they co-occur or in streams where brook trout do not occur but have unrestricted access. Beneficial and detrimental impacts of the Proposed Action are discussed below for individual streams, and collectively for the Kootenai River Core Area.

Libby Creek. Theoretically, the baseline condition for sediment of "functioning at unacceptable risk" of Libby Creek (see Table 4) would improve in the long-term with implementation of minimization measures to reduce sediment inputs (see Table 6). However, the Service has determined that despite an increasingly beneficial condition in Libby Creek habitat due to long-term sediment reductions, the overall situation for bull trout in Libby Creek is likely to degrade in the long-term for the following reasons.

The isolated population of resident bull trout above the falls on Libby Creek contributes to the population size and genetic diversity of the Kootenai River Core Area. It also has value because its isolation provides protection from the threat of competition and hybridization with brook trout. However, this isolated population is vulnerable to loss via catastrophic events such as droughts, landslides, floods, or fire because there would be no opportunity for natural recolonization (Rieman and McIntyre 1995, FS and DEQ 2009). The past losses of bull trout populations in West Fork Rock Creek and Copper Gulch provide examples of the vulnerability of local populations to catastrophic declines in this core area.

The impact of the Proposed Action to the isolated bull trout population and designated critical habitat above Libby Creek Falls was determined to be beneficial to approximately 1,150 feet of occupied habitat downstream of station LB-300 in the short-term due to increased streamflow during low flow conditions and long-term decreased sediment inputs after temporary increases

(KNF BA 2013). However, the KNF BA (2013) determination of beneficial effects due to increased streamflow did not take into account that the supplemental water entering the stream would have a much higher water temperature than the stream water. At best, baseline condition for stream temperature in Libby Creek is “functioning at risk” for bull trout (see Table 4) and warmer augmented water would worsen this habitat attribute likely creating a condition of “functioning at an unacceptable risk” for bull trout. As discussed elsewhere, significantly warming the stream water during bull trout spawning and egg incubation times may have unintended adverse impacts to bull trout reproduction. The KNF BA (2013) further states that impacts to approximately 13,120 feet of occupied and presumably occupied habitat upstream of station LB-300 would be beneficial due to decreased sediment inputs, after temporary increases, and detrimental due to decreased streamflow during low flow conditions. These assessments of beneficial effects to bull trout due to long-term reductions in sediment input to the stream are likely overstated and are discussed further in Appendix A.

The KNF BA (2013) states that downstream of Libby Creek Falls, bull trout and designated critical habitat would benefit from decreased sediment inputs, after temporary increases, and would benefit from short-term increased streamflow during low flow conditions (although the raised water temperature issue was not considered). A conservative assessment is that the overall impact of the Proposed Action to bull trout and designated critical habitat in Libby Creek proper would be detrimental if streamflow is reduced during low flow conditions in the majority of the bull trout occupied reach above the falls. This conclusion is based on the limited occurrence of bull trout and limited evidence of spawning in Libby Creek downstream of the falls in the action area. As such, the benefits of sediment reduction throughout the stream in the action area are unlikely to compensate for the detrimental impacts of reduced streamflow during low flow conditions above the falls. For these reasons, and because the baseline conditions for “base flow” areas functioning at unacceptable risk for bull trout in Libby Creek (see Table 4), the Service has determined that the long-term increasing beneficial condition for bull trout habitat due to sediment reduction does not reflect other negative factors that will likely depress the Libby Creek bull trout population.

Big Cherry, Bear, Cable, Midas creeks, Fisher River, and West Fisher Creek. The significant impact of the Proposed Action on Big Cherry Creek, Bear Creek, Cable Creek, Midas Creek, Fisher River, and West Fisher Creek is temporarily increased input of sediment over baseline conditions which range for these streams from functioning “at risk” to functioning at “unacceptable risk” for bull trout (see Table 4). The temporary increases are due to disturbances during road construction, road closures or road use, followed by long-term reductions in sediment input at mine closure (see Table 6). This includes designated bull trout critical habitat in Bear Creek and West Fisher Creek. As previously stated, this overall beneficial impact to habitat condition may or may not translate to a benefit to the bull trout population due to severe impacts of short-term sediment increases on a small bull trout population, or benefits accruing to non-native brook trout which have been detrimental to bull trout populations elsewhere in the Core Area. Bull trout redd survey effort has varied among the streams; however, available data indicate that Bear Creek, followed by West Fisher Creek, provide the greatest contributions in the action area to the Kootenai River Core Area bull trout population. Bear Creek also supports the highest densities of bull trout in the entire action area, based on available survey data.

The baseline condition in Big Cherry Creek and Fisher River are likely to improve with implementation of sediment BMPs on roads from a baseline integrated rating of “functioning at unacceptable risk”. The baseline condition in Bear, Cable, Midas creeks and West Fisher Creek would likely improve with long-term sediment reductions from a baseline integrated rating of “functioning at risk” (see Table 4). For reasons outlined above, the Service has determined that an increasing beneficial habitat condition in Big Cherry Creek, Fisher River, Bear, Cable, Midas, and West Fork Fisher creeks for bull trout does not necessarily translate to improving the overall integrated baseline conditions for bull trout. The Service has determined that despite an increasingly beneficial condition in Libby Creek habitat due to long-term sediment reductions, the overall situation for bull trout in Libby Creek is likely to degrade in the long-term.

Ramsey and Poorman Creeks. Bull trout populations in Ramsey Creek and Poorman Creek would benefit from long-term sediment reductions after temporary increases; however, conclusions regarding these two streams are complicated by predicted streamflow reductions during low flow conditions. Maximum baseflow reductions in Ramsey Creek of 2 percent would occur during operations, and would improve to a 1 percent reduction after closure. Maximum baseflow reductions in Poorman Creek would be 12 percent at a point that typically is dewatered at baseflow conditions near its confluence with Libby Creek and this effect would occur after mine closure. These conditions would increase low flow challenges to bull trout, including gaining access to the stream due to a seasonally dry lower reach, and result in modification of spawning and egg incubating habitats during baseflow conditions. As such, the baseline conditions of both creeks for baseflow is currently “functioning at risk” for bull trout (see Table 4) which would likely worsen to “functioning at unacceptable risk” for bull trout.

Although, the benefits of long-term decreased sediment inputs to all bull trout occupied streams in the Kootenai River Core Area portion of the action area would benefit bull trout and designated bull trout critical habitat, it could also benefit non-native brook trout, thereby increasing interspecific competition. Net impacts to Ramsey Creek and Poorman Creek could also be beneficial, except for the possibility of increased competition with brook trout in Ramsey Creek. Baseline condition in Ramsey Creek would improve with minimization measure implementation of long-term sediment reduction from a baseline “integrated” rating of “functioning at risk” (see Table 4). Likewise, baseline conditions in Poorman Creek would improve from a baseline “integrated” rating of “functioning at unacceptable risk”. However, for reasons previously outlined, the Service has determined that conditions in Ramsey and Poorman creeks for bull trout and bull trout habitat are likely to remain degraded.

Summary of Kootenai River Core Area Effects.

The Service has determined that short-term adverse effects due to sediment inputs are predicted to occur in several Montanore Project affected streams followed by long-term sediment reductions (see Table 6). However, the benefits of the predicted long-term sediment reductions are unlikely to be realized because of the following: 1) potential increased severity of impacts from short-term sediment increases on several small bull trout populations in the action area, 2) benefits accruing to non-native brook trout due to habitat degradation caused by stream flow depletions and warm water augmentation into Libby Creek, and 3) permanent streamflow reductions during low flow conditions as predicted in some action-area streams.

As a result of these anticipated impacts to streams affected by the Montanore Project as discussed above, the Kootenai River core area bull trout population is expected to be subjected to adverse impacts that are likely to slow the rate of survival and recovery of this core area population of bull trout. The local populations in tributaries of the Libby Creek drainage and other bull trout occupied streams in the action area that contribute to the core area population are likely to decline to a lower level and therefore decrease the numbers and reproduction of bull trout that sustain the current level of the core area. Without aggressive mitigation to offset these losses, it is likely they will become permanent thus increasing the challenge of survival and recovery of the Kootenai River core area bull trout population.

Lower Clark Fork River Core Area Overall Effects

The Service determined that the Lower Clark Fork River core area bull trout population will be adversely affected from the Proposed Action. Short-term adverse effects due to sediment inputs are predicted for East Fork Rock Creek and Rock Creek due to a proposed road closure project. Additionally, significant and permanent degradation to important local bull trout populations due to Montanore Project caused streamflow depletions will likely occur (see Table 5). Streamflow impacts (predicted by hydraulic models) are expected to permanently damage several streams including Rock Creek and East Fork Bull River; and Libby Creek. The hydraulic models (KNF BA 2013) predicted that these reductions in baseflow will occur and be at their worst near the end of the mining project and then persist permanently because mining activities will modify the existing ground water system that feeds the baseflow of the subject streams. By the time the mine closes, the damage to the groundwater system will be complete and only slight improvements are predicted to occur after that. Beneficial and detrimental impacts of the Proposed Action are discussed below for individual streams, and collectively for the Lower Clark Fork Core Area.

East Fork Rock Creek and Rock Creek (mainstem). Bull trout populations and designated critical habitat in East Fork Rock Creek and Rock Creek could benefit from long-term sediment reductions after temporary sediment load increases due to access changes to FSR 150A (road closure). As previously stated, reduced sediment loads in the action area streams may result in sediment baseline conditions for bull trout improving in the long-term following a short-term period (2 years) of increased sediment loads (see Table 6), however, the short-term adverse impacts to bull trout populations and their long-term effects cannot be overlooked.

Bull trout populations and designated bull trout critical habitat would be negatively impacted by predicted streamflow reductions during low flow conditions. Maximum baseflow reductions in East Fork Rock Creek of 9 percent would occur after mine closure and continue indefinitely (see Table 5). This impact would be significant as this reach supports the known existing spawning habitat for the resident bull trout in Rock Creek. This flow depletion impact would not be adequately mitigated by the long-term reduction in sediment input (KNF BA 2013). Maximum baseflow reductions in mainstem Rock Creek are predicted to be 8 percent and would occur after the mine closure phase (see Table 5). This predicted flow depletion would increase existing low flow challenges to bull trout, including gaining access to the upper portion of the stream due to seasonally dry reaches blocking spawning migrations. If predicted flow reductions were to increase the length, duration, or frequency of occurrence of the seasonally dry reaches, this might also decrease the probability of colonization by brook trout which reside in lower reaches of Rock Creek. Brook trout have not been reported to date in upstream portions of the drainage or in the East Fork or West Fork of Rock Creek. The seasonally dry reaches in Rock Creek are suspected as contributing to the absence of brook trout in East Fork Rock Creek (Salmon Environmental Services 2012).

The baseline condition for base flow condition in Rock Creek and East Fork Rock Creek of "functioning at unacceptable risk" for bull trout see (Table 4) would degrade during the initial Resource Evaluation Phase (two year period), then improve following minimization measure (BMPs) during the Construction and Operation Phases (about 20 years). Then at the mine Closure Phase predicted reductions in baseflow effects would cause the rating to degrade permanently.

West Fork Rock Creek - The Service has determined that detrimental impacts to bull trout and bull trout critical habitat in the West Fork Rock Creek would occur due to predicted streamflow depletions during low streamflow conditions (Table 4). The current rating for baseflows of "functioning at unacceptable risk" for bull trout (see Table 4) would be maintained or further degraded and will contribute to the overall "integrated" rating of "functioning at unacceptable risk." The reasons for this overall degraded situation have been previously outlined, above, and include reduced fish access to the stream and seasonal reductions in the quantity of habitat during critical life history stages (spawning, incubating, and rearing) of bull trout.

East Fork Bull River - The bull trout population and designated critical habitat in East Fork Bull River would be negatively impacted by predicted streamflow reductions during low flow conditions (Table 4). Current condition for baseflow is "functioning at risk for bull trout" (see Table 4). Maximum baseflow flow reductions in East Fork Bull River of 13 percent are predicted to occur after mine closure. The most seriously affected reach of the East Fork Bull River currently supports much of the bull trout spawning (and egg incubation) known to occur in the drainage, and the adverse impacts due to predicted flow depletions would extend downstream to the mouth through juvenile bull trout rearing habitats.

The overall "integrated" baseline condition for bull trout and bull trout habitat (including bull trout critical habitat) would remain in a condition of "functioning at risk" throughout the mine life and then degrade at the beginning of the mine Closure Phase (about year 24 of the project), to an integrated condition of "functioning at unacceptable risk" to bull trout. The change in condition is attributed to mine caused baseflow depletions in East Fork Bull River.

Summary of Lower Clark Fork Core Area Effects

The Service has determined that short-term adverse effects due to sediment inputs are predicted for East Fork Rock Creek and Rock Creek due to a proposed road closure project; longer term beneficial effects to habitat are then predicted to occur (see Table 6). Permanent degradation of habitat and decreased population levels of bull trout are likely to occur to important local bull trout populations in East Fork Rock Creek, Rock Creek and East Fork Bull River due to Montanore Project caused streamflow depletions.

As a result of these anticipated impacts to East Fork Rock Creek, Rock Creek and East Fork Bull River, the Lower Clark Fork River Core Area bull trout population is expected to be subjected to adverse impacts that are likely to slow the rate of survival and recovery of this core area population of bull trout. These two local populations (Rock Creek and East Fork Bull River) provide significant contributions of bull trout to the core area population and without off-setting mitigation the impacts to the local populations are likely to decline to a lower level and therefore decrease the numbers and reproduction of bull trout that help sustain the core area population at current levels. Without aggressive mitigation to offset these losses, it is likely they will become permanent thus increasing the challenge of survival and recovery of the Lower Clark Fork River core area bull trout population.

C. Species Response to the Proposed Action

Expected Response

The expected bull trout population response to the proposed mining operations is associated with impacts to the aquatic habitat and the resulting impacts to individual bull trout that inhabit action area streams in two bull trout core areas. The expected response to predicted baseflow depletions in a number of streams (notably, Libby Creek, Rock Creek and East Fork Bull River) would be decreased numbers of bull trout due to reduced reproduction and survival. This decreased bull trout population response would be expected to occur because of: 1) disruption (modification) of spawning sites through reduced size and diminished hyporheic flows through the gravels, resulting in spawning bull trout being forced to utilize less favorable spawning locations or locations with diminished capability (size and quality); 2) diminished water flow through gravels containing incubating bull trout eggs, causing reduced survival to hatching of bull trout eggs; and 3) diminished amount and quality of juvenile bull trout rearing habitat caused by reduced water flow through streambed substrates, resulting in reduced survival of juvenile bull trout.

Similarly, the expected response to additions of significant volumes of “warm” water to Libby Creek baseflows would be decreased numbers of bull trout due to reduced reproduction and survival. This decreased bull trout population response would be expected to occur because of: 1) disruption or delay of bull trout spawning in the affected stream reach through modification of stream water temperatures, resulting in spawning bull trout being forced to utilize less favorable spawning locations further upstream of the streamflow augmentation site, or forced to use spawning sites with diminished capability (size and quality); 2) modified water temperature of water flowing through gravels containing incubating bull trout eggs, causing reduced survival and/or untimely hatching of bull trout eggs; and 3) modified quality of juvenile bull trout rearing habitat caused by artificial warming of water flowing through streambed substrates, resulting in modified growth rates and reduced survival of juvenile bull trout.

The expected response to predicted short-term increases in sediment input from the proposed mining activities in a number of streams would be decreased numbers of bull trout in the affected streams and respective core areas. This negative population response would largely be attributable to reduced survival of incubating eggs and young (small) fish as increased sediment in the affected streams decreases egg survival and fills interstitial spaces in the substrate reducing volume and quality of juvenile bull trout rearing habitats. Increases in sedimentation affect incubation, emergence, and survival rates of eggs, fry, and juveniles. Fine sediment fills spaces between the gravel needed by incubating eggs and fry. Because bull trout eggs incubate about seven months in the gravel, they are especially vulnerable to fine sediment and water quality degradation (Fraley and Shepard 1989). Juveniles are similarly affected, as they also live on or within the streambed cobble (Pratt 1984).

The expected long-term response of bull trout populations to implementation of proposed Best Management Practices (primarily for reduction of sediment inputs to streams) would be increased bull trout numbers (except where brook trout are also present). The positive population response would be attributable to increased survival of incubating eggs and increased survival of all other life stages of bull trout as stream substrate conditions improve over existing conditions, thus benefitting feeding and sheltering capabilities of the affected streams. The expected response to predicted long-term improvement of stream habitat quality due to sediment reductions in streams with brook trout co-existing with bull trout would be decreased numbers of bull trout. It is anticipated, and as observed in Lower Clark Fork Core Area streams (Horn and Tholl 2011) brook trout and bull trout both respond proportionately to their representation in fish populations to improving stream conditions. Brook trout have a reproductive, hybridization, and possibly competitive advantage over bull trout, resulting in long-term replacement of some bull trout populations by brook trout. This negative bull trout population response has been observed in a number of core area streams that no longer harbor viable bull trout populations, but have been replaced by brook trout populations (for example, Pilgrim Creek, Elk Creek, South Fork Bull River, Martin Creek, and possibly Flower Creek). Warnock and Rasmussen (2013) conclude that regardless of the mechanisms at work in a stream aiding brook trout occupation (invasion), the result may be a biotic obstacle for recolonization by recovering native bull trout; and, that integrated efforts that strive to recover bull trout populations in areas currently dominated by brook trout would benefit from strategic removal programs if they are to have the highest chance of success.

In summary, the negative bull trout population responses would be attributed to reduced quantity and quality of spawning areas (baseflow depletions), disruption of hyporheic flows in spawning and egg incubation gravels (baseflow depletions), increased water temperature during spawning and egg incubation periods (Libby Creek due to water releases to the stream near the adit site), and to short-term increased sediment accumulations in streams (from mining related activities and road usage, construction and re-construction) in spawning, egg incubation, and rearing substrates. Since some of the affected bull trout populations are present in very low numbers or at risk for a variety of reasons, the expected response may be loss of persistence from portions of some drainages (Libby Creek).

Response to Catastrophic or Unexpected Events

Metals Effects

Waste rock, ore and tailings can be a source of elevated metals concentrations to aquatic ecosystems through metals dissolution, depending on mineralogy, storage conditions, water management, and water treatment. Within the Montanore deposit, low to moderate acid generation potential exists for waste rock (KNF BA 2013). Metals are not expected to cause toxicity to aquatic biota during any phase of mine operation. In the unlikely event that water with elevated metals concentrations did reach Libby Creek, toxicity could be increased due to low total hardness and low total alkalinity. Another potential source of heavy metal release to Libby Creek would be the tailings impoundment. The tailings would retain some residual metals after processing in the mill. If tailings seepage were to reach surface water, that water would carry dissolved metals and could cause elevated metal concentrations in Libby Creek. Based on the mineralogy of the waste rock and tailings, the Sampling and Analysis Plan, options for selective handling and backfill, the design criteria for the Tailings Storage Facility, and the treatment of all discharged water, the potential for exposure of bull trout or their designated critical habitat to concentrations of metals that would cause acute or chronic toxicity or elevated concentrations in sediment or biota would be negligible (KNF BA 2013). This is based on a low risk of exposure attributable to the mitigating measures included as the Proposed Action.

The vast majority of the tailings pipeline between the Libby Plant Site and the Tailings Storage Facility would be buried a minimum of 2 feet deep and would present no risk to bull trout. There would be two stream crossings and pumping stations, one along FSR 4781 at Ramsey Creek and one along FSR 278 at Poorman Creek. It is conceivable that the tailings pipeline would release tailings to Poorman Creek and Ramsey Creek and to Libby Creek via these two streams. In the context of Libby Creek and the Kootenai River Core Area, the significance would depend on the magnitude of the failure. In the event of a tailings line failure, tailings would fill interstitial spaces in the stream substrate creating an embedded, erosion resistant surface. The primary point of effect would be either Ramsey Creek or Poorman Creek from their respective pipeline crossings downstream to their confluence with Libby Creek. Depending on the time of year, a tailings leak could affect bull trout by entombing eggs or juveniles in the gravel or by affecting the quality of spawning habitat until it was removed either through remediation or natural flushing. Given the burial of the majority of the pipeline, the use of double-walled pipe, a leak detection system, additional containment, protective covering, sumps and isolation valves at stream at the stream crossings, the potential for exposure of bull trout to tailings or release of tailings to designated critical habitat has been reasonably minimized.

The risk of metals contamination or nutrient enrichment resulting from a tailings pipeline failure was considered minimized for the same reasons stated above. Potential impacts from the immediate release of dissolved metals or nutrients from the liquid component of the tailings slurry was considered minimal because it would amount to a short-term pulse that would be diluted within a short distance of the release.

Nutrient Effects

Potential inputs to streams that could reduce water quality as a result of the Proposed Action, other than suspended sediment which was addressed previously, are restricted to the Libby Creek watershed. Potential contaminants would be hazardous materials that would be used during operation, metals in drainage from waste rock, tailings, and the Libby Adit, and nutrients from blasting agents and sanitary facilities. The KNF BA (2013) determined that the potential for adverse effects to bull trout from reduced water quality would be negligible due to facilities design, waste rock and ore mineralogy, groundwater interception, and required water treatment to achieve effluent limits. The two exceptions are suspended sediment (addressed previously) and effect of the Proposed Action on stream water temperature (also previously addressed).

Potential impacts to bull trout due to changes to surface water quality relating to groundwater impacts would be negligible (KNF BA 2013). Any stream that would have reduced flow due to mine dewatering would have lower total dissolved solids (TDS) because there would be less deep bedrock groundwater entering the stream, although the change may not be measurable. Bedrock groundwater has a mean TDS of about 110 mg/L based on Libby Adit samples, whereas surface water typically has a low TDS of <50 mg/L, and often <20 mg/L. This would only occur where bedrock groundwater has a significant connection to streams. Regardless, TDS toxicity to freshwater fish, invertebrates, and algae has been documented to occur due to high concentrations of individual ions (KNF BA 2013), not a lack of TDS that is within the range of natural waters. Long after mining ceases when the groundwater cone-of-depression recovers to the point that groundwater flow would once again go from the mine to streams, any water that is exposed to the mine void and seeps into groundwater could contribute elevated concentrations of nutrients and metals to streams. However, this water would be subject to the beneficial influences of attenuation and dilution.

Riparian Areas Effects

Vegetation clearing and other disturbances are proposed under the Proposed Action. Riparian disturbance could have the following impacts to bull trout or bull trout habitat:

- Increased water temperature due to reduced shading;
- Reduced instream cover due to reduced input of large woody debris;
- Increased sediment inputs due to soil disturbance or reduced buffering capacity for sediment from existing roads or disturbances.
- Increased likelihood for channel migration and instability due to vegetation removal.

The majority of impacts under the Proposed Action would occur within the boundary of the mine facilities and would not impact fish bearing streams. The mine facilities would be fully contained with no surface water connection to area streams. Impacts within fish-bearing streams would occur at road and transmission line crossings. The potential impact of roads on sediment input to streams was previously addressed. Any ongoing impacts to shading and instream cover for existing roads would not be attributable to the Proposed Action, and would be negligible with regard to bull trout for new crossings of streams that do not support bull trout.

Possible impacts may occur to stream temperature and recruitment of organic matter and large woody debris for bull trout occupied streams from riparian disturbance at new road and transmission line crossings and widening of the right of way to accommodate mine and public use, such as on FSR 278. A new crossing would be constructed immediately upstream of the existing culvert on Poorman Creek, resulting in two crossings. The new crossing would require a maximum of 100 feet of riparian vegetation clearing on both banks of Poorman Creek. An additional crossing over Ramsey Creek would be placed at the location of a former crossing that was washed out. As such, riparian disturbance would be minimal compared to the existing condition. The transmission line would cross Fisher River, West Fisher Creek, and Libby Creek at one location on each stream. The nearest H-frame structure would be located 250 to 300 feet from these streams. Typically, trees would be cleared along a 200 foot wide corridor but shrubs and shorter vegetation would not be cleared. Transmission lines would be strung across the streams by helicopter. Possible impacts to bull trout and bull trout habitat resulting from these crossings and right of way widenings would be minor due to the small amount of habitat that would be impacted relative to the total stream lengths. Likewise, possible bull trout responses to these impacts would not be predictable and verification of accountable relationships of bull trout responses to the impacts would likely not be of measurable magnitude.

D. Effects of the Action to Designated Critical Habitat

Critical habitat is defined in section 3 of the Act "as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection; and specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species." To be included in a critical habitat designation, "the habitat within the area occupied by the species must first have features that are essential to the conservation of the species. Critical habitat designations identify, to the extent known using the best scientific and commercial data available, habitat areas that provide essential life cycle needs of the species (i.e. areas on which are found the primary constituent elements as defined at 50 CFR 424.12 (b))."

Action agencies authorizing activities within lands occupied by bull trout are mandated by the Endangered Species Act of 1973, as amended, to consider the environmental baseline in the action area and effects to bull trout that would likely occur as a result of management actions. To that end, agency biologists use the four biological indicators and the 19 physical habitat indicators in the bull trout matrix to assess the environmental baseline conditions (see Table 4) and determine the likelihood of incidental take per interagency guidance and agreement on section 7 consultation on the effects of actions to bull trout (USDI Fish and Wildlife Service 1998a). Analysis of the 19 Framework habitat indicators provides a very thorough analysis of the existing habitat condition and potential impacts to bull trout habitat. While assessing the environmental baseline and potential effects to bull trout as a species, agency biologists have concurrently provided a companion analysis of effects to the primary constituent elements (PCEs) for designated bull trout critical habitat and related habitat indicators (Appendix C). This companion analysis (known as the "crosswalk") is virtually the same analysis as the specific effects of the proposed action as shown in the preceding section, because the PCEs considered under critical habitat involve the same parameters analyzed in the matrix (see Table 4).

There is a strong relationship between PCEs and the "associated habitat indicators" for bull trout, which the Service uses to analyze site-specific impacts to the species at the project level. The Service examines the effects to individual PCEs based on the linkage between the PCEs and associated habitat indicators and any other factors pertinent to the project analysis (USDI Fish and Wildlife Service 2010a). In other words, bull trout critical habitat within the action area will be affected the same way and to the same degree as listed and discussed in the matrix and rationale sections above.

Kootenai River Basin Critical Habitat (Libby Creek, Bear Creek and West Fisher Creek)

Libby Creek

Libby Creek contains 24.2 miles of designated critical habitat (USDI Fish and Wildlife Service 2010a) (see Figure 14). In general, the Service anticipates activities associated with the proposed Montanore mining operation could potentially negatively impact the majority of PCEs of bull trout critical habitat in the Libby Creek drainage. It is anticipated that affected PCEs would not be destroyed or adversely modified so as not to function for bull trout, but instead the level of function would be diminished below baseline conditions to some degree, and would be permanent for baseflow depletion and water temperature increase impacts and temporary for sediment impacts (the duration of effects restricted to the 6 year road use and closure period).

Predictions of effects from baseflow depletions in Libby Creek would begin at the start of the Construction Phase (following year 2 of the project) and continue through the mine Post-Closure Phase and would continue indefinitely thereafter (see Table 5). Negatively affected PCEs include No. 1 (influences of subsurface water, hyporheic flows), No. 7 (natural hydrograph), and No. 8 (water quality and quantity). These effects represent a permanent adverse effect to bull trout critical habitat.

Increases in water temperature in Libby Creek are predicted to occur at the start of the Resource Evaluation Phase (year 1 of the project) and continue through the mine Post-Closure Phase and then continue indefinitely thereafter. Negatively affected PCE includes No. 5 (water temperature). This effect represents a permanent adverse effect to bull trout critical habitat.

Predicted increases in sedimentation in Libby Creek could cause degradation of PCE No. 6 (spawning and rearing substrate, see KNF BA 2013) and other PCEs to a lesser and undetermined extent (see Table 6). The increase in sedimentation and habitat degradation is anticipated to occur at the beginning of the Resource Evaluation Phase and continue for about 6 years until the beginning of the Operation Phase; then road closures are predicted to result in an improvement to the baseline condition thereafter by returning to or near baseline conditions. The effects on other PCEs as a result of increased (and temporary) sedimentation are difficult to discern.

Predicted beneficial effects of sediment control through application of BMPs and road closures are predicted to benefit nonnative brook trout in Libby Creek downstream of Libby Creek Falls. This negative effect will degrade PCE No. 9 (detrimental nonnative fish) beginning at the start of the Operations Phase (about year 6 of the project) and continue indefinitely thereafter (KNF BA 2013). Predicted beneficial effects to nonnative fish populations (PCE No. 9) will affect bull trout through interspecific competition, predation, and hybridization. These effects represent a permanent adverse effect to bull trout critical habitat.

Impacts associated with groundwater development, metals contamination, and catastrophic events also are inherent to a proposal of this magnitude and considered risks to proposed bull trout critical habitat. Such impacts are difficult to predict and are consequently not anticipated to occur by the Service. These potential impacts contribute to the overall risk to designated bull trout critical habitat in the Kootenai River Basin.

The specific effects of mining operations on designated critical habitat are virtually the same as those described in the preceding section, "Effects of the Action", because the PCEs considered under designated critical habitat involve the same habitat parameters such as influences of subsurface water, migration habitats, water temperature, spawning and rearing substrates, natural hydrograph, water quality and quantity. Consequently, those discussions and analysis of effects apply here; and therefore, will not be repeated. Impacts, should they occur, related to water quality and quantity because of the construction, operation, and post-Closure periods of the Montanore Project are primarily expected to adversely affect aquatic habitat (including designated critical habitat) and subsequently fish, aquatic macroinvertebrates, and plants by reducing habitat quantity, quality and diversity.

The expected designated bull trout critical habitat response to the mining operations is associated with impacts to the aquatic habitat and the resulting impacts to individual bull trout. Predicted permanent decreases in groundwater contributions to streamflow (PCE Nos. 1, 7, and 8) will result in decreased quantity of habitat, especially during baseflow conditions, affecting bull trout spawning, egg incubation, juvenile rearing, food and sheltering capabilities of the stream. Increased water temperatures (PCE No. 6) in Libby Creek (predicted to occur due to Mine Adit water supplementation to the stream) will result in decreased quality of habitat, especially during baseflow conditions, similarly affecting bull trout spawning, egg incubation, and juvenile rearing. Increased sediment from the proposed mining activities has potential to impact the habitat's ability (PCE No. 6) to support several life stages of bull trout within the action area during the proposed project. Increases in sedimentation affect incubation, emergence, and survival rates of eggs, fry, and juveniles. Fine sediment fills spaces between the gravel needed by incubating eggs and fry. Because bull trout eggs incubate about seven months in the gravel, they are especially vulnerable to fine sediment and water quality degradation (Fraley and Shepard 1989). Rearing habitat is similarly affected, as juveniles also live on or within the streambed cobble (Pratt 1984). To avoid these effects, the Proposed Action includes extensive sediment reduction minimzation (BMPs).

Given the existing degraded baseline condition of the watershed, depletion of baseflows, increased stream water temperature, an increase in sedimentation, and benefits to nonnative fish could adversely affect all designated bull trout critical habitat in Libby Creek. This will be the likely result because the habitat is located within or downstream of proposed sites of ground water depletions, warm water augmentation, sediment producing (and improving) activities, and areas where nonnative fish will benefit. Permanent impacts of baseflow depletions, warm water augmentation, and nonnative fish benefits are adverse impacts to most of the PCEs of critical habitat in the Libby Creek drainage.

Bear Creek

Bear Creek contains 8.2 miles of designated critical habitat (USDI Fish and Wildlife Service

2010a) (see Figure 14). In general, the Service anticipates activities associated with the proposed Montanore mining operation could measurably negatively impact at least one of the PCEs (No. 6) of bull trout critical habitat in the Bear Creek drainage. It is anticipated that other affected PCEs would not be destroyed or adversely modified so as not to function for bull trout, but instead the level of function would be diminished below baseline conditions to some degree, and would be temporary for sediment impacts (the duration of effects restricted to the 2 year road closure period).

Predicted increases in sedimentation in Bear Creek could cause degradation of PCE No. 6 (spawning and rearing substrate, see KNF BA 2013) and other PCEs to a lesser and undetermined extent. The increase in sedimentation and habitat degradation is anticipated to occur at the beginning of the Resource Evaluation Phase and continue for about 2 years until the beginning of the Construction Phase; then the road closure in Cable Creek (a tributary of Bear Creek) is predicted to result in an improvement to the baseline condition thereafter by returning to or near baseline conditions. The effects on other PCEs as a result of increased (and temporary) sedimentation are difficult to discern; however; long-term monitoring of habitat conditions and water quality parameters are likely to reveal any significant changes to these PCEs.

The specific effects of mining operations on designated critical habitat are virtually the same as those described in the preceding section, "Effects of the Action", because the PCEs considered under designated critical habitat involve the same habitat parameters such as influences of subsurface water, migration habitats, water temperature, spawning and rearing substrates, natural hydrograph, water quality and quantity. Consequently, those discussions and analysis of effects apply here; and therefore, will not be repeated. Impacts, should they occur, related to water quality and quantity because of the construction, operation, and post-Closure periods of the Montanore Project are primarily expected to adversely affect aquatic habitat (including designated critical habitat) and subsequently fish, aquatic macroinvertebrates, and plants by reducing habitat quantity, quality and diversity.

The expected designated bull trout critical habitat response to the mining operations is associated with impacts to the aquatic habitat and the resulting impacts to individual bull trout. Increased sediment from the proposed road closure in Cable Creek has potential to impact the habitat's ability (PCE No. 6) to support several life stages of bull trout within the action area during the proposed project. Increases in sedimentation affect incubation, emergence, and survival rates of eggs, fry, and juveniles. Fine sediment fills spaces between the gravel needed by incubating eggs and fry. Because bull trout eggs incubate about seven months in the gravel, they are especially vulnerable to fine sediment and water quality degradation (Fraley and Shepard 1989). Rearing habitat is similarly affected, as juveniles also live on or within the streambed cobble (Pratt 1984). To avoid these effects, the Proposed Action includes extensive sediment reduction minimization (BMPs). Predicted beneficial effects to nonnative fish populations (PCE No. 9) will affect bull trout through interspecific competition, predation, and hybridization.

Given the existing degraded baseline condition of the watershed, a temporary (2 years) increase in sedimentation could adversely affect about one half of the designated bull trout critical habitat in Bear Creek as critical habitat is located downstream of sediment producing activities in Cable

Creek.

West Fork Fisher Creek

West Fork Fisher Creek contains 8.3 miles of designated critical habitat (USDI Fish and Wildlife Service 2010a) (see Figure 13). In general, the Service anticipates activities associated with the proposed Montanore mining operation could potentially negatively impact some of the PCEs of bull trout critical habitat in the West Fork Fisher Creek drainage. It is anticipated that affected PCEs would not be destroyed or adversely modified so as not to function for bull trout, but instead the level of function would be diminished below baseline conditions to some degree, and would be permanent for sediment impacts (the duration of effects restricted to the 2 year road closure period) and for beneficial effects on nonnative fish.

Predicted increases in sedimentation could cause degradation of PCE No. 6 (spawning and rearing substrate, see KNF BA 2013) and other PCEs to a lesser and undetermined extent. The increase in sedimentation and habitat degradation is anticipated to occur at the beginning of the Resource Evaluation Phase and continue for about 2 years until the beginning of the Construction Phase; then road closures are predicted to result in an improvement to the baseline condition thereafter by returning to or near baseline conditions. The effects on other PCEs as a result of increased (and temporary) sedimentation are difficult to discern; however; long-term monitoring of habitat conditions and water quality parameters are likely to reveal any significant changes to these PCEs.

Predicted beneficial effects of sediment control through application of BMPs and road closures are predicted to benefit nonnative brook trout in West Fork Fisher Creek. This negative effect will degrade PCE No. 9 (detrimental nonnative fish) beginning at the start of the Construction Phase (about year 2 of the project) and continue indefinitely thereafter (KNF BA 2013). These effects represent a permanent adverse effect to bull trout critical habitat.

The specific effects of mining operations on designated critical habitat are virtually the same as those described in the preceding section, “Effects of the Action”, because the PCEs considered under designated critical habitat involve the same habitat parameters such as influences of subsurface water, migration habitats, water temperature, spawning and rearing substrates, natural hydrograph, water quality and quantity. Consequently, those discussions and analysis of effects apply here; and therefore, will not be repeated. Impacts, should they occur, related to water quality and quantity because of the construction, operation, and post-Closure periods of the Montanore Project are primarily expected to adversely affect aquatic habitat (including designated critical habitat) and subsequently fish, aquatic macroinvertebrates, and plants by reducing habitat quantity, quality and diversity.

The expected designated bull trout critical habitat response to the mining operations is associated with impacts to the aquatic habitat and the resulting impacts to individual bull trout. Increased sediment from the proposed mining activities has potential to impact the habitat’s ability (PCE No. 6) to support several life stages of bull trout within the action area during the proposed project. Increases in sedimentation affect incubation, emergence, and survival rates of eggs, fry, and juveniles. Fine sediment fills spaces between the gravel needed by incubating eggs and fry.

Because bull trout eggs incubate about seven months in the gravel, they are especially vulnerable to fine sediment and water quality degradation (Fraley and Shepard 1989). Rearing habitat is similarly affected, as juveniles also live on or within the streambed cobble (Pratt 1984). To avoid these effects, the Proposed Action includes extensive sediment reduction minimization (BMPs).

Given the existing degraded baseline condition of the watershed, a temporary increase in sedimentation, and the permanent benefits to nonnative fish could adversely affect all designated bull trout critical habitat in West Fork Fisher Creek. This is the likely result because the habitat is located downstream of proposed sediment- producing (and improving) activities and areas where nonnative fish will benefit. Permanent impacts of nonnative fish benefits are adverse impacts to all components of critical habitat in the West Fork Fisher Creek drainage.

Lower Clark Fork River Basin Critical Habitat (Rock Creek and East Fork Bull River)

Rock Creek

Rock Creek (including East Fork Rock Creek) contains 8.4 miles of designated critical habitat (USDI Fish and Wildlife Service 2010a) (see Figure 14). In general, the Service anticipates activities associated with the proposed Montanore mining operation could potentially negatively impact some of the PCEs of bull trout critical habitat in the Rock Creek drainage. It is anticipated that affected PCEs would not be destroyed or adversely modified so as not to function for bull trout, but instead the level of function would be diminished below baseline conditions to some degree, and would be permanent for baseflow depletion impacts and temporary for sediment impacts (the duration of effects restricted to the 2 year road closure and recovery period).

Predictions of effects from baseflow depletions would occur during the mine Closure Phase which begins at the end of operations (about 24 years in the future) and would continue indefinitely (see Table 5). Negatively affected PCEs include No. 1 (influences of subsurface water, hyporheic flows), No. 7 (natural hydrograph), and No. 8 (water quality and quantity). These effects represent a permanent adverse effect to bull trout critical habitat.

Increases in sedimentation could cause degradation of PCE No. 6 (spawning and rearing substrate, see KNF BA 2013) and other PCEs to a lesser and undetermined extent. The increase in sedimentation and habitat degradation is anticipated to occur during the first two years of the Resource Evaluation Phase and then result in an improvement to the baseline condition thereafter by returning to or near baseline conditions. The effects on other PCEs as a result of increased (and temporary) sedimentation are difficult to discern; however; long-term monitoring of habitat conditions and water quality parameters are likely to reveal any significant changes to these PCEs.

The specific effects of mining operations on designated critical habitat are virtually the same as those described in the preceding section, “Effects of the Action”, because the PCEs considered under designated critical habitat involve the same habitat parameters such as influences of subsurface water, migration habitats, water temperature, spawning and rearing substrates, natural hydrograph, water quality and quantity. Consequently, those discussions and analysis of effects apply here; and therefore, will not be repeated. Impacts, should they occur, related to water quality and quantity because of the construction, operation, and post-Closure periods of the Montanore Project are primarily expected to adversely affect aquatic habitat (including designated critical habitat) and subsequently fish, aquatic macroinvertebrates, and plants by reducing habitat quantity, quality and diversity.

The expected designated bull trout critical habitat response to the mining operations is associated with impacts to the aquatic habitat and the resulting impacts to individual bull trout. Predicted permanent decreases in groundwater contributions to streamflow will result in decreased quantity of habitat, especially during baseflow conditions, affecting bull trout spawning, egg incubation, juvenile rearing, food and sheltering capabilities of the stream (PCEs Nos. 1, 6, 7, and 8). Increased sediment from the proposed mining activities has potential to impact the habitat's ability (PCE No. 6) to support several life stages of bull trout within the action area during the proposed project. Increases in sedimentation affect incubation, emergence, and survival rates of eggs, fry, and juveniles. Fine sediment fills spaces between the gravel needed by incubating eggs and fry. Because bull trout eggs incubate about seven months in the gravel, they are especially vulnerable to fine sediment and water quality degradation (Fraley and Shepard 1989). Rearing habitat is similarly affected, as juveniles also live on or within the streambed cobble (Pratt 1984). To avoid these effects, the Proposed Action includes extensive sediment reduction minimization (BMPs).

Given the existing degraded baseline condition of the watershed, depletion of baseflows, and an increase in sedimentation could adversely affect all designated bull trout critical habitat in Rock Creek because the habitat is located downstream of proposed sediment producing activities and the habitat locations have been modeled to be affected by groundwater depletions. Permanent impacts of baseflow depletions are an adverse impact to all components of critical habitat in the Rock Creek drainage.

East Fork Bull River

Designated bull trout critical habitat occurring in the East Fork Bull River is shown in Figure 14. The total amount of designated critical habitat is 7.4 miles in the East Fork Bull River watershed.

In general, the Service anticipates activities associated with the proposed Montanore mining operation could potentially negatively impact some of the PCEs of bull trout critical habitat in the East Fork Bull River drainage. It is anticipated that affected PCEs would not be destroyed or adversely modified so as not to function for bull trout, but instead the level of function would be diminished below baseline conditions to some degree, and would be permanent for baseflow depletion impacts.

Predictions of effects from baseflow depletions would occur during the mine Closure Phase which begins at the end of operations (about 24 years in the future) and would continue indefinitely (see Table 5). Negatively affected PCEs include No. 1 (influences of subsurface water, hyporheic flows), No. 7 (natural hydrograph), and No. 8 (water quality and quantity). These effects represent a permanent adverse effect to bull trout critical habitat.

The specific effects of mining operations on designated critical habitat are virtually the same as those described in the preceding section, "Effects of the Action", because the PCEs considered under designated critical habitat involve the same habitat parameters such as influences of subsurface water, migration habitats, water temperature, spawning and rearing substrates, natural hydrograph, water quality and quantity. Consequently, those discussions and analysis of effects apply here; and therefore, will not be repeated. Impacts, should they occur, related to water quality and quantity because of the construction, operation, and post-Closure periods of the Montanore Project are primarily expected to adversely affect aquatic habitat (including designated critical habitat) and subsequently fish, aquatic macroinvertebrates, and plants by reducing habitat quantity, quality and diversity.

The expected designated bull trout critical habitat response to the mining operations is associated with impacts to the aquatic habitat and the resulting impacts to individual bull trout. Predicted permanent decreases in groundwater contributions to streamflow will result in decreased quantity of habitat, especially during baseflow conditions, affecting bull trout spawning, egg incubation, juvenile rearing, food and sheltering capabilities of the stream (PCEs Nos. 1, 6, 7, and 8).

Given the existing degraded baseline condition of the watershed, depletion of baseflows could adversely affect all designated bull trout critical habitat in East Fork Bull River because the habitat locations have been modeled to be affected by groundwater depletions (KNF BA 2013). Permanent impacts of baseflow depletions are an adverse impact to all components of critical habitat in the East Fork Bull River drainage.

VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act (50 CFR 402.14).

A. Cumulative Effects to Bull Trout

It is likely that ongoing and reasonably foreseeable actions on private lands within the action area include timber harvest, road building, subdivision, home site and septic system development, road construction and maintenance, riparian disturbance, streambank armoring, and water withdrawals (KNF BA 2013). Effects to fish habitat resulting from these practices include reduced channel stability, decreased habitat complexity, increased nutrient inputs, increased sedimentation, increased stream temperature, and reduced base flows. Although all of these activities are likely to occur, the amount and intensity on private land would not change the scope or magnitude of effects anticipated from this proposed action.

Private land in the area is primarily held by Plum Creek which operates under an approved Habitat Conservation Plan (HCP) for native fish. The other major holdings include the MMC properties and property owned by David Cleveland, John Cleveland, and Libby Placer Mining Company. The Montana Department of Natural Resources and Conservation Trust Land

Management Division developed a voluntary multi-species HCP with technical assistance from the Service that addresses forest management actions relating to timber harvest, roads, and grazing on State lands that are covered under the plan (MDNRC 2011).

Activities on other private lands in Libby Creek would include continued subdivision, well drilling, agriculture, grazing, timber harvest, and access development. Identifying the location and intensity of these activities is not possible; however, cumulatively they have the potential to affect bull trout and designated critical habitat but not to the extent that those impacts would be measurable. Activities on private land in Rock Creek and East Fork Bull River would likely include additional stream restoration efforts as part of ongoing mitigations for other projects. Those actions would likely provide a direct benefit to bull trout.

The Avista Utilities fish passage program is well-funded with full-time dedicated staff to implement the trap and transport of bull trout for the entire 45-year licensing period. The Avista program has identified and implemented habitat acquisition and restoration projects as funding allows. Cooperative efforts between Avista, Montana Department of Fish, Wildlife, and Parks, and local watershed groups are providing long-term habitat protection <u>on private lands</u> through land acquisition, conservation easements, and watershed restoration. Fragmentation of the historical migratory populations in the Lower Clark Fork River (LCFR) is considered the highest risk to bull trout. Recovery of the LCFR Core Area is dependent upon the success of upstream fish passage around Cabinet Gorge Dam, which has not yet happened with reliability. Both upstream and downstream fish passage programs funded by Avista Utilities provide a direct benefit to bull trout.

B. Cumulative Effects to Bull Trout Critical Habitat

Past private forestry practices and mining activities in the Kootenai River and Lower Clark Fork River Core Areas have degraded existing habitat, including bull trout critical habitat located on Libby Creek and its tributaries, West Fisher Creek, Rock Creek, and East Fork Bull River; however, habitat conditions are improving and these practices now consider potential impacts to aquatic habitat and incorporate best management practices (BMPs) and other minimization measures to avoid harmful effects. Other risks to critical habitat include environmental instability from landslides and rain on snow events, thermal barriers, and rural and residential development (MBTSG 1996). Residential development is anticipated to increase as more areas in the Lower Clark Fork River and Kootenai River Core Areas become populated, including the action area. Both commercial and residential development on private lands often occur along stream corridors, which could lead to stream channel alterations exacerbating water temperature, nutrient, and bank stability problems on downstream reaches of streams designated as critical habitat.

It is likely that ongoing and reasonably foreseeable actions on private lands within the action area include timber harvest, road building, subdivision, home site and septic system development, road construction and maintenance, riparian disturbance, streambank armoring, and water withdrawals (KNF BA 2013). Effects to fish habitat, including bull trout critical habitat, resulting from these practices include reduced channel stability, decreased habitat complexity, increased nutrient inputs, increased sedimentation, increased stream temperature, and reduced base flows. Although all of these activities are likely to occur, the amount and intensity on private land would not change the scope or magnitude of effects anticipated from this proposal.

VII. CONCLUSION

A. Jeopardy Analysis

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 (Appendix B). 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 interim recovery unit(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 BO in the Introduction section, the approach to the jeopardy analysis in relation to the proposed action follows a hierarchal relationship between units of analysis (i.e., geographical subdivisions) that characterize effects at the lowest level or smallest scale (local population) toward the highest level or largest scale (Columbia River Interim Recovery Unit) of unit of analysis. Table 1 shows the hierarchal relationship between units of analysis that was used to determine whether the proposed action, the Montanore Project, 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 would 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, then further analysis is warranted at the next higher scale.

The data and information provided in the biological assessment (KNF BA 2013) and provided to the Service to date suggests that predicted stream baseflow depletions, short-term increases in sediment input to bull trout streams, and "warm water" augmentation to Libby Creek at baseflow conditions may result in adverse impacts to individual bull trout, and bull trout local populations, and result in adverse effects to bull trout critical habitat. Successful and timely implementation of proposed BMPs for minimizing sediment input to action area streams have the potential to cause short-term adverse effects. However, in the long-term beneficial effects from sediment reduction to some individual bull trout streams in the Action Area are likely and therefore could benefit the affected bull trout local populations in both the Kootenai River Core Area and the Lower Clark Fork River Core Area if negative impacts from brook trout expansion do not offset the expected benefits.

Rock Creek Mine and Montanore Mine Impacts

As proposed and included in baseline conditions, when implemented the Rock Creek Mine is anticipated to adversely impact the majority of occupied bull trout habitat in the West Fork and mainstem of Rock Creek and to a lesser extent habitat in the lower section of the East Fork Rock Creek (only a few hundred yards of the East Fork are partially downgradient from the mill site) (USDI Fish and Wildlife Service 2007). Activities in the Rock Creek Mine action area associated with the proposed mining operation would likely result in some mortality related to expected degradation caused by sediment input of aquatic habitat including spawning habitat, rearing habitat, and food supply and the related risk to all bull trout life history stages. Sediment levels are likely to increase over the five year construction period and could reach a level to cause morphological channel changes (e.g., filling of pools, substrate embeddedness) that reduce the quality of rearing and foraging habitat for bull trout. During this same period, degradation in the quality of spawning habitat is likely due to deposits of fine sediment in spawning gravels. Increases in sedimentation (total and fine sediment), water quality degradation, and changes in channel and habitat complexity related to mining activities are anticipated to result in reduced egg, larval, and juvenile life history stages by impairing feeding, breeding and sheltering patterns of adult and juvenile bull trout.

Implementation of the Rock Creek Mine proposed action is likely to reduce somewhat the existing level of reproduction, numbers, or distribution of bull trout within Rock Creek for five to seven years. The Service concludes that the Montanore Project, when implemented, would cause minor degradation of the existing condition in the Rock Creek drainage during the initial Evaluation Phase due to increased sediment input over a two to four year period (KNF BA 2013). The Montanore Project is also predicted to cause adverse effects (due to baseflow depletions) to bull trout and bull trout critical habitat over the existing baseline conditions (including operation of the Rock Creek Mine) beginning at the conclusion of the Operating Phase of the mine. If the adverse effects caused by the Montanore Project occur simultaneously with adverse effects caused by operation of the Rock Creek Mine, the Service anticipates a further additive degradation of the existing condition in Rock Creek and likely greater effects to the local population which would likely decline in abundance, distribution, and reproductive potential.

Rock Creek

The proposed Montanore Mine is expected to cause degradation of existing habitat conditions in Rock Creek due to baseflow depletions at or near the end of the Operating Phase of the mine. Maximum baseflow reductions in East Fork Rock Creek of 9 percent and in the mainstem Rock Creek of 8 percent is predicted to occur after mine closure and be permanent. This would increase the existing low flow challenges to adult migratory bull trout because the baseflow depletions could impede access to some spawning reaches due to the chronically dewatered sections that occur each year. Adult migratory bull trout currently encounter passage restrictions in most years and these permanent reductions of baseflows could increase the stream length, duration, or frequency of the existing passage restrictions. This impact could be severe for the migratory component of bull trout and possibly inhibit some movement of resident fish. However, resident bull trout are generally smaller and therefore able to pass through narrower and shallower restrictions. The predicted maximum baseflow change and permanent loss of habitat availability (post-closure) in the Rock Creek drainage depending on stream reach is 8-9 percent. However, the actual change could be much greater or lesser because model predictions cannot capture all the real world complexities of the hydrogeological relationships between groundwater and surface water. Consequently, error margins can be quite wide with complex models.

Loss of spawning habitat (as measured at RC 2000, see Figure 9) is estimated at 8 percent and because spawning habitat is already limited in Rock Creek, these changes could equate to a measured percentage reduction in bull trout spawning success for migratory fish, but less pointed for resident fish. Furthermore, expected permanent reductions of juvenile and adult habitat, 4 percent and 3 percent respectively, could result in a small to moderate reduction in abundance and distribution when considering the likelihood of increased competition for food and escape cover.

The predicted reductions in available habitat by bull trout life stage mentioned above and as modeled from baseflow reductions imply negative impacts to spawning and juvenile bull trout survival to at least a portion of the local Rock Creek bull trout population. Permanent loss of this habitat would likely limit distribution of the existing juvenile population and reduce the current numbers of fish in the affected reaches. The migratory component of the local population may be severely impacted as late season (during baseflow conditions) access to spawning areas would be restricted to only those years with perennial flow adequate to provide enough water over riffle areas to pass these large fish. Generally, perennial flow events take place about 1 in 10 years; however, with climate change the annual interval period between perennial flow events may increase. The trend in redd counts of these adfluvial fish would be expected to decrease over time as a result, unless the migratory component can be supported by contributions from Avista's ongoing upstream transport program (see core area discussion below). The loss of habitat due to baseflow reductions in the East Fork Rock Creek is likely to negatively affect the spawning population of resident fish since the WUA data collection sites were located in or near spawning reaches where baseflow reductions were revealed. In turn, it is reasonable to expect a reduction in redds constructed by resident fish since available spawning habitat, as predicted, would be reduced.

In summary, based on the anticipated changes to baseline conditions of habitat and population characteristics due to reduced baseflow, the Service expects a decrease in the bull trout population inhabiting East Fork Rock Creek and mainstem Rock Creek. In general, for every 1 percent baseflow reduction, usable habitat availability is reduced 0.4 percent for adults, 0.5 percent for juveniles, and 1 percent for spawning. The East Fork Rock Creek population surveys (1992-2010) for bull trout show a bull trout density of about 0.023 fish per square yard. This density value is likely to decrease and assuming the maximum reduction of 9 percent is realized at mine closure, this value would decrease to 0.021 fish per square yard. This is likely an over-simplification because the relationship between habitat availability and bull trout distribution varies considerably due to reach-specific characteristics which make it too complex to accurately predict impacts to bull trout abundance. Nevertheless, the negative impact to this resident population is likely to be relatively small because this population is currently stable with consistent levels of observed bull trout, the majority of the affected spawning reach will remain intact, and the remaining primary habitat features appear adequate to maintain the biological mechanisms for self-regulation and persistence. The negative impact to the adfluvial component could be more severe because of the small number of adult returns (2-4) in any given year. Also, late season access to spawning areas of adfluvial fish may be impeded. Baseflow depletions are likely to exacerbate the annual chronic dewatering and in those few perennial flow years may shorten or eliminate the opportunities for migratory spawning adults to access upstream reaches in Rock Creek where higher quality spawning areas exist. Because these larger bull trout are more fecund than smaller fish, their contribution to the Rock Creek local population is disproportionately greater to their abundance. Elimination or diminishment of these larger fish lowers the potential growth rate and makes the population more vulnerable to other factors.

The Service anticipates an appreciable decline of the migratory component of the Rock Creek local population which would lower the current potential for recovery of this local population and would decrease the long-term survival of these migratory fish, unless the current Avista upstream transport program, as expected, maintains or improves the existing contributions to this adfluvial component of the Rock Creek population (see core area discussion below). In addition, the resident population could be at greater risk due to increased isolation and stochastic events in the watershed. However, the small reduction in available habitat and resulting population effects of the resident population is not expected to be appreciable and would likely remain stable and, although slightly lower in population size, similar to baseline conditions in terms of abundance, distribution, and reproductive success.

East Fork Bull River

The proposed Montanore Mine will cause further degradation of habitat conditions in the East Fork Bull River due to baseflow depletions at or near the end of the Operating Phase of the mine. Maximum baseflow reductions in East Fork Bull River is estimated at 13 percent and would occur after closure and be permanent. The predicted maximum potential reductions in the spawning habitat would range between 5 and 13 percent in the East Fork Bull River depending on stream reach. The reduced availability of spawning habitat, which is already limited under existing conditions, is likely to have negative impacts to spawning and juvenile bull trout survival. At post-closure the anticipated permanent change in baseline conditions would decrease in function for bull trout from “at risk” to “unacceptable risk” for the following: 1) average wetted stream width and maximum pool depth; 2) baseflow hydrology and flow timing characteristics; and 3) subsurface water connectivity and maintenance of the water table for springs, seeps, and groundwater upwelling.

Both migratory and resident bull trout utilize the East Fork Bull River, which supports the highest densities of bull trout in the Bull River drainage. The bulk of the spawning reaches that occur in the Bull River drainage occur in the East Fork Bull River. The greatest threat to this local population is non-native fish particularly brown trout, which spawn in the same reaches causing superimposition on bull trout redds that has likely been ongoing for years. A reduction in spawning habitat availability (as predicted) and habitat quality may facilitate non-native interspecific competition and negatively affect bull trout reproduction. Another major threat to the adfluvial component of this local population is lack of connectivity due to Avista’s Cabinet Gorge Dam which blocks returning adults from Lake Pend Oreille. However, Avista’s current upstream transport program mitigates for some of this impact.

The predicted permanent baseflow depletion and resultant decreases of spawning and egg incubation habitats in the East Fork Bull River will likely cause a negative impact to the local bull trout population. The affected spawning reach in the East Fork Bull River currently supports much of the bull trout spawning known to occur at this time. The current average number of redds per year (14.7) for adfluvial fish in the East Fork Bull River will likely decrease permanently. The actual decrease in numbers of spawners is difficult to ascertain, but with a predicted loss of 13 percent available spawning habitat, the current average redd count could decline proportionally all else being equal even though this is an oversimplification. Furthermore, the current average bull trout density of 0.013 per square meter would likely decline in the East Fork Bull River. The permanent loss of spawning habitat and adult habitat will likely cause a decline in abundance, distribution, and reproductive potential of this local population.

Lower Clark Fork River Core Area

The East Fork Bull River and Rock Creek are two of seven primary bull trout local populations that support the Lower Clark Fork River (LCFR) core area population. East Fork Bull River and Rock Creek contributed 21 percent and 9 percent, respectively, of the total bull trout PIT tag capture events for the combined data from Lake Pend Oreille tributaries and LCFR tributaries during 1998 and 2011. Currently, the East Fork Bull River and Rock Creek are the only bull trout spawning populations in the Cabinet Gorge reservoir reach in the LCFR. These two local populations represent the strongest populations in this reach and maintaining spawning and rearing success in these two local populations is essential to maintaining the existing survival status and potential for recovery of the LCFR bull trout core area population.

As indicated above and in the Effects section of this BO, baseflow depletions in the East Fork Bull River and Rock Creek will have permanent consequences to both of these bull trout local populations due to loss of habitat availability, particularly loss of spawning habitat. Also, these adverse effects are likely to be more severe to the adult migratory component of these local bull trout populations, which is the particular life history form that is emphasized in the draft bull trout recovery plan for purposes of recovery. As a result, there will be a loss of reproductive potential at the local level and a loss, although less acute, at the core area level because of the anticipated lower level of productiveness (fecundity) from these larger migratory fish, and to some degree a decrease in distribution due to increased difficulty of adult migratory bull trout accessing spawning areas in the Rock Creek drainage.

The Service anticipates a permanent decrease in recruitment from these two local populations, particularly the migratory component, which would negatively influence the recovery potential of the LCFR core area population. However, most of the available habitat (85-90 percent) for both local populations will be unaffected; consequently, the majority of the spawning areas for both populations will remain largely intact and useable. Furthermore, the distribution of bull trout in these watersheds is likely to stay about the same, with the exception of baseflow periods when available habitat would be limited to a smaller area (probably <10 percent) below baseline conditions. The expected decline in bull trout numbers is related to lower recruitment from these local populations due to poorer spawning success of migratory fish and resulting smaller numbers of fish reaching the juvenile life stage. The two juvenile populations will likely be reduced to some level below the current baseline, but not likely to be a substantial reduction because juvenile rearing habitat in the East Fork Bull River is not anticipated to be affected by baseflow depletions, and in Rock Creek a relatively small amount of juvenile rearing habitat (4 percent) would become unavailable. Therefore, the overall impact of a lower level of recruitment from current existing levels is not expected to have an appreciable effect on the LCFR core area population. Nevertheless, there is expected to be a small negative effect which will contribute to slow the rate of recovery of this core area population.

As indicated above, the negative impact from the mine's effects on the two local populations is not anticipated to increase to a level where it would "appreciably" reduce the reproduction, numbers, or distribution throughout the entire LCFR core area. Furthermore, five more primary spawning and rearing streams help support this core area population with smaller contributions from several secondary streams. In addition, fish passage is being addressed at the Avista dams which are currently the major threat to the LCFR core area population. The existing Avista upstream fish passage transport program of capturing and moving Montana origin migratory-sized adult bull trout pass the Avista dams has proven to be successful. This mitigation program will continue to transport 30 to 50 of these adult fish annually to LCFR Montana tributaries including the East Fork Bull River and Rock Creek. During 2001-2011, 89 transported adult bull trout were determined to be in spawning reaches during the spawning period in the East Fork Bull River, and 14 spawning bull trout were in Rock Creek during 2003-2011. It is anticipated that eventually (within 5 years) with newly constructed permanent fishways at the two Avista dams that the number of adult bull trout transported to Montana tributaries would increase significantly and the LCFR core area population will benefit with this major threat removed.

In summary, the LCFR core area population would experience a small but measured negative effect from the loss of recruitment from these two local bull trout populations, but not to the degree that it appreciably reduces the recovery potential of the core area. In addition, survival of bull trout would not be appreciably reduced because the core area population would continue to maintain all the necessary age classes, genetic heterogeneity, and number of sexually mature individuals to produce viable offspring and in stream environments that provide all the habitat requirements to complete bull trout life cycles and life history forms.

Libby Creek

The proposed Montanore Mine is anticipated to cause degradation of baseline habitat conditions at several locations throughout the Libby Creek drainage. The quality of the current overall habitat conditions in the Libby Creek watershed is functioning at unacceptable risk for bull trout as a result of land development, road construction, extensive timber harvest, and mining activities that have occurred along the mainstem and nearly all tributaries. The road activities associated with the proposed mining operations are predicted to cause short-term increases of sediment input followed by long-term decreases that are expected to improve baseline conditions. However, the short-term (2-4 years) increases may benefit non-native fish such as brook trout which may have a harmful effect on the already small bull trout population present in a few reaches and streams that are occupied in this drainage. It is probable that the expected long-term benefits may not be realized in time for the affected bull trout population, especially if the brook trout population expands rapidly.

As indicated above the water depletions and temperature changes in Libby Creek are likely to cause significant adverse effects that are permanent. Predicted maximum changes in spawning habitat in Libby Creek are expected to be a short-term 20 percent reduction in available spawning habitat followed by a permanent loss of 13 percent at mine closure. The impact to the isolated resident bull trout population in this area is likely to be a permanent decline in abundance due to decreased spawning success. The predicted increase in baseflows downstream of LB-300 due to mine adit inflows is likely to be negated to some degree if not entirely because of the increase stream temperature in the affected spawning reach. The addition of warm adit water to Libby Creek is likely to have a harmful effect on bull trout spawning success and egg incubation, which would result in a negative causal effect to the population of bull trout that is currently maintained at a low persistence level in Libby Creek.

Migratory (fluvial) bull trout in the Libby Creek drainage are present, but in very low numbers. Most spawn in Bear Creek and in other tributaries the presence of migratory fish are considered rare include Big Cherry, Cable, Midas, Poorman, and Ramsey creeks. The mainstem is primarily a migration/transport reach for these fish because spawning of adult migratory fish is not known to occur in the mainstem. Because these larger bull trout are more fecund than smaller fish, their contribution to the Libby Creek local population is disproportionately greater to their abundance and the absence of these larger fish lowers the potential growth rate and makes the local Libby Creek population more vulnerable to other factors.

Production is currently limited in most of the Libby Creek drainage with the exception of the upper reaches which has numerous spawning areas with resident fish above the barrier falls. Libby Creek above the falls and Bear Creek are probably the most resilient bull trout that occupy the entire Libby Creek watershed. The resident population of bull trout in Libby Creek is the component most exposed to the mine's effects as predicted in the KNF BA and discussed in this BO. A permanent reduction in spawning habitat availability (as predicted) is likely to cause a decline of this resident population due to poorer spawning success. The anticipated higher stream temperature in the spawning reach where these resident fish spawn will reduce the quality of the existing spawning habitat conditions and contribute to the decline of this resident population. The extent of the population decline is difficult to ascertain, and it could be highly variable from year to year. However, as expected, the poorer habitat conditions would occur for an extended period and likely facilitate non-native (brook trout) interspecific competition in spawning and rearing reaches below the barrier falls. The decline of the resident population due to less available and poorer quality spawning habitat above the falls and creation of poorer quality habitat in combination with an expanding non-native brook trout population below the barrier falls may have a detrimental effect on persistence and growth and survival of the resident population of bull trout in the upper reaches of Libby Creek. In turn, the decreased function of this habitat from existing baseline conditions is expected to have a negative impact on the potential for recovery of this local population.

Kootenai River Core Area

The Forest Service indicated that the Libby Creek local population has low to moderate significance in support of the Kootenai River core area population (USFS 2013). Libby Creek watershed is considered an important primary bull trout spawning and rearing stream and is one of the six watersheds that provide a fluvial life history (although limited) form and a resident life history form that supports the core area population. Five other bull trout primary spawning and rearing streams and several other smaller secondary streams contribute to the core area population with Quartz Creek the most heavily used spawning and rearing stream. Most of the bull trout in the Libby Creek drainage is distributed in tributaries to the mainstem Libby Creek with the exception of the upper reaches of Libby Creek. Bear Creek has on average has 12 redds which represent most of the fluvial population in the Libby Creek drainage. Migratory-sized bull trout have been observed on rare occasion in Big Cherry Creek, Midas Creek, Cable Creek, Poorman Creek, Ramsey Creek, and Granite Creek and most of these creeks are suspected of having small, patchy resident populations of bull trout.

As indicated above and in the Effects section of this BO, baseflow depletions in Libby Creek will have permanent consequences to the local resident bull trout population occupying the mainstem due to loss of habitat availability, particularly loss of a small portion of the available spawning habitat and degradation of the quality of spawning, incubating, and rearing habitat of these resident fish. As a result, there will be a loss of reproductive potential at the local level and a loss, although less acute, at the core area level because the core area population is supported by five other primary bull trout streams. It is likely that the resident bull trout population in Libby Creek above the barrier falls would continue to persist, although lower in abundance and reproduction. Several other tributary streams in the Libby Creek drainage are not expected to be affected by the mine as these bull trout (resident and migratory fish) would likely continue to provide a similar level of contribution as currently exists to the core area population.

The Service predicts the size of the resident population in the upper reaches below the barrier falls would diminish making the local population more vulnerable to stochastic events and reproduction of the resident population above the falls would diminish from lower spawning success due to increased stream temperature. However, we do not expect an appreciable reduction in abundance, distribution, and reproduction of bull trout at the scale of the Kootenai River core area population. At this scale we expect a negative effect on the potential for recovery due to a slowing of the rate of recovery because of the anticipated reduction of the resident bull trout population and the increased risk of the loss of genetic heterogeneity due to brook trout expansion in the drainage.

The Service has determined that implementation of the Montanore Project is not likely to appreciably reduce the survival and recovery of bull trout at the scale of either the Lower Clark Fork River or Kootenai River core areas, and by extension not likely to appreciably reduce the survival and recovery of bull trout at the Clark Fork River Management Unit or Kootenai River Management Unit levels and the larger scale of the Columbia River Interim Recovery Unit.

This determination is further supported by the following:

- The Clark Fork River Management Unit consists of major river drainages including the Blackfoot, Clark Fork, Swan, Flathead, and Bitterroot rivers. Bull trout populations still occupy their historic range in this Unit and in these watersheds and this would not change due to the proposed mine.

- Bull trout populations are considered strong in the South Fork Flathead, Blackfoot, and Swan rivers of the Clark Fork River Management Unit (USDI Fish and Wildlife Service 1998c) and trends in abundance of bull trout are apparently stable in these rivers.

- The Lower Clark Fork Core Area contains 308 of approximately 3,369 miles of key bull trout recovery habitat in the Clark Fork River basin upstream of Albenai Falls Dam (USDI Fish and Wildlife Service 2005b). As such, this core area contains a relatively minor portion (about 9 percent) of the important bull trout distribution in the Clark Fork River basin.

- Significant progress has been made in fish passage over the lower Clark Fork River Avista dams and several habitat restoration projects in the Lower Clark Fork Core Area have been implemented and more are likely in the near future.

- The Clark Fork River watershed is only 1 of at least 20 major watersheds forming the Columbia River basin, though it is amongst the largest (USDI Fish and Wildlife Service 2002b). This demonstrates the small fraction of bull trout abundance, reproduction, and distribution of the Columbia River basin bull trout represented by this core area.

- Lake Pend Oreille Core Area of the lower Clark Fork River system is at, or near, recovery goals of the Service's Draft Bull Trout Recovery Plan and the population is stabilized or increasing.

- Likewise, the Kootenai River watershed is only 1 of at least 20 major watersheds forming the Columbia River basin (USDI Fish and Wildlife Service 2002b). This demonstrates the small fraction of bull trout abundance, reproduction, and distribution of the Columbia River basin bull trout represented by this core area.

- Kootenai River Core Area of the Kootenai Management Unit contains 297 of approximately 347 miles of key bull trout recovery habitat in the Kootenai River basin within the boundaries of the United States (USDI Fish and Wildlife Service 2005b). Although the core area contains a major portion (about 86 percent) of the important bull trout distribution in the Kootenai River basin within the United States, major portions of the basin lie outside the U.S. in Canada. Aside from one spawning and rearing tributary in the United States, most important bull trout tributaries to Koocanusa Reservoir (adjacent core area to the Kootenai River core area) lie north of the international border. The entire headwaters of the Kootenai River have extensive migrations of bull trout from the U.S. to numerous watersheds in British Columbia for spawning and rearing. The White River, Skookumchuck Creek, St. Mary River, Elk River, Wigwam River, and Bull River are just some of the very important tributaries identified for a thriving population of bull trout in Koocanusa Reservoir (USDI Fish and Wildlife Service 2005b).

- Bull trout conservation is being implemented through Habitat Conservation Plans (HCP) in place on private land (Plum Creek Timber Company Native Fish HCP and Montana DNRC HCP) in both the Kootenai River and Lower Clark Fork River Core Areas.

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.” 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, including the Rock Creek Mine), the effects of the proposed mining operations, and the cumulative effects, it is the Service’s biological opinion that the actions of the Montanore Project, as proposed, are not likely to jeopardize the continued existence of bull trout, either directly or indirectly, in the wild. This conclusion is based on the magnitude of the project effects (to reproduction, distribution, and abundance) in relation to the listed population.

B. Conclusion for Designated Critical Habitat

Adverse Modification of Designated Bull Trout Critical Habitat Analysis

The adverse modification analysis focuses on the rangewide status of critical habitat, the factors responsible for that condition, and what is necessary for critical habitat to provide the necessary conservation value to bull trout (USDI Fish and Wildlife Service 2010a). Within the Columbia River basin, the Service has designated 32 critical habitat units (CHUs) as critical habitat for bull trout. The conservation role of bull trout CHUs is to support viable core area populations. The Montanore Project affects critical habitat in two CHUs, Kootenai River Basin and Lower Clark Fork River Basin. Within the Kootenai River Basin, the Montanore Project affects critical habitat in 1 of 8 core areas; and within the Lower Clark Fork River Basin, the Montanore Project affects critical habitat in 1 of 14 core areas.

The Proposed Action clearly predicts: permanent adverse impacts from baseflow depletions to designated critical habitat (Libby Creek, Rock Creek drainage, and East Fork Bull River); permanent adverse impacts from warm water supplementation to baseflow conditions in Libby Creek which is designated as critical habitat; short-term adverse impacts from sediment additions to habitats designated as critical habitat (Libby Creek, Bear Creek, West Fisher Creek, and Rock Creek drainage); and it also clearly predicts permanent adverse impacts to bull trout critical habitat caused by beneficial effects to nonnative fishes (Libby Creek, Bear Creek and West Fork Fisher Creek).

However, after reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed mining operations, and the cumulative effects, it is the Service's biological opinion that the actions as proposed, are not likely to destroy or adversely modify bull trout critical habitat. This conclusion is based on the magnitude of the project effects in relation to the designated critical habitat at the Columbia River basin scale. Guidance for analysis of designated critical habitat for bull trout was provided in the final rule (70 FR 56311) and in the Director’s December 9, 2004, memorandum and was promulgated in response to litigation on the regulatory standard for determining whether proposed Federal agency actions are likely to result in the “destruction or adverse modification” of designated critical habitat under Section 7(a)(2) of the Act (Appendix D). The Director’s December 9, 2004, memorandum outlines interim measures for conducting Section 7 consultations pending the adoption of any new regulatory definition of “destruction or adverse modification.” Consequently, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat. Critical habitat is defined in section 3 of the Act "as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical and biological features essential to the conservation of the species and that may require special management considerations or protection; and specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species."

As proposed, implementation of the Montanore Project is anticipated to negatively impact designated critical habitat in Libby Creek, Bear Creek, West Fisher Creek, Rock Creek and East Fork Bull River (and a number of less significant bull trout occupied streams without designated bull trout critical habitat) by diminishing the function of some of the PCEs due to baseflow depletions, increases in sedimentation, augmentation of warm water (Libby Creek), and enhancement of detrimental nonnative fish populations. Activities in the action area associated with the proposed mining operation would likely degrade aquatic habitat including: depletion of subsurface water flows, migration corridor modifications, food production capability, habitat complexity, stream water temperatures, spawning and rearing substrate, natural hydrograph, water quality and quantity, and increasing detrimental nonnative fish. The degraded critical habitat would affect all bull trout life history stages for the long-term (permanent) due to baseflow depletions, augmentation of warm water, and enhancement of detrimental nonnative fish, and during the short-term (2 – 6 years) due to sediment additions to streams. The short-term effects from sedimentation should subside and levels of sedimentation are expected to return to those observed before construction and improve in the long-term. Increases in sedimentation related to mining activities are anticipated to reduce the functional ability of critical habitat to a small degree below baseline conditions temporarily, for about 2 to 6 years associated with the Resource Evaluation and Construction Phases. The long-term effects from baseflow depletions, warm water augmentation, and detrimental nonnative fish are predicted to result in adverse effects, and are anticipated to permanently reduce the functional ability of the affected critical habitats to a significant degree. Some primary constituent elements in Libby Creek, Bear Creek, West Fork Fisher Creek, Rock Creek (including East Fork Rock Creek), East Fork Bull River are expected to be permanently "degraded" over existing conditions. However, the Service has determined that the degraded condition of some PCEs will not be to the extent that the critical habitat will not be able to support the viability of the respective Core Area bull trout populations (see below).

Kootenai River Basin Critical Habitat Unit

The Kootenai River Basin consists of 325 miles (523 km) of streams and 29,873 acres (12,089 ha) of lakes and reservoirs designated as critical habitat (USDI Fish and Wildlife Service 2010a). Anticipated impacts would be confined to the 24.2 miles of designated bull trout critical habitat in the Libby Creek drainage, 8.2 miles of designated critical habitat in Bear Creek, and 8.3 miles of designated bull trout critical habitat in West Fisher Creek. Therefore, by extension the overall impact on the abundance and quality of designated critical habitat in the Kootenai River Core Area and the Kootenai River Basin CHU would be small, and therefore, not likely to be appreciably affected. The following reasons are the basis for our conclusion:

- The function of designated critical habitat in the Kootenai River Basin would not be significantly reduced because none of the PCEs in Libby Creek, Bear Creek and West Fisher Creek would be eliminated. It is anticipated that at most, affected PCEs would be diminished functionally by a small degree.

- The Kootenai River Basin CHU consists of many streams and rivers occupied by bull trout and with hundreds of miles of designated critical habitat.

- The Kootenai River Core Area contains 269 miles of streams designated critical habitat for bull trout. As such, the value of designated critical habitat within the action area (Libby Creek = 24.2 miles, Bear Creek = 8.2 miles, and West Fisher Creek =8.3 miles) is relatively small (about 15.1 percent) compared to the designated critical habitat distribution in the core area.

- The Kootenai River watershed is only 1 of at least 20 major watersheds forming the Columbia River basin (USDI Fish and Wildlife Service 2002b).

- Critical habitat in the Kootenai River Core Area comprises 1.4 percent (269 stream miles) of the total Columbia River basin (19,729 stream miles) stream miles of critical habitat, and the combined critical habitat in Libby Creek, Bear Creek, and West Fisher Creek (40.7 miles) comprises about 0.2 percent of the total Columbia River basin stream miles of designated critical habitat.

- Bull trout conservation is being implemented through Habitat Conservation Planning and more plans are being developed on non-Federal ownership within the lower Kootenai River Core Area.

This demonstrates the relatively small amount of designated critical habitat distribution located in the Libby Creek, Bear Creek, and West Fisher Creek watersheds in comparison to the Kootenai River Core Area, and even smaller fraction when compared to the entire Columbia River Basin CHU or the Columbia Basin as a whole. Based on the small amount of designated critical habitat exposed to potential project effects in the Libby Creek, Bear Creek, and West Fisher Creek watersheds in relation to the Kootenai River Core Area and the fact that the impacted area will still support the PCEs, it is the Service's conclusion that the proposed action is not likely to destroy or adversely modify designated critical habitat of the Columbia River basin.

Clark Fork River Basin Critical Habitat Unit

The Clark Fork River Basin consists of 3,328 miles (5,356 km) of streams and 295,587 acres (119,620 ha) of lakes and reservoirs designated as critical habitat (USDI Fish and Wildlife Service 2010a). Anticipated impacts would be confined to the 8.4 miles of designated bull trout critical habitat in the Rock Creek drainage and 7.9 miles of designated bull trout critical habitat in the East Fork Bull River drainage. Therefore, by extension the overall impact on the abundance and quality of designated critical habitat in the Lower Clark Fork Core Area and the

Lower Clark Fork River CHU would be small, and therefore, not likely to be appreciably affected. The following reasons are the basis for our conclusion:

- The function of designated critical habitat in the Clark Fork River basin would not be significantly reduced because none of the PCEs in Rock Creek and East Fork Bull River would be eliminated. It is anticipated that at most, affected PCEs would be diminished functionally by a small degree.

- The Clark Fork River Basin CHU consists of major river drainages occupied by bull trout and with thousands of miles of designated critical habitat including the Blackfoot, Clark Fork, Swan, Flathead, and Bitterroot rivers.

- The Lower Clark Fork River Core Area contains 308 of approximately 3,369 miles of key bull trout recovery habitat in the Clark Fork River basin upstream of Albenai Falls Dam (USDI Fish and Wildlife Service 2005b). As such, this core area contains a relatively minor portion (about 9 percent) of the important distribution in the Clark Fork River basin.

- The Lower Clark Fork River Core Area contains 283 miles of stream designated critical habitat for bull trout. As such, the value of designated critical habitat within the action area (Rock Creek = 8.4 miles, East Fork Bull River = 7.9 miles) is relatively small (about 5.8 percent) compared to the designated critical habitat distribution in the core area.

- The Clark Fork River watershed is only 1 of at least 20 major watersheds forming the Columbia River basin, though it is amongst the largest (USDI Fish and Wildlife Service 2002a).

- Critical habitat in the Lower Clark Fork River Core Area comprises 1.4 percent (283 stream miles) of the total Columbia River basin (19,729 stream miles) stream miles of critical habitat, and the combined critical habitat in Rock Creek and East Fork Bull River (16.3 miles) comprises less than 0.1 percent of the total Columbia River basin stream miles of designated critical habitat.

- Significant benefits to bull trout populations in both Rock Creek and East Fork Bull River have been achieved in recent years by upstream and downstream fish passage programs for juvenile and adult bull trout at the lower Clark Fork River Avista dams. Several successful habitat restoration projects in the lower Clark Fork River basin have been implemented as well.

- Bull trout conservation is being implemented through Habitat Conservation Planning and more plans are being developed on non-Federal ownership within the Lower Clark Fork River Core Area.

This demonstrates the relatively small amount of designated critical habitat distribution located in the Rock Creek and East Fork Bull River watersheds in comparison to the Lower Clark Fork River Core Area, and even smaller fraction when compared to the entire Columbia River Basin CHU or the Columbia Basin as a whole. Based on the small amount of designated critical habitat exposed to potential project effects in the Rock Creek and East Fork Bull River watersheds in relation to the Lower Clark Fork River Core Area and the fact that the impacted area will still support the PCEs, it is the Service's conclusion that the proposed action is not likely to destroy or adversely modify designated critical habitat of the Columbia River basin.

VIII. 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 an intentional or negligent action or omission which creates the likelihood of injury to 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 the terms and conditions of this Incidental Take Statement.

The measures described below are not discretionary, and must be undertaken by KNF so that they become binding conditions of any contract or permit issued to any party, as appropriate, for the exemption in section 7(o)(2) to apply. The KNF has a continuing duty to regulate the activity covered by this incidental take statement. If the KNF fails to: 1) assume and implement the terms and conditions or, 2) fails to require any party, entity, or individual contracted to implement the action, or any part of the action, to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or 3) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, KNF must report the progress of implementing the action and mitigation measures and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(I)(3)].

The biological assessment (KNF BA 2013) and the effects analysis in this BO describe activities expected to occur during implementation of the proposed action that have potential to adversely affect bull trout to such an extent that incidental take is anticipated. Predicted stream baseflow depletions, short-term increases in sediment input to bull trout streams, and "warm water" augmentation of outflow of the Libby Adit Water Treatment Plant to Libby Creek at baseflow conditions is likely to result in adverse impacts to individual bull trout and depression of numbers in local populations. As previously mentioned, the decreased numbers of bull trout would likely negatively affect the survival and recovery at the local scale; however, the amount of incidental take is not anticipated to be of the magnitude to decrease survival to the extent it would eliminate bull trout altogether in any of the affected reaches. Nevertheless, the amount of incidental take, although unknown, is anticipated to cause a decline to a lower level of abundance below the existing baseline population in the affected reaches, but not to an extent that the remaining population is insufficient in size, representative age classes, genetic heterogeneity, and reproductive potential to complete all the requirements necessary to carry on the species life cycle. In turn, we expect the recovery potential of the affected local populations to decline to a lower level as well and result in slowing the rate of recovery due to the lowered population growth rates and negative impacts to genetic integrity.

The Service anticipates that take in the form of "harm" ("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") will result to bull trout from implementation of the Proposed Action. Both direct and indirect effects include modifications of bull trout habitat due to altered groundwater inflows to action area streams, increased sediment input to streams over the short-term (2 – 6 years), and due to augmentation of Libby Creek baseflows with relatively warm water from the Libby Adit Water Treatment Plant. These habitat modifications will affect bull trout spawning, egg incubation, and juvenile and sub-adult rearing habitat. The amount of take that may result from reduced habitat quantity and quality conditions is difficult to quantify for the following reasons:

It is difficult to determine how many bull trout occur in near vicinity of project impacts and the extent of incremental downstream effects from points of predicted flow depletions, sediment inputs, and warm water augmentation.

The effect of incremental decreases in certain habitats at baseflows may have greater or lesser effect on bull trout survival depending on specific use of the subject habitats; that is, a 10 percent reduction of spawning habitat or a 10 percent reduction in hyporheric flows through egg incubation gravels may impact the reproduction and survival of young bull trout more than by 10 percent.

Likewise, the effect of increased sediment input, for even a relatively short time-frame (2 – 6 years), will have varying effects on bull trout spawning and egg incubation survival (and larger local population survival and recovery) depending on the existing sediment loads in particular affected streams and the status of the bull trout and introduced species (brook trout) populations in those streams.

The effect of relatively long-term warm water flow augmentation to Libby Creek is difficult to quantify because of the varying degree of impact to overall water temperature at varying baseflow conditions over the years of impact. Additionally, the amount of reproduction (percentage of total) for the isolated Libby Creek bull trout population that occurs in the affected reach is unknown. The effect that warmer water temperatures will have on bull trout spawning is unknown, likewise the effect of warmer water temperatures on timing of bull trout spawning is unknown. If bull trout successfully spawn in the stream area influenced by warmer water, then the effects of warmer water on incubating eggs, timing of hatching, and ultimately on overall survival and recovery of bull trout is unknown.

For these reasons, the Service has determined that the actual amount or extent of the anticipated incidental take due to changes in habitat conditions in the affected streams is unquantifiable. In cases where we determine the level of take is unquantifiable, the Service uses surrogates to measure the amount or extent of incidental take, and whether the amount of take anticipated has been exceeded. In this biological opinion we use the extent and magnitude of predicted stream flow depletions, the extent and magnitude of anticipated warm water flow augmentation, and the extent and magnitude of expected sediment loading to measure the amount and extent of take.

A. Amount or Extent of Take Anticipated

The Service anticipates certain activities associated with the proposed mining operation would result in some incidental take of bull trout in the form of harm related to expected degradation of aquatic habitat conditions including spawning habitat, egg incubation habitat, juvenile rearing habitat and food supply and the related risk to bull trout life history stages. Predicted decreases in baseflows, changes in water temperature (Libby Creek), and increases in sedimentation related to mining activities are anticipated to adversely affect and likely result in a take of the egg, larval and juvenile life history stages by harming or impairing feeding, breeding and sheltering patterns of adult and juvenile bull trout.

The Service predicts that baseflow depletions in Libby Creek will begin during the Construction Phase and continue indefinitely after mine closure. Baseflow depletions in the Rock Creek drainage and in East Fork Bull River will be most severe at mine closure and are projected to continue indefinitely. The predicted “warm water” supplementation to Libby Creek by water additions from the Libby Adit Water Treatment Plant will begin during the Construction Phase and will last indefinitely. Impacts from increases in sediment input to a number of bull trout occupied streams will last 2 – 6 years beginning during the Evaluation Phase and continuing through the Construction Phase. Impacts associated with groundwater development, metals contamination, and catastrophic events also are inherent to a proposal of this magnitude and considered risks to bull trout. Although these later impacts are not expected, occurrence of such impacts is difficult to predict and could contribute to the overall risk to bull trout in the Kootenai River and Lower Clark Fork River Core Areas.

The amount of take expected in the action area watersheds is difficult to quantify because of 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 be masked by seasonal fluctuations in numbers and aquatic habitat modifications are difficult to ascribe to particular sources, especially in already degraded watersheds. In addition, the effects of management actions associated with some mining operations are largely unquantifiable in the short term and may only be measurable in the long-term effects to the species or population levels. However, where the effects can be measured and the amount of take quantified, the Service has identified particular approaches and metrics to measure those effects.

The amount of take that may result from implementation of the proposed action is difficult to quantify for the following reasons:

- The duration and magnitude of sediment delivery is a function of weather conditions and the effectiveness of the mitigation measures.

- The amount and location of sediment deposition depends on numerous factors (flow regime, size of stream, channel roughness).

- Losses to bull trout in any life stage may be masked by wide seasonal fluctuations in numbers of individuals present and increases in natural sediment.

- The varying degrees measures proposed by the KNF to minimize the delivery of additional sediment to bull trout habitat would likely be effective.

- If a change in brook trout/bull trout species composition occurs in certain streams, impacts of increased competition and or hybridization would be difficult to quantify with the current levels of information.

- The natural hydrograph of stream flow in several streams may be changed or shifted imperceptibly over time through interruption of groundwater flow that supports or contributes to natural peak and base flow duration, timing and magnitude.

Anticipated Take Due to Baseflow Depletions

As discussed above, the Service can use surrogates to measure the amount or extent of incidental take. In this biological opinion, the extent and magnitude of baseflow depletions will be used as a surrogate to determine the level of anticipated take that may result from the Proposed Action.

For the <u>Kootenai River Core Area</u>, and specifically for Libby Creek, the Service predicts (see Table 5) that stream flow during baseflow conditions would decrease 9.3 percent during the Construction Phase, 20.4 percent during the Operations Phase, 18.5 percent during the Closure Phase, and 13 percent decrease in baseflows would likely occur indefinitely. These predicted flow depletions would affect 13,186 feet of Libby Creek occupied by bull trout between the Cabinet Mountains Wilderness Boundary downstream to the Libby Adit Water Treatment Plant outflow point to Libby Creek (see Figure 3). The anticipated level of take is reflected in the stated values of baseflow depletions.

For Poorman Creek, the Service predicts (see Table 5) that stream flow during baseflow conditions would decrease 3.2 percent during the Construction Phase, 10.3 percent during the Operations Phase, 9.7 percent during the Closure Phase, and a 11.6 percent decrease in baseflows would occur into an indefinite future. These predicted flow depletions would occur in occupied bull trout habitat (predicted flow depletions were modeled at a point 1,069 feet upstream of the confluence of Poorman Creek with Libby Creek, see Figure 9) and would affect an unknown distance of Poorman Creek upstream of that point.

Potential baseflow reductions in other bull trout occupied streams in the action area, including Ramsey Creek, were considered to be negligible and beyond the capability and calibration of the predictive model (KNF BA 2013).

For the Lower Clark Fork River Core Area, and specifically for East Fork Rock Creek, the Service predicts (see Table 5) that stream flow during baseflow conditions would decrease 8.9 percent during the Post-Closure Phase and this baseflow depletion would occur into an indefinite future. At a minimum, these predicted flow depletions would affect 4,792 feet of East Fork Rock Creek, occupied by bull trout, located between the confluence of the East Fork and West Fork Rock and extending upstream to the RC-3 "Streamflow Impact Estimate Location" (see Figure 9). Impacts of streamflow depletions were not estimated for the stream reach located upstream of this location (KNF BA 2013), however, some level of impact would likely occur for some unknown distance upstream, potentially affecting another 12,067 feet of occupied bull trout habitat.

For the mainstem Rock Creek, the Service predicts (see Table 5) that stream flow during baseflow conditions would decrease 2.4 percent during the Closure Phase, and a 7.7 percent decrease in baseflows would occur during the Post-Closure Phase and into an indefinite future. These predicted flow depletions would intermittently occur, at some unknown level, in occupied bull trout habitat located within 28,008 feet of Rock Creek with perennial flow downstream of the confluence of the East Fork and West Fork Rock Creek.

For the East Fork Bull River, the Service predicts (see Table 5) that stream flow during baseflow conditions would have a maximum decrease of 1.9 percent during the Operation Phase, 4.3 percent during the Closure Phase, and a 12.9 percent decrease in baseflows would occur during the Post-Closure Phase and into an indefinite future. Predicted flow depletions, at levels less than the maximum estimates, are estimated at three sites on the East Fork Bull River. Therefore, predicted flow depletions at various levels at or less than the stated maximum values would occur in the 36,378 feet of occupied bull trout habitat of the East Fork Bull River.

While some baseline information exists to compare pre-project baseflow levels to predicted baseflow depletions caused by the Proposed Action, not all streams have long-term data sets for comparison. Some predicted baseflow depletions will occur relatively early in project development (Construction or Operation Phases for Libby Creek and Poorman Creek, respectively) while others will occur decades into project development (Operations to Post-Closure Phases for East Fork Rock Creek, Rock Creek, and East Fork Bull River). Establishment of appropriate numbers and locations of stream flow measuring stations will be necessary to establish when take has been exceeded. The longer the record of documented baseflow stream levels, the more accurate future determinations of the level of take will be. The development, approval, and early implementation of a stream flow monitoring plan will facilitate appropriate baseflow stream flow metrics to measure, detect, and evaluate each year to determine project-related changes to baseflow conditions. This information can be used to assess impacts and gauge whether the amount of incidental take is being exceeded and whether additional corrective actions are needed to address incidental take concerns (through principals of adaptive management).

Take will be exceeded if the measured level of baseflow depletions exceeds the predicted baseflow depletions described for each stream (see Table 5) and each "Streamflow Impact Estimate Location" (see Figure 9). Take will also be exceeded if the length of affected stream reach is more than that described for each affected stream.

Anticipated Take Due to Increased Flows and Warm Water Augmentation to Libby Creek

In this biological opinion, the extent and magnitude of warm water flow augmentation will be used as a surrogate to determine the level of anticipated take that may result from the Proposed Action. For Libby Creek, the Service predicts (see Table 5) that stream flow during baseflow conditions would increase 78.7 percent during the Construction Phase, 124.6 percent during the Operations Phase, 70.5 percent during the Closure Phase, and a 44.3 percent increase in baseflows would occur into an indefinite future. This increase in baseflows would be attributable to water inflow to Libby Creek (groundwater or surface water) from the Libby Adit Water Treatment Plant. The temperature of the discharge of mine and adit water during the Resource Evaluation, Construction and Operations Phases is expected to be between 56° and 65° F. This predicted flow augmentation of warm water (exceeding stream ambient water temperature during bull trout reproductive and rearing time periods) would affect 1,144 feet of Libby Creek from the Libby Adit Water Treatment Plant outfall downstream to Libby Creek Falls. No estimate of the magnitude of expected flow augmentation at baseflow conditions or water temperature influence downstream of Libby Creek Falls was provided in the KNF BA. It is anticipated that both factors (increased flow and increased water temperature) would be detectable and potentially affect bull trout for some distance downstream of the Libby Creek Falls.

Baseline information exists to compare pre-project streamflow levels and water temperatures with post-impact levels caused by the Proposed Action; however, the baseline should be updated prior to initiation of the Resource Evaluation Phase. Streamflow impacts are predicted to occur during the Construction Phase, which may begin two years after initiation of the Resource Evaluation Phase. The level of take will be determined by comparing baseline levels of baseflow in Libby Creek and flow levels of Libby Adit Water Treatment Plant outfall. Take will occur if measured outfall flows exceed the predicted volume in each respective mine phase. For water temperature, the level of take will be determined by comparing baseline and measured stream temperatures (above and below the outfall) with measured water temperatures from the Libby Creek Adit Water Treatment Plant outfall. The extent of take will be determined by measuring water temperatures at locations downstream of Libby Creek Falls selected to reflect the downstream extent of the warm water influence on stream water temperature. Take will be exceeded if water temperatures immediately downstream of the Libby Creek Adit Water Treatment Plant outfall exceed 2° F above ambient stream temperatures measured upstream of the outfall. Take will be exceeded for extended stream segments if stream temperatures immediately downstream of Libby Creek Falls exceed 2° F above ambient stream temperatures recorded upstream of the outfall.

Anticipated Take Due to Sediment Loading

As discussed above, the Service can use surrogates to measure the amount or extent of incidental take. In this biological opinion, the amount and duration of annual sediment loading (with BMPs) to each of the affected streams will be used as surrogates to determine the level of anticipated take that may result from sediment impacts (2013 KNF BA Appendix D) during the period of the proposed mine implementation.

The following summary of potential impacts was taken from a literature review on the effects of sediment on bull trout and their habitat (USDI Fish and Wildlife Service 2010b). The introduction of sediment in excess of natural amounts can have multiple adverse effects on bull trout and their habitat. The effect of suspended and deposited sediment beyond natural background conditions can be fatal at high levels. Embryo survival and subsequent fry emergence success have been highly correlated to percentage of fine material within the streambed. Low levels of suspended sediment may result in sublethal and behavioral effects such as increased activity, stress, and emigration rates; loss or reduction of foraging capability; reduced growth and resistance to disease; physical abrasion; clogging of gills; and interference with orientation in homing and migration. The effects of increased suspended sediments can cause changes in the abundance and/or type of food organisms, alterations in fish habitat, and long-term impacts to fish populations. No threshold has been determined at which fine-sediment addition to a stream is harmless. Even at low concentrations, fine-sediment deposition can decrease growth and survival of juvenile salmonids (Weaver and Fraley 1991, Weaver and White 1985, Furniss et al.1991).

Baseline information does exist to compare pre-project levels of both parameters (suspended and deposited sediment) with post-impact levels caused by the Proposed Action; however, the baseline should be updated prior to initiation of the Resource Evaluation Phase (the point at which increases in sediment input are predicted to occur). The amount of sediment delivered to the stream and the amount of fine sediment levels in spawning areas are reasonable biological predictors of project impacts. Habitat for bull trout degrades when a change in the amount and composition of sediment delivered to the stream results in such changes as reducing pool depth, filling of interstitial space, and causing channels to braid. When this happens, cover, food supply, reproduction, and security for bull trout are diminished. Levels of fine sediment deposited in spawning areas during sediment loading reflect the quality of spawning habitat since increasing fine sediment deposits reduces survival of bull trout embryos and fry, and therefore, negatively impacts productivity (Weaver and Fraley 1991, Weaver and White 1985, Furniss et al.1991, Bjornn and Reiser 1991, Tappel and Bjornn 1983, Bjornn et al. 1977, Bjornn et al.1974).

The amount of total sediment delivered to the streams from proposed project activities is expected to increase and peak during four years of the Resource Evaluation and Construction Phases, and the percentage of this total that constitutes fine sediment (less than 6.35 mm or .25 inches) is expected to increase as well. Both sediment parameters (total sediment and percent fines in spawning gravel) can be measured and changes detected by conventional substrate sampling methods during this period. Moreover, it is reasonable to expect to observe a measurable reduction in total sediment delivered to the stream and a reduction in fine sediment levels in spawning gravel within two years following specific project construction, assuming implementation of the proposed sediment abatement measures and BMPs continue throughout this period and are effective (Ketcheson and Megahan 1996). As a result, the duration of anticipated incidental take from sediment impacts is six years. Consequently, intensive post-construction annual sediment monitoring will be necessary for at least six consecutive years, and some reduced level of monitoring will be necessary for an additional thirty years, to assure the magnitude in fine sediment levels is declining and trending toward pre-project conditions or better (as predicted in the KNF BA 2013).

The level of take will be determined for individual affected streams by comparing annual predicted baseline levels of sediment (with BMPs) with predicted annual increases as modeled in the road sediment assessment (2013 KNF BA, Appendix D), and then with predicted annual decreases in sediment loading, through time (Year 1 through Year 30). Take will be exceeded if annual baseline level increases go beyond the predicted levels in any given year or if annual predicted decreases are not achieved as modeled for each stream in the road sediment assessment (Year 1 through Year 30). Take will also be exceeded if the predicted baseline level increases exceed the duration (exceed the number of years) of the modeled increases. Since model predictions can have wide margins of error, allowance can be applied of ± 10 percent of the predicted values and duration of increased sediment loading of no more than one year than predicted. Montanore Project related increases in sediment input and expected duration of that increased sediment input are predicted for Libby Creek (2 years), Big Cherry Creek (4 years), Bear Creek (2 years), Cable Creek (2 years), Midas Creek (2 years), Poorman Creek (2 years), Ramsey Creek (4 years), Fisher River (4 years), West Fisher Creek (2 years), Rock Creek (2 years), and East Fork Rock Creek (2 years). The Proposed Action will not affect sediment input to the East Fork Bull River. The extent of sediment input impact within a particular stream will be determined through appropriate location and number of monitoring stations.

Mitigation measures are expected to be effective to reduce sediment loading; however, it is difficult to predict how effective the measures will be and how much change in substrate composition will affect survival for bull trout or any salmonid (Weaver and Fraley 1991, Chapman 1988). Consequently, collecting accurate baseline information before construction of sediment causing project features is essential for more accurate comparison purposes and will be required as part of the Fisheries Monitoring Plan (see Terms and Conditions, Appendix E). The duration and periodicity of sediment monitoring through the life of the mine should follow the road sediment assessment (2013 KNF BA, Appendix D) during the development of the Fisheries Monitoring Plan, see below, to determine and verify initial increased sediment levels and to document the predicted long-term decrease in sediment levels attributable to the Proposed Action (sediment reduction BMPs).

The development and approval of the Fisheries Monitoring Plan (see Terms and Conditions, Appendix E) will incorporate appropriate sediment/substrate metrics to measure, detect, and evaluate each year project-related changes in habitat conditions that can be related to changing population parameters. In turn, this information can be used to assess impacts and gauge whether the amount of incidental take is being minimized as anticipated and whether additional corrective actions are needed to address incidental take concerns (through principals of adaptive management). In this biological opinion, incidental take from potential sediment impacts has been assessed based on the best technical information available; however, through the development of the Fisheries Monitoring Plan, there may emerge a better means to calculate this incidental take or to refine this approach to better reflect the potential impacts. Because the Service will participate (in an advisory role) in the development and approval of this Plan, the Service may re-evaluate this assessment in this incidental take statement based on new technical information to help better refine its incidental take assessment and to ensure that sediment impacts are being minimized accordingly.

B. Effect of the Take

Through the analysis in this biological opinion, the Service has determined that this level of anticipated take is not likely to result in jeopardy to bull trout by this project, as proposed.

C. Reasonable and Prudent Measures

The KNF BA (2013, Appendix A) Proposed Action includes a Bull Trout Mitigation Plan that contains specific and conceptual mitigation measures intended to offset projected adverse effects to bull trout including incidental take as a result of implementation of the proposed Montanore Project. As previously stated, the Service has determined that some measures of the proposed Plan (as described in the 2013 KNF BA) - that is, certain elements of the Bull Trout Mitigation Plan - are unlikely to be implemented or unlikely to be implemented in a timely manner. Therefore, to avoid the uncertainty that measures in the Plan would not be implemented in a timely manner the Service includes these proposed mitigation measures in this Incidental Take Statement as Reasonable and Prudent Measures along with the associated Terms and Conditions (see Appendix E). We expect that the KNF would implement these minimization measures as they become binding conditions of any contract or permit issued to any party, as appropriate, for the exemption in section 7(o)(2) of the Act to apply.

The KNF proposed Bull Trout Mitigation Plan consists of 27 "measures to offset bull trout population and critical habitat impacts in the Kootenai River and Lower Clark Fork River core areas". The Plan also contains a "conceptual bull trout mitigation plan" which outlines proposed mitigation projects that are intended for further evaluation, assessment, and planning stages prior to implementation. The Reasonable and Prudent Measures identified below (and their following Terms and Conditions, Appendix E) were based on the KNF proposed Plan; the significant exception occurs in KNF proposed mitigation for bull trout in Libby Creek.

The Service has determined the following Reasonable and Prudent Measures are necessary and appropriate to minimize the incidental take of bull trout:

1. Identify and implement, in a timely manner, means to minimize predicted adverse project effects to bull trout in the action area (within the Kootenai River and Lower Clark Fork River core areas) of the proposed Montanore Project. Identify an adaptive management plan/process as a means to use new information to make changes to minimization measures to assure and verify that the specified level of incidental take associated with the Montanore Project is not exceeded.

2. Monitor activities associated with the proposed action: to ensure that all specified project activities comply with Best Management Practices described as Proposed Actions in the KNF BA (2013) and to required terms and conditions of this biological opinion (see Appendix E).

D. Terms and Conditions

The KNF BA (2013) (Appendix A) Proposed Action includes a Bull Trout Mitigation Plan that proposes specific mitigation measures that could minimize the take of bull trout resulting from adverse effects of predicted water depletions, predicted increased water temperatures in Libby Creek, and predicted increases in sediment. Each mitigation measure is proposed with specific timing for implementation related to dates of KNF authorization of particular mine phases of the Montanore Project. The timing of mitigation implementation is related to uncertainties in determining mitigation measure feasibility and to determining achievement and documentation of biological success of mitigation actions. However, some statements in the KNF's Bull Trout Mitigation Plan text suggest that timing of mitigation measures or prioritization of measures could be dependent upon further studies (hydrology and modeling studies). The Service has determined that timing of implementation measures to minimize take should most appropriately be linked to feasibility assessments and verification of success, rather than to further studies. The Service has further determined that because of the qualifying statements, it is unlikely that KNF's Bull Trout Mitigation Plan will be implemented in its entirety and unlikely to be implemented in a timely manner and therefore cannot be considered to minimize the effects of the proposed action in this BO.

The Terms and Conditions of this BO (see Appendix E) are intended to do the following: 1) clarify commitments and timing regarding implementation of measures contributing to minimization of incidental take of bull trout (and other details) proposed in the KNF BA (2013), 2) focus appropriate monitoring activities to assure the success of projects to minimize take, and 3) verify that the specified level of take is not exceeded and allow changes to mitigation projects as new information is collected. In addition, several minor modifications to timing of the KNF Proposed Action are included to account for minimization of take measures determined to be necessary by the Service (especially pertaining to proposed mitigation measures identified to offset adverse impacts to bull trout predicted to occur in Libby Creek).

In order to be exempt from the prohibitions of section 9 of the Act, KNF shall comply and shall require MMC to comply with the Terms and Conditions in Appendix E in this BO and which implement the Reasonable and Prudent Measures, described above. These Terms and Conditions are non-discretionary.

IX. 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 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.

1. The Service recommends the FS update the Bull Trout Conservation Strategy USFS (2013) as needed throughout the duration of implementation of the proposed Montanore Mine and as long afterward as the effects of the project continue to occur to affected

streams reaches. Updates should capture changes to baseline parameters including habitat conditions and population characteristics as soon as possible.

2. The Service recommends the FS support efforts under the Draft Bull Trout Recovery Plan (and Final when completed) for the affected core area populations, specifically the Kootenai River and Lower Clark River Fork core area populations.

X. REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the request. 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 addition, KNF will need to reinitiate consultation if (5) the term of the KNF authorization issued to MMC to develop, operate, close the Montanore Project exceeds 25 years; (6) KNF's assessment of the Fisheries Monitoring Plan results indicates that the estimated level of take will exceed the amount authorized in the incidental take statement for this biological opinion; and/or (7) if the Service does not agree with the manner or timeliness of mitigation measure development (above). In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. The Service retains the discretion to determine whether the conditions listed in (1) through (7) have been met and re-initiation of formal consultation is required. In instances where the amount or extent of incidental take is exceeded re-initiation of consultation is required. The Service retains the discretion to determine whether the conditions listed in (1) through (7) have been met and re-initiation of formal consultation is required. In instances where the amount or extent of incidental take is exceeded re-initiation of consultation is required.

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APPENDIX A. U.S. FISH AND WILDLIFE SERVICE ASSESSMENT OF THE BULL TROUT MITIGATION PLAN (KNF BA 2013)

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

INTRODUCTION

The KNF BA (2013) proposes mitigation for impacts of the Montanore Project to bull trout and designated bull trout critical habitat (Appendix A in KNF BA 2013). As stated in Section II. C. of this BO, the Service appreciates the cooperation in preparing this document and applauds the applicant's commitment and intent to mitigate for adverse impacts through the measures identified in the Plan. However, even though the Service collaborated with KNF and Montanore Project staff (applicant) and consultant regarding development of this Bull Trout Mitigation Plan (Plan), as proposed in the KNF BA, the Service has determined the Plan would not be implemented in its entirety and in a timely fashion for the main reason stated below.

The Service has determined that implementation of the Plan is uncertain due to the qualifying statements in the BA that condition implementation of certain elements of the Plan upon completion of a further hydrologic assessment that will determine the extent of predicted streamflow depletions. As a result, some elements of the Plan may be implemented while other elements of the Plan indicate the "intent" to implement, but implementation may be based on forthcoming information in the future. The effects analysis in this BO (Section V) is not based on what might occur, but rather on those mitgation measures in the BA and Plan that the Service has determined are reasonably certain to occur and are expected to be completed based on the information provided (KNF BA 2013).

The future hydrologic assessment and modeling effort that is proposed to be conducted during the Resource Evaluation phase would supercede the previous three modeling efforts and provide another prediction which would have to be analyzed for its effects on bull trout and bull trout critical habitat. The Service acknowledges the Plan's adaptive management approach of using improved information when it becomes available either through monitoring or future modeling to make a better informed decision regarding appropriate mitigation. Furthermore, the Service can address this occurrence should it happen in the future. This process would likely require re-initiation of Section 7 consultation, a new jeopardy analysis and preparation of a revised BO. Likewise, the contingency mitigation described below, is proposed by KNF for "significant impacts" to bull trout; such effects would have to be reanalyzed by the Service through the ESA consultation process.

The Service analyzed the effects of implementing the Plan as proposed and discusses deficiences in the Plan because the Service views the Plan, <u>if modified</u>, as having the potential to reduce impacts ("incidental take") to bull trout from the Montanore Project's adverse effects. The Service review of the objectives of the proposed bull trout mitigation measures indicate that a number of conservation actions in the long-term would fully offset projected impacts from the Montanore Project to bull trout populations and bull trout critical habitat, including impacts initially determined to be minor or negligible (and risk of adverse impacts from catestrophic events). Bull trout mitigation was designed to increase resident and migratory populations in the two potentially impacted bull trout core areas; Lower Clark Fork River and Kootenai River. To this end, the Service has determined that projects were selected that are likely to maintain, create or improve self-sustaining local bull trout populations in stream reaches where they occurred historically but are currently absent, occur at low population densities, are at risk of invasion by non-native fish species, or are at risk of being detrimentally impacted by the proposed mining activities.

Regarding impacts from sediment that would potentially enter streams due to current or proposed use or construction of roads or facilities, or disturbance resulting from other mitigation projects would be mitigated through road access changes under the Wildlife Mitigation Plan and through use of BMPs. Relative to existing sediment input, for the Lower Clark Fork River Core Area and Kootenai River Core Area, there would be a net increase in sediment for two to four years, depending on the stream, followed by a long-term (foreseeable future) decrease for all bull trout occupied streams in the Action Area, with the exception of East Fork Bull River. The Proposed Action would not impact sediment inputs to East Fork Bull River.

Bull Trout Mitigation Plan (Plan Overview)

The Plan was based on the following KNF conclusions (bulleted items below) regarding anticipated impacts to bull trout and bull trout critical habitat. Specific mitigation measures were identified in the BA that were expected to reduce those impacts (for example, BMPs to reduce sediment input to streams). Other mitigation measures were identified in the Plan that would monitor and assist in correcting deficiencies in mitigation measures (for example, the Fisheries Monitoring Plan identifies sediment monitoring in affected streams as a task).

- Proposed bull trout mitigation (Plan, Appendix A in KNF BA 2013) was designed by KNF to account for potential impacts in the Libby Creek drainage, some of which were determined to be minor or negligible. This includes risks of adverse impacts due to changes in water quality, water temperature, riparian areas, and fish passage (other than impacts relating to potential changes to streamflow, see below), and benefits to non-native fish species. This includes the risk of a release of tailings, which would also be partially mitigated in Ramsey Creek, Poorman Creek, and Libby Ceek by the net long-term sediment reduction in each of these streams that would result from the use of BMPs and road access changes under the Wildlife Mitigation Plan (KNF BA 2013).
- Proposed KNF bull trout mitigation (Plan, Appendix A in KNF BA 2013) primarily addresses potential impacts that would occur if predicted streamflow reductions during low flow conditions were to occur (significant reductions in baseflow for some streams were estimated from hydrologic ground water modeling results). When pertaining to streamflow changes, short-term is defined as occuring during the construction, operations, or closure phases, long-term is defined as persisting for centuries after the closure phase (KNF BA 2013).
- The KNF concluded that streams that have designated bull trout critical habitat in the Action Area would potentially benefit from long-term decreases in sediment inputs, with the exception of East Fork Bull River, which would not be impacted by sediment that would be attributable to the Proposed Action. Conversely, designated critical habitat would be permanently (long-term) adversely impacted by predicted streamflow reductions during low flow conditions.

Proposed Action (Bull Trout Mitigation Plan)

The objectives of proposed bull trout mitigation measures (the Plan) are to establish a number of conservation actions that in the long-term will fully offset projected impacts, including impacts initially determined to be minor or negligible (and risk of adverse impacts from catestrophic events) from the mine project to bull trout populations and bull trout critical habitat. Bull trout mitigation was designed to increase resident and migratory populations in the two potentially impacted Core Areas; Lower Clark Fork River and Kootenai River. To this end, projects were selected that are likely to maintain, create or improve self-sustaining local bull trout populations in stream reaches where they occurred historically but are currently absent, occur at low population densities, are at risk of invasion by non-native fish species, or are at risk of being detrimentally impacted by the Montanore Project (BO Appendix A, Figure 1). As stated above, the Service gas assessed that it is unlikely that mitigation measures identified in the KNF Bull Trout Mitigation Plan will be implemented in a timely way to address the impacts to stream flows in the action area. Therefore, it is uncertain that any of the proposed mitigation projects on streams listed below would be implemented in a timely fashion.

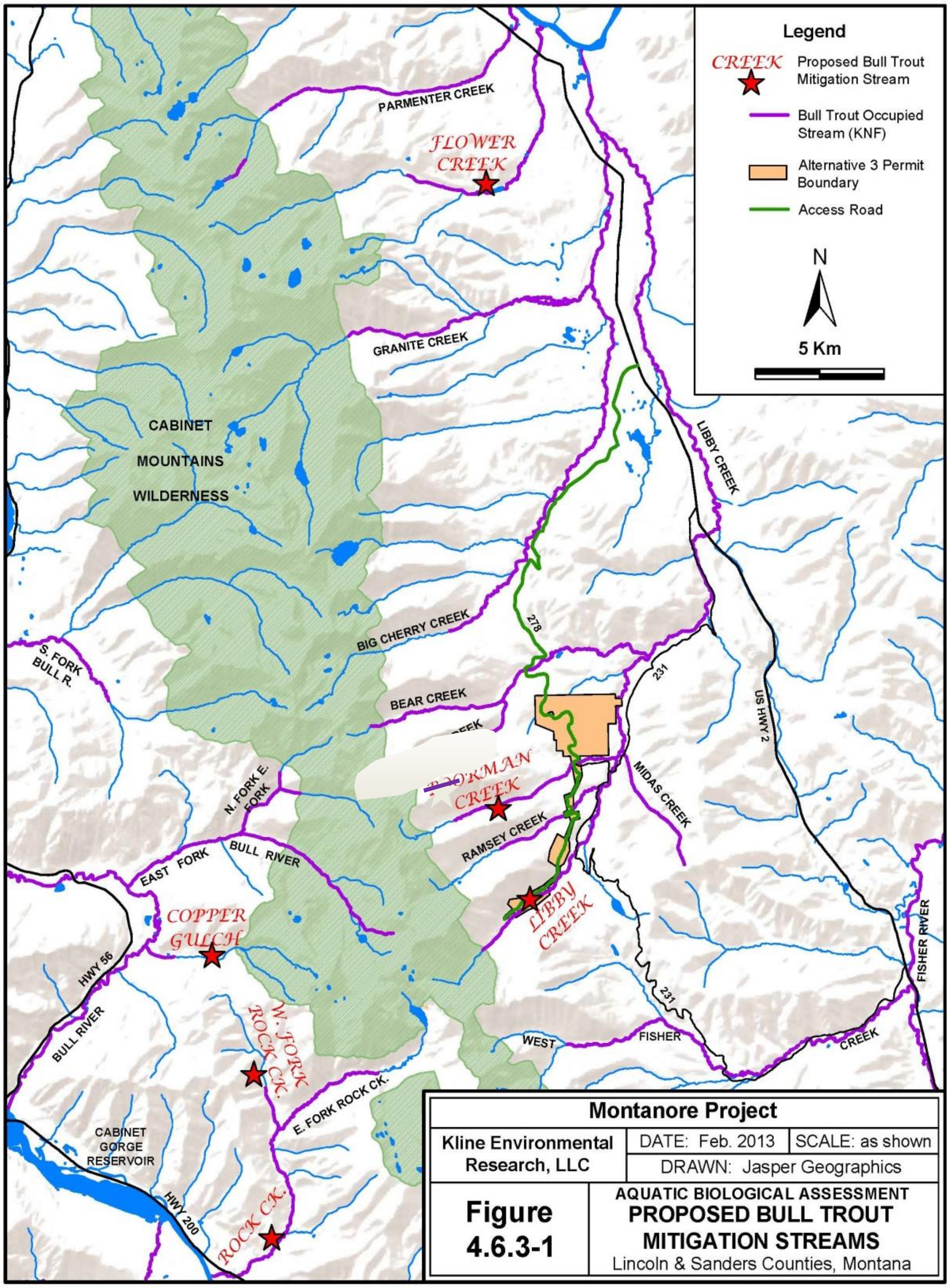
Projects on the following streams would be evaluated and implemented if determined to be feasible.

- Lower Clark Fork River Core Area
    - West Fork Rock Creek
    - Rock Creek (mainstem)
    - Copper Gulch
- Kootenai River Core Area
    - Flower Creek
    - Libby Creek

Proposed mitigation actions for these streams may include:

- Create or secure genetic reserves through bull trout transplanting or habitat restoration to protect existing bull trout populations from catastrophic events;
- Rectify factors that are limiting the potential of streams to support increased production of bull trout;
- Eradicate non-native fish species, especially brook trout that are a hybridization threat to bull trout.

Appendix A, Figure 1. Montanore Project proposed bull trout mitigation streams (Adapted from KNF BA 2013).

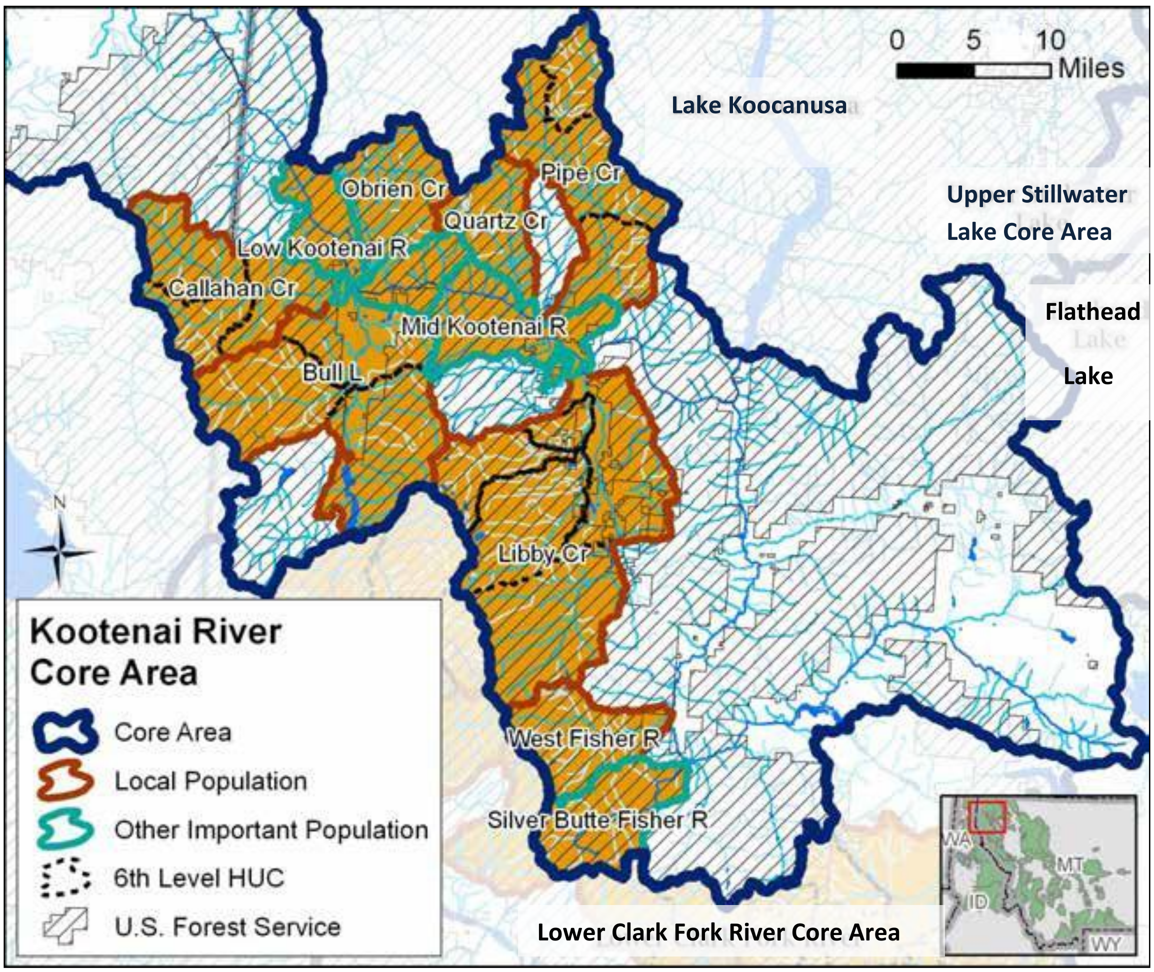


Environmental Baseline Conditions

Status of Bull Trout in the Kootenai River Core Area

The Kootenai River core area in the United States (bounded by Libby Dam with no fish passage on the upper end and the international border on the lower end) has the capability to exchange bull trout from its headwater spawning and rearing streams with downstream waters in Kootenay Lake in British Columbia (Fredenberg et al. 2005; Figure 6).

Figure 6. Kootenai River Core Area and adjacent Core Areas for bull trout (Adapted from Bull Trout Conservation Strategy, USFS 2013).



Kootenay Lake is a large natural lake with several large tributaries entirely in Canada, including the Duncan River and Lardeau River. Kootenay Lake is a productive bull trout system, but the available evidence indicates most of the bull trout in Kootenay Lake spawn in tributaries in Canadian portions of the Kootenai River. It may be that the historic conditions of the Kootenai

River upstream of Kootenay Lake prior to Libby Dam were less suitable for bull trout, or there were limited opportunities to navigate Kootenai Falls to access the best spawning and rearing habitat in the U.S. portions of the Kootenai River system. Regardless, there is limited evidence that bull trout from Kootenay Lake routinely migrate to United States portions of the Kootenai River system, or vice versa, either currently or historically. While the connectivity that does occur may be important, it is not a major migratory route.

Bull trout densities in the Kootenai River core area may have historically been somewhat higher than they are today, but have experienced nowhere near the reductions observed in other western Montana Core Areas (Bull Trout Conservation Strategy, USFS 2013).

Impacts to bull trout populations in the Kootenai River core area began in the late 19th century with extensive habitat destruction due to gold mining in Libby Creek, agricultural land conversion , and the development of riparian railroads, however more significant changes in bull trout populations likely occurred in the middle part of the century when development pressures in the form of timber harvest and road construction began to occur over relatively large areas of spawning and rearing habitat, including the upper Fisher River.

A major event affecting populations in the core area occurred with the construction of Libby Dam in 1974. This dam effectively severed much of the upper watershed, including productive habitat in Grave Creek, the Wigwam River and other river systems in Canada. Movement patterns of fluvial bull trout in the Kootenai River core area are therefore significantly restricted from historical patterns. Kootenai Falls also bisects this core area, which (because of the falls) was originally considered to be two separate core areas, but radio telemetry has demonstrated that at least partial upstream passage occurs over the falls. Fluvial populations in the truncated system are, however, geographically distributed throughout the core area, which increases the potential for recovery.

The proportion of fluvial to resident forms as it compares to historic proportions is uncertain. The only known resident bull trout population is found in Libby Creek above an impassable waterfall. There has been some loss of smaller populations, as in Parmenter Creek. The primary cause of loss of the Parmenter Creek bull trout population was irrigation withdrawals and irregular flows over the last 75 years. Another bull trout population in Flower Creek became isolated with the development of the Libby municipal water supply and associated dams which isolated the once migratory population. Only hybrids of bull trout and brook trout have been collected from Flower Creek recently. The Kootenai River provides abundant deep water foraging, migrating, and overwintering (FMO) habitat and there does appear to be a relatively strong fluvial component remaining in index spawning reaches, including individuals from the West Fisher Creek and Libby Creek local populations. However, the strength of the Kootenai River population is somewhat misleading, as recent genetic testing has indicated that the population appears to be heavily supported by entrainment (one-way, downstream movement) of Lake Koocanusa Core Area bull trout through Libby Dam.

Gas bubble disease may be a key factor affecting bull trout in the Kootenai River core area. Reduced nutrient flow past the dam (due to the reservoir acting as a sink) and reduced phosphate spill in the Canadian portion of the Kootenai River may also be significant. These three issues appear to be key contributors to mainstem rearing capacity limitations. Conversely the dam provides an abundant food source for bull trout directly downstream. Kokanee salmon entrained by the dam are discharged at the base of the dam. Opportunistic species such as bull trout have benefitted from this condition and bull trout in excess of 20 pounds are occasionally observed in the Kootenai River core area as a result of the enhanced food supply below Libby Dam.

Forest Service biologists estimate that as many as 300 to 400 fluvial redds may have been present in the Kootenai River core area historically (Bull Trout Conservation Strategy, USFS 2013). As with most bull trout populations, overall numbers were likely highly variable from year to year, based on natural climatic and disturbance patterns.

Bull trout populations in the Kootenai River core area were first exposed to significant human-caused impacts in the late 1800's. Timber harvest and road construction impacted most spawning tributaries and cumulatively impacted rearing habitats in the mainstem Kootenai River. The construction of Libby Dam in 1974 was the single-most significant impact to bull trout in this core area during the current era.

Numerous smaller scale impacts to bull trout gradually occurred throughout the Kootenai River valley in the middle part of the 20th century. These included grazing, subdivision, and agricultural development along many of the important low gradient streams, road and energy corridor development in riparian areas, and logging and road development in tributary streams. These all had impacts to bull trout and their habitats; however, not of the same magnitude as Libby Dam.

Changes in fish species composition within the Kootenai River system, brought about by intentional and illegal stocking programs, have created an additional impact to the system. Brook trout are the main non-native species threat; they exist in numerous tributary streams that contain bull trout and are of particular concern in the O'Brien Creek drainage.

The 1950's-80's saw a rapid expansion of road construction and logging, especially on the upper watersheds of this core area. Further downstream, the climate is more maritime and dominated by rain on snow events. Steep slopes in the middle and upper portions of many Cabinet Mountain drainages produce high bedload levels as a result of their flashy nature. In some cases, this bedload has been exacerbated by road construction and logging. These loads have exceeded the transport capacity of some streams resulting in cobble and boulder dominated systems.

This period of management and heavy road construction also resulted in fragmentation of bull trout populations at undersized culvert crossings in some areas. Most of these barriers have been addressed in recent years and connectivity, aside from Libby Dam, is not a significant issue (Bull Trout Conservation Strategy, USFS 2013).

In recent years, some past impacts, such as culvert barriers, have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Logging and road construction have decreased considerably and hundreds of road miles have been removed from the landscape in key bull trout watersheds such as Quartz, Pipe, Callahan, and O'Brien creeks. Fishing regulation changes do not allow people to keep, or intentionally fish for bull trout, but poaching was an issue in this core area after angling was closed in 1994 and likely remains.

Overall, current bull trout numbers in the Kootenai River core area appear to be relatively stable. Bull trout distribution is relatively good and fluvial components exist in all local populations. Biologically, if nonnative brook trout threats can be controlled, and headwater spawning and rearing habitat can be improved and connectivity maintained, there is potential for this core area to rebound. However, the apparent population strength, as reflected by adult bull trout captured in the Kootenai River, is misleading as a significant proportion of the large bull trout routinely encountered downstream of Libby Dam appear (verified by genetic testing) to have originated from upstream of Libby Dam.

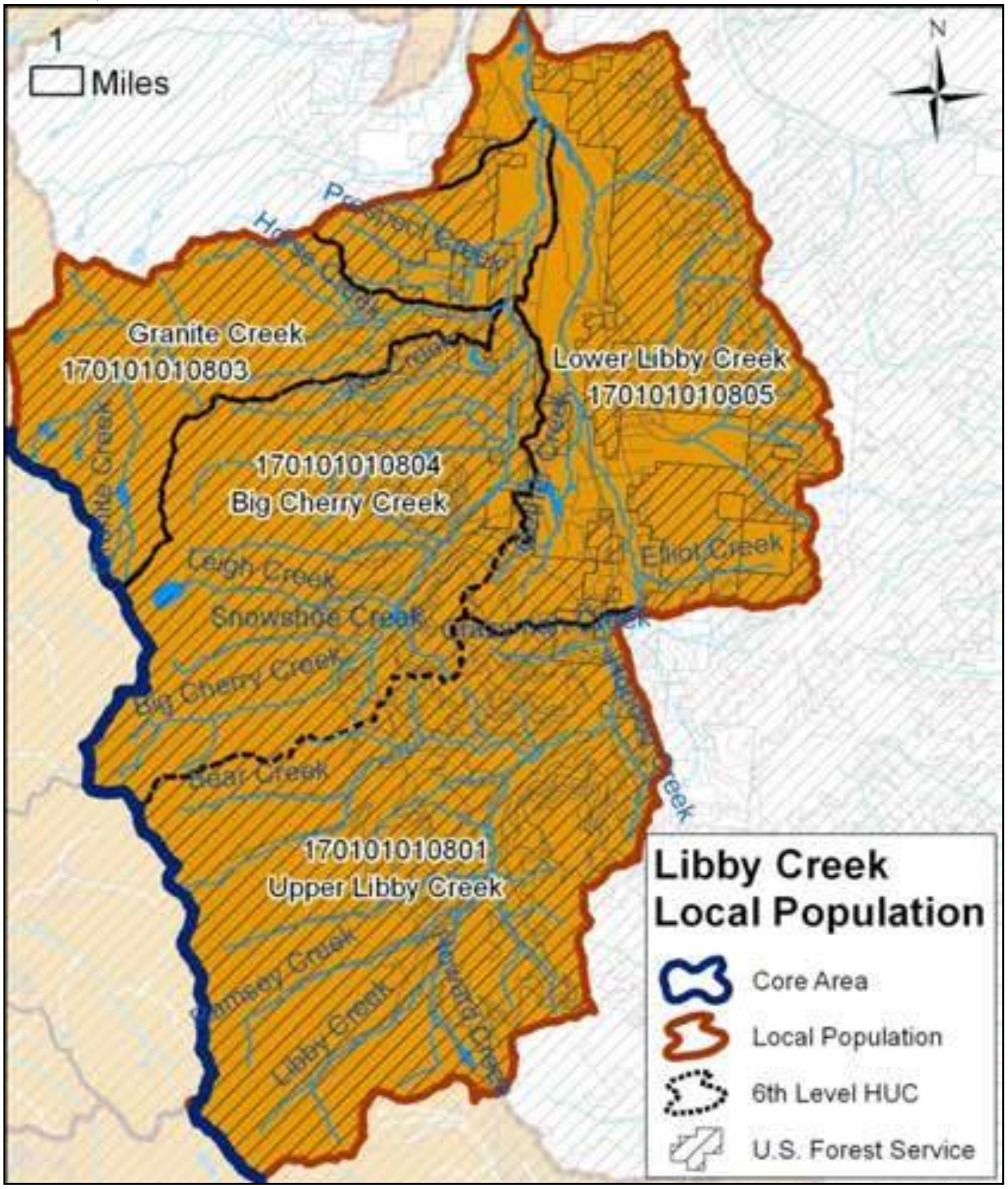
Status of Kootenai River Core Area Local Populations within the Action Area

The Kootenai River Core Area lies entirely within the boundary of the Kootenai National Forest (Bull Trout Conservation Strategy, USFS 2013). Two local populations are located in the state of Idaho (Boulder & Long Canyon Creek), and the Bull Lake bull trout population is designated as a "simple core area", not included as a "local population" in the Kootenai River Core Area. The six remaining local bull trout populations in the Kootenai River Core Area are: Libby Creek, West Fisher River, Pipe Creek, Quartz Creek, O'Brien Creek, and Callahan Creek. The Libby Creek and West Fisher River local populations are within the action area and are further described below. Flower Creek lies in the Kootenai River Core Area and mitigation activities for bull trout are proposed for that drainage, since it may harbor a residual population of bull trout, it is included in the following discussion.

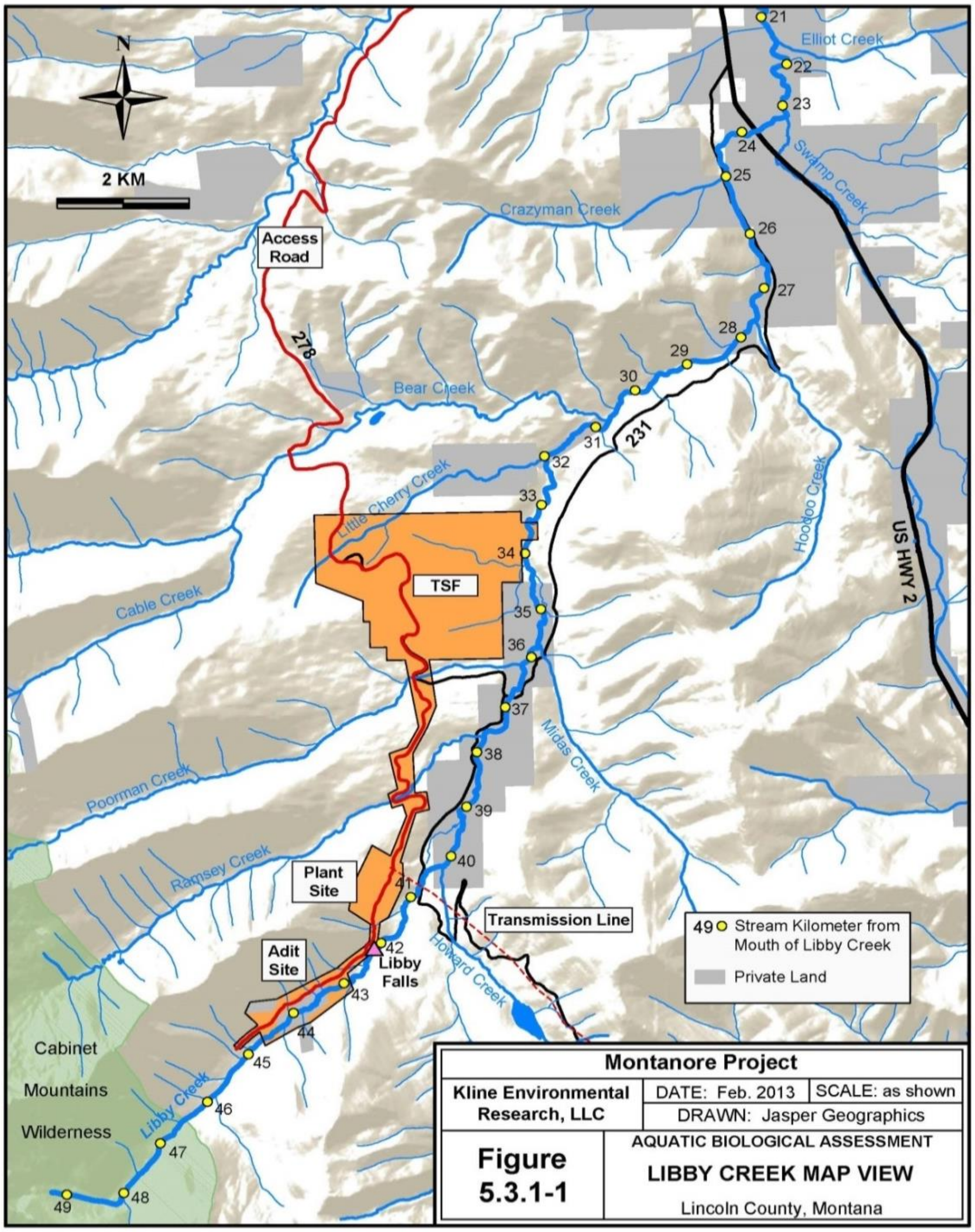
Libby Creek Local Bull Trout Population

Libby Creek is a 150,000-acre watershed with its beginnings in numerous tributaries in the Cabinet Mountains Wilderness and its mouth at the confluence with the Kootenai River near the town of Libby (BO Appendix A, see Figure 1and Figures 2 and 3). The lower portion of the drainage is separated into an east and west division by Highway 2. Those drainages on the east portion are situated in drier pine/fir habitats with most of the tributaries being intermittent. Those streams on the west side originate in the Cabinet Mountains, flood frequently, and are prone to rain on snow events.

Appendix A, Figure 2. Libby Creek local bull trout population (Adapted from KNF BA 2013).



Appendix A, Figure 3. Upper Libby Creek in proximity to the Montanore Project proposed mine facilities (Adapted from KNF BA 2013).

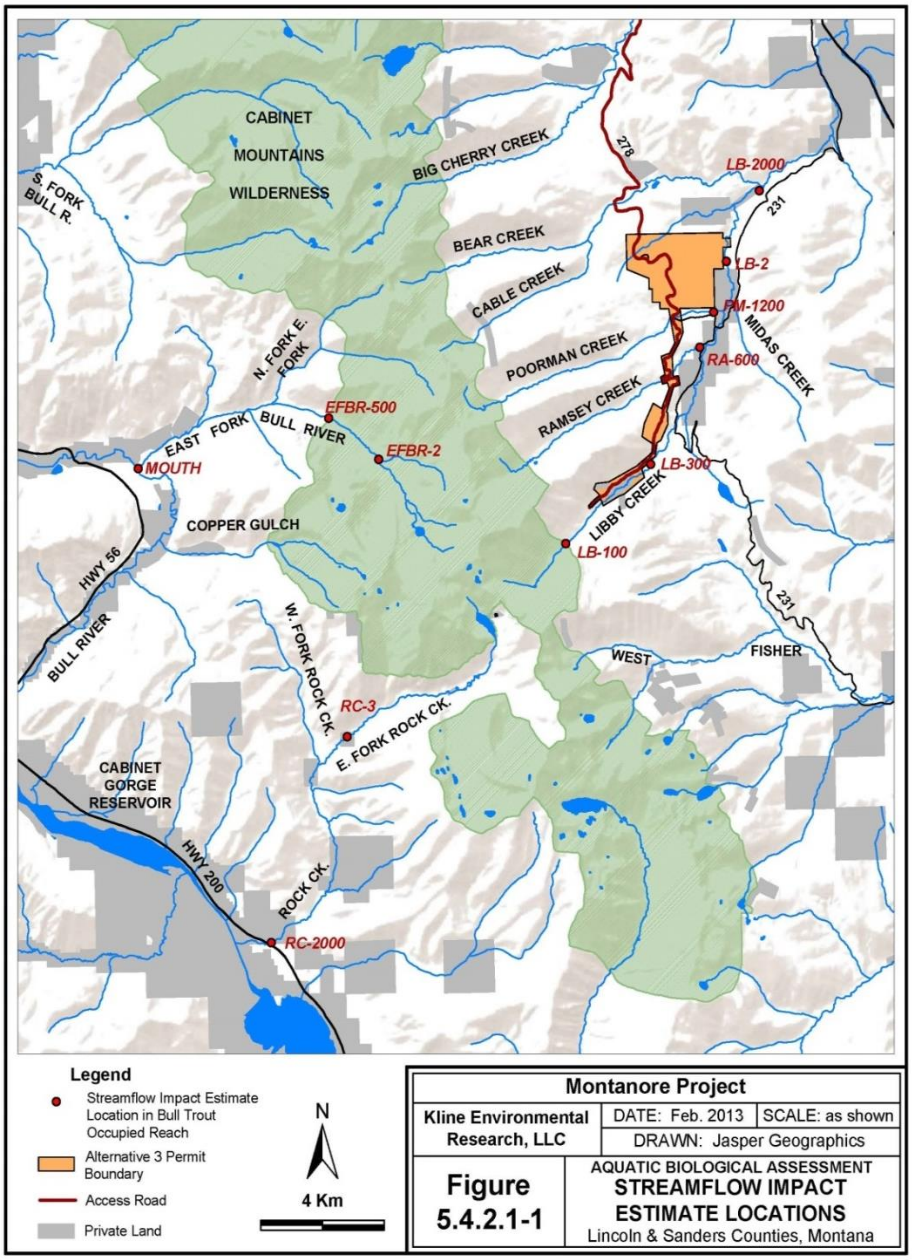


Land development has impacted the entire length of the mainstem Libby Creek and the lower reaches of all of the tributaries in the drainage. Major tributaries entering the lower portion of Libby Creek include Granite/Big Cherry and Swamp Creeks. Highway construction and land development have impacted the entire length of Swamp Creek with reaches being channelized. A highway reconstruction project, including rechannelization of several miles of Swamp Creek is currently under construction (2014). Other tributaries entering the drainage further upstream include Bear Creek (and its tributary Cable Creek), Little Cherry Creek, Poorman Creek, Midas Creek, and Ramsey Creek (see Appendix A, Figures 1 and 2).

Landtypes in the Cabinet Mountains are very steep, contain a large quantity of rock, have high water delivery efficiency, and a low water holding capacity. Precipitation rates are high which consists of snow and rain, most of which runs off into stream channels and downstream. Rain on snow events with high volume runoffs are frequent in this watershed. The KNF BA (2013) adequately describes stream fish habitat conditions in mainstem Libby Creek resulting from these geologic and precipitation conditions.

Libby Creek is considered "occupied" by bull trout from its confluence with the Kootenai River upstream to the Cabinet Mountains Wilderness boundary (KNF BA 2013) (see BO Appendix A, Figure1). Libby Creek Falls creates a barrier to upstream fish movement at a location near the proposed mine adit (see BO Appendix A, Figure 3). Fish habitat in surveyed sections of this reach ranged from low gradient riffle/run complexes, to relatively steep riffles, to more diversified habitat. Bull trout are the only species of fish that have been reported in this reach. The average bull trout density in a reach between LB-300 and the natural fish barrier is 0.031 fish per square yard or 0.037 fish per square meter (see BO Appendix A, Figure 3, and Figure 4).

Appendix A, Figure 4. Location sites where streamflow impact estimates were predicted to occur due to the Montanore Project (Adapted from KNF BA 2013).



A fish survey conducted upstream of the Cabinet Wilderness Area boundary during 1988 reported no fish. Bull trout are the only species of fish that have been reported upstream of the Falls. The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Libby Creek is "Functioning at Unacceptable Risk" (BO Appendix A, Table 1. This determination was made with the qualification that "insufficient information" was available. The "Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Appendix A, Table 1. Predicted impacts to the baseline conditions in the Montanore Project action area. (Adapted from KNF BA 2013)

Indicator		Libby Cr		Bear Cr		Cable Cr		Midas Cr		Poorman Cr		Ramsey Cr		Big Cherry		Flower Cr		Fisher R		W Fisher Cr		Rock Cr		E Fork Rock		W Fork Rock		E Fork Bull R		Copper Gu	
		B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I	B	I
RMO	Pool frequency	U	I	R	M	R	M		M	R	M	R	M	U	M		M	U	M	R	M	R	M	R	M	R	M	R	M	R	M
	Temperature	RU	D	R	M	A	M		M	A	D	R	M	RU	M		M	U	M	R	M	A	M	A	M	A	M	R	M	R	M
	Large woody debris	R	I	A	M	A	M	A	M	A	M	A	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	A	M	R	M
	Wetted width/depth	R	M	R	M	R	M		M	R	M	R	M	R	M		M	A	M		M	R	D	R	D	R	M	R	D	R	M
PCE	Influences of subsurface water	U	D	R	M															RU	M	R	D	R	D			R	D		
	Migratory habitats	U	M	R	M															RU	M	R	D	R	D			R	D		
	Food base	U	M	R	M															RU	M	R	M	R	M			R	M		
	Aquatic environment complexity	U	M	R	M															RU	M	R	M	R	M			R	M		
	Temperature	U	D	R	M	Not Critical Habitat		Not Critical Habitat		Not Critical Habitat		Not Critical Habitat		Not Critical Habitat		Not Critical Habitat		Not Critical Habitat		RU	M	R	D	R	D	Not Critical Habitat		R	D	Not Critical Habitat	
	Substrate	R	DI	R	DI															R	DI	R	DI	R	DI			R	M		
	Natural hydrograph	U	D	R	M															U	M	R	D	R	D			R	D		
	Water quantity and quality	U	D	R	M															U	M	R	D	R	D			R	D		
	Detrimental non-native fish species	R	D	R	D															R	D	R	I	R	D			R	M		
	Integrated	U	DM	R	DI															RU	DI	R	D	R	D			R	D		
MPI Subpop	Subpopulation size	R	DM	R	DI		DI		DI	U	DM	R	DI	R	DI	U	I	R	DI	R	DI	R	D	R	D	R	I	AF	D	U	I
	Growth and survival	R	DM	A	DI		DI		DI	U	DM	R	DI	R	DI	U	I	R	DI	R	DI	U	D	U	D	U	I	R	D	U	I
	Life history diversity and isolation	R	M	R	M		M		M	U	M		M	R	M	U	I	R	M	R	M	U	M	U	M	U	I	R	M	U	I
	Persistence and genetic integrity	R	D	R	D	R	D	R	D	U	M		D	R	D	U	I	R	D	R	D	U	I	U	D	R	I	R	M	U	I
MPI Habitat	Temperature	RU	D	R	M	A	M		M	A	D	R	M	RU	M		M	U	M	R	M	A	D	A	D	A	M	R	D	R	M
	Sediment	U	DI	U	DI		DI		DI	RU	DI	RU	DI		DI	R	M	U	DI	U	DI	R	DI	R	DI	R	M	R	M	R	M
	Chemical contaminants/nutrients	U	M	R	M	R	M	A	M	R	M	A	M	U	M	R	M	RU	M	RU	M	A	M	A	M	A	M	R	M	A	M
	Man-made physical barriers	R	M	A	M	R	M	R	M	R	I	A	M	R	M	U	M	R	M	R	M	R	M	R	M	R	M	A	M	R	M
	Substrate embeddedness	R	DI	R	DI		DI		DI	A	DI	A	DI	R	DI		M	R	DI	R	DI	A	DI	A	DI	A	M	R	M	R	M
	Large woody debris	R	I	A	M	A	M	A	M	A	M	A	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	A	M	R	M
	Pool frequency and quality	U	DI	R	DI		DI		DI	R	DI	R	DI	U	DI		M	U	DI	R	DI	R	DI	R	DI	R	M	R	M	R	M

	Large pool frequency	U	M	R	M		M		M	R	M	R	M	U	M		M	U	M	R	M	R	M	R	M	R	M	A	M	R	M
	Off-channel habitat	R	M	R	M		M		M	A	M	A	M	R	M		M	R	M	R	M	R	M	R	M	R	M	A	M	R	M
	Refugia	U	M	R	M		M		M	R	M		M		M		M	R	M		M	U	M	U	M	U	M	R	M	R	M
	Scour pool avg width/max depth	R	DI	R	DI		DI		DI	R	DI	R	DI	R	DI		M	A	DI		DI	A	DI	A	DI	R	M	A	M	R	M
	Streambank stability	R	M	R	M	A	M	A	M	A	M	A	M	R	M		M	R	M	R	M	R	M	R	M	R	M	R	M	R	M
	Floodplain connectivity	U	M	R	M		M	I	M	A	M	A	M	U	M		M	U	M	R	M	R	M	R	M	R	M	R	M	R	M
	Peak and base flows	U	D	U	M	R	M	R	M	R	D	R	M	U	M	R	M	U	M	U	M	U	D	U	D	U	M	R	D	R	M
	Drainage network length	RU	M	R	M	A	M	A	M	A	M	A	M	RU	M	R	M	U	M	U	M	R	M	R	M	R	M	R	M	R	M
	Road density/location	U	I	U	I	U	I	U	I	U	I	U	I	U	I	R	M	U	DI	U	DI	R	I	R	I	R	M	R	M	R	M
	Disturbance history	U	D	R	M	R	M	R	M	U	M	U	M	U	M	R	M	U	M	U	M	R	M	R	M	R	M	R	M	R	M
	Riparian conservation areas	U	M	R	M	A	M	A	M	U	M	U	M	U	M	R	M	U	M	U	M	R	M	R	M	R	M	R	M	R	M
	Disturbance regime	U	M	R	M	R	M	R	M	R	M	R	M	U	M	R	M	U	M	U	M	R	M	R	M	R	M	R	M	R	M
MPI Integrated	Individual Stream	U	M* **	R	I*	R	I*	R	I*	U	DM	R	I*	U	I*	U	I**	U	I*	R	I*	U	M*	U	D	U	I**	R	D	U	I**
	6th Level HUC	FAR / I**														FAR / I **		FUR / I*				FAR / I**						FAR / D		FUR / I**	
	Core Area	FAR / I**																				FAR / I**									

B = Baseline, I = Impact. *Assumes successful mitigation. 6th Level HUC for east side assumes successful mitigation on upper Libby Cr, and does not rely on contingency mitigation on Flower Cr.

* Assumes benefits of long-term sediment reduction exceeds detrimental impacts of short-term sediment increases and benefits to non-native species.

Code	Baseline	Impact
(blue)	Functioning Appropriately (A)	Improve (I)
(green)	FA/FAR (AF)	Degrade Then Improve (DI)
(yellow)	Functioning at Risk (R)	Maintain (M)
(orange)	FAR/FUR (RU)	Degrade Then Maintain (DM)
(pink)	Functioning at Unacceptable Risk (U)	Degrade (D)
	Insufficient Information	

Big Cherry Creek - Big Cherry Creek flows 19.2 miles before entering Libby Creek approximately two miles upstream of the Kootenai River confluence. Big Cherry Creek is considered "occupied" by bull trout from its confluence with Libby Creek upstream to approximately mile15.5 (KNF BA 2013) (see BO Appendix A, Figure1). Four bull trout were captured in 2012, all in the upper reach of Big Cherry Creek which was downstream of Forest Service Road (FSR) 4785. Through genetic analyses, the largest bull trout collected from Big Cherry Creek was determined to have originated from West Fisher Creek as its most likely population of assignment; this indicates that the migratory-sized fish (much larger than the smaller resident-sized fish found in streams) had likely originated from the Libby Creek drainage and had reared to adulthood in the Kootenai River.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Big Cherry Creek is "Functioning at Unacceptable Risk" (see BO Appendix A, Table 1). This determination was made with the qualification that "insufficient information" was available. The "Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Bear Creek - Bear Creek is 8.2 miles in length. Disturbances in the Bear Creek watershed include two road crossings, logging, and past mining activities. No fish barriers occur between the Libby Creek confluence and the road crossing at stream mile 3.8, and none have been reported upstream of the road crossing. Bear Creek is considered "occupied" by bull trout from its confluence with Libby Creek upstream to its source (KNF BA 2013) (see BO Appendix A, Figure1). The Bear Creek fish population includes *Oncorhynchus* sp. (rainbow, westslope cutthroat, redband trout or hybrids), brook trout, and bull trout (MFISH). The average bull trout density in Bear Creek, near and downstream of FSR 278 bridge, is 0.045 fish per square yard or 0.054 per square meter (n = 13, 1999-2010). This is the highest reported average bull trout density of all steams in the Action Area.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Bear Creek is "Functioning at Risk" (see BO Appendix A, Table 1). This determination was made with the qualification that "insufficient information" was available. The "Functioning at Risk" rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Cable Creek - Cable Creek flows 4.2 miles to Bear Creek, and is considered "occupied" by bull trout for approximately 2.2 miles upstream from its confluence with Bear Creek (KNF BA 2013) (see BO Appendix A, Figure1). Resident and migratory bull trout are considered to be incidental.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Cable Creek is "Functioning at Risk" (see BO Appendix A, Table 1). This determination was made with the qualification that "insufficient information" was available. The "Functioning at Risk" rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Midas Creek - Midas Creek flows 3.3 miles to Libby Creek, and is considered “occupied” by bull trout for its entire length (KNF BA 2013) (see BO Appendix A, Figure1). Bull trout are considered rare and primarily migratory. The KNF removed a culvert barrier, allowing greater use by bull trout.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Midas Creek is “Functioning at Risk” (see BO Appendix A, Table 1). This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Poorman Creek - Poorman Creek originates in a steep, glacial cirque and flows 5.5 miles before entering Libby Creek. No fish have been documented in the upper half of Poorman Creek, above the barriers.

The lower half of Poorman Creek includes two partial impediments to upstream fish movement. One is loss of surface flows (subsurface flow) near the Libby Creek confluence during low flows. The other is a culvert (FSR 278) that creates a partial barrier. During year 2012 electrofishing surveys, rainbow trout or rainbow trout hybrids were captured upstream and downstream of the FSR 278 culvert (Kline and Savor 2012). Poorman Creek is considered “occupied” by bull trout from its confluence with Libby Creek upstream to approximately mile 4.5 (KNF BA 2013) (see BO Appendix A, Figure1). It is possible that the FSR 278 culvert forms a barrier to bull trout.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Poorman Creek is “Functioning at Unacceptable Risk” (see BO Appendix A, Table 1). This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Ramsey Creek - Ramsey Creek originates in a steep, glacial cirque and flows 6 miles before entering Libby Creek. A partial barrier occurs near the middle of Ramsey creek, and a complete barrier to fish is located approximately four miles upstream of the Libby Creek confluence. No fish occur upstream of the complete barrier, however, bull trout are reported to occur downstream of the barriers. Ramsey Creek is considered “occupied” by bull trout from its confluence with Libby Creek upstream to approximately mile 3.2 (KNF BA 2013) (see BO Appendix A, Figure1).

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Ramsey Creek is “Functioning at Risk” (see BO Appendix A, Table 1). This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

West Fisher River Local Bull Trout Population

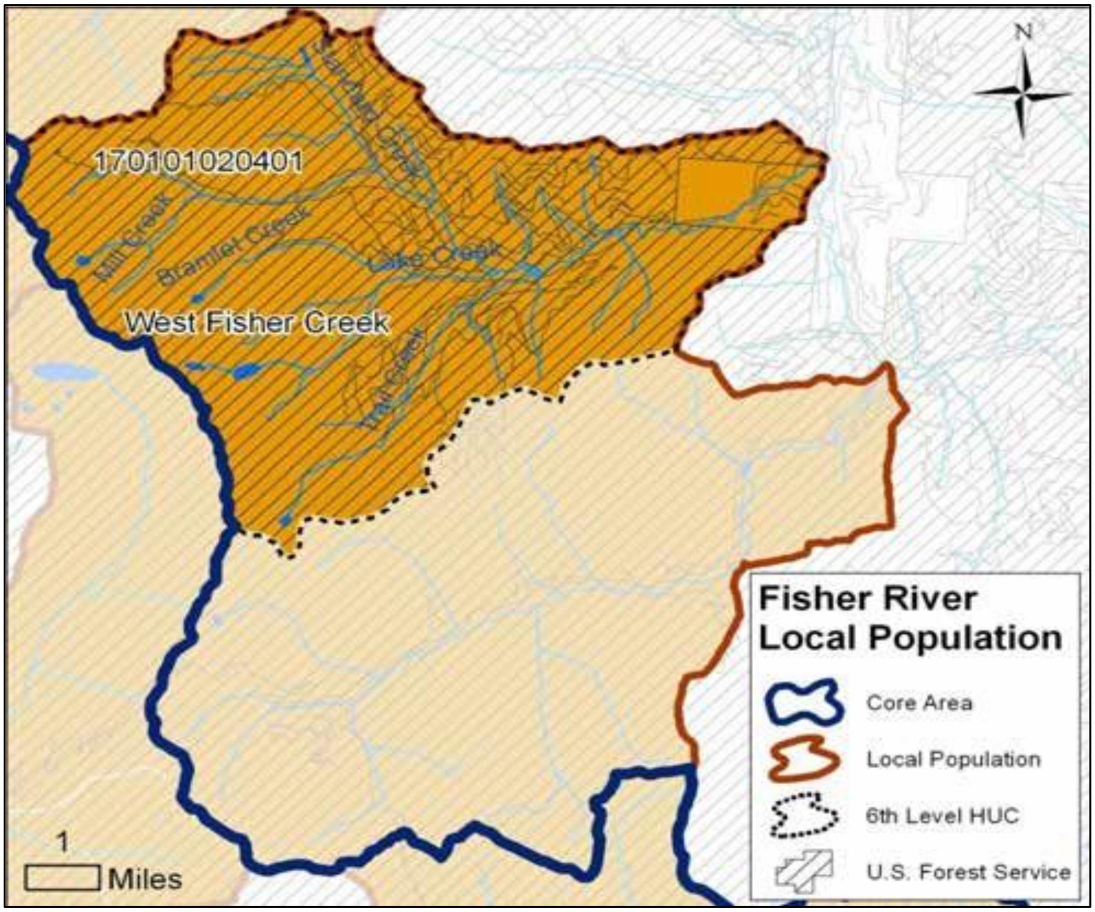
Fisher River - Although bull trout occurrence is rare in the mainstem Fisher River, primarily a migratory population, it is considered “occupied” by bull trout from its confluence with the Kootenai River upstream to the confluence of West Fisher Creek (River) (see BO Appendix A, Figure1). Brook trout, rainbow trout, longnose dace, and mountain whitefish commonly occur along the entire mainstem river. Bull trout occur in the mainstem a short distance downstream of the confluence of West Fisher Creek. The majority of bull trout use and the only known spawning occur in the West Fisher and Silver Butte/Fisher River tributaries.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Fisher River is “Functioning at Unacceptable Risk” (see BO Appendix A, Table 1). This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

West Fisher Creek - West Fisher Creek originates on the east slope of the Cabinet Mountains Brook trout, bull trout, redband trout, mountain whitefish, rainbow trout, sculpin, and westslope cutthroat trout occur in West Fisher Creek. Surveys of this stream were conducted in 1987, 1993, and 2002-2004, and documented the collection of rainbow trout, brook trout, bull trout, and mountain whitefish (KNF BA 2013). Only bull trout were collected from the surveys conducted about 3.7 miles upstream of the confluence (see BO Appendix A, Figure1). The average bull trout density in West Fisher Creek, near FSR 231 bridge, is 0.011 fish per square yard or 0.013 per square meter (n = 10, 2002-2010).

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) West Fisher Creek is “Functioning at Risk” (see BO Appendix A, Table 1). This determination was made with the qualification that “insufficient information” was available. The “Functioning at Risk” rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Appendix A, Figure 5. West Fisher Creek local bull trout population. (Adapted from KNF BA 2013).



__Flower Creek Bull Trout Population__

Flower Creek flows approximately 13 miles to the Kootenai River (see BO Appendix A, Figure 1, above). Headwater tributaries begin in a series of small lakes located on Forest Service lands within the Cabinet Mountains Wilderness. The lower portion flows through the city of Libby, Montana. Two man-made dams are present in the lower half of Flower Creek. The lower dam is used as a diversion point for a water intake that feeds by gravity to a water treatment plant. The portion of Flower Creek that flows from the upper dam to the lower dam lies mostly on lands managed by the Forest Service. Upper Flower Creek Dam is operated by the city as part of their water supply storage system. The 58-foot high concrete arch dam was completed in 1945. The Upper Flower Creek reservoir has a normal capacity of 221 acre-feet. The upper dam is substandard with regard to failure risk. The City of Libby has begun the process to replace the upper dam. The stream is considered to have substantial fisheries resource value above the dams. Bull trout are known to have occurred in Flower Creek. Prior to 2012, the only salmonids captured in recent surveys have been brook trout and hybridized westslope cutthroat trout (MFISH 2012). During 2012, one bull trout/brook trout hybrid was captured below the lower reservoir and one was captured upstream of the upper reservoirs (Kline and Savor 2012). This indicates that bull trout are or recently were present but are not common.

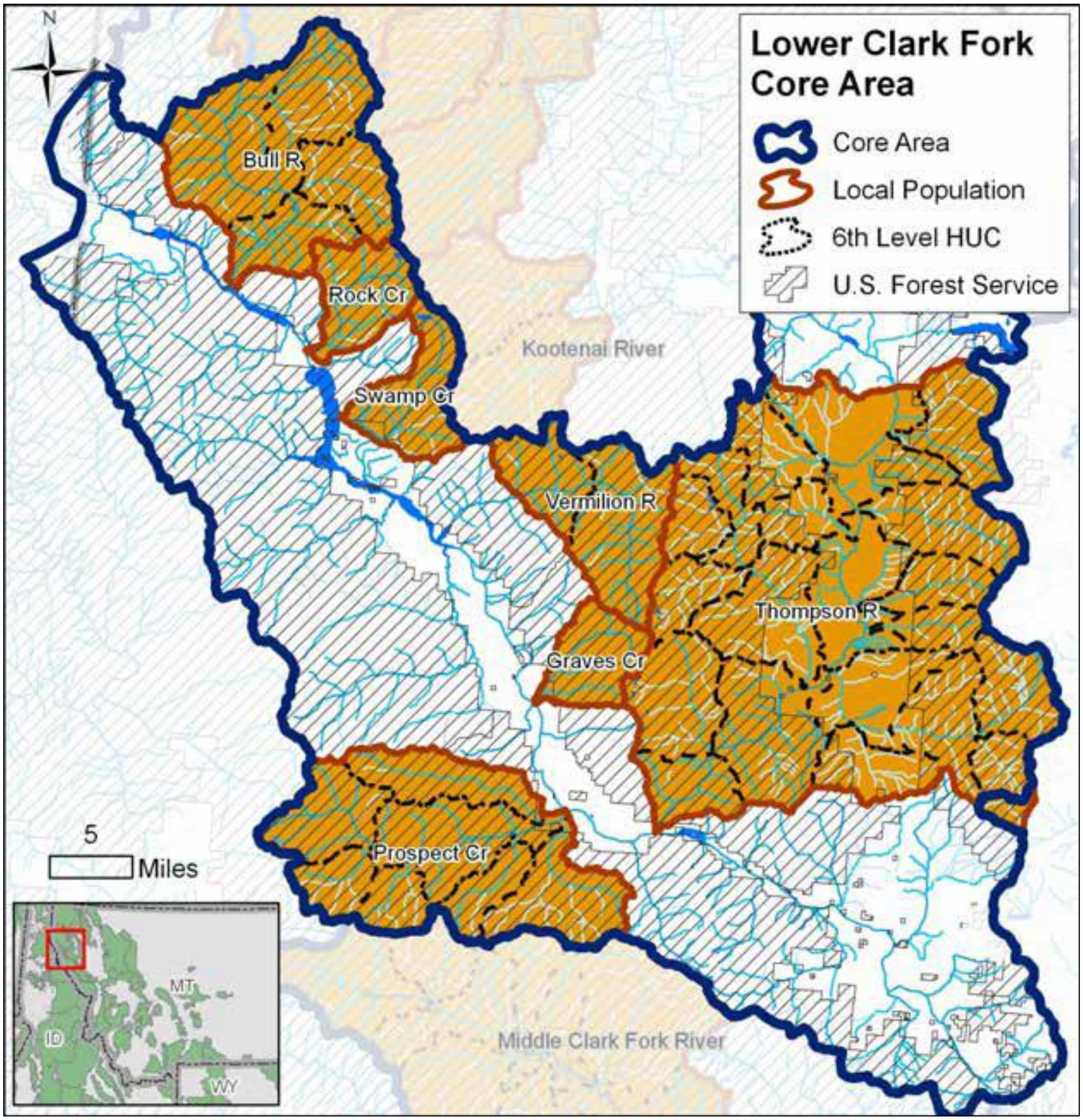
The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Flower Creek is “Functioning at Unacceptable Risk” (see BO Appendix A, Table 1). This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

Status of Bull Trout in the Lower Clark Fork River Core Area

The Lower Clark Fork River Core Area has 14 local bull trout populations designated with 7 located in tributaries of the Flathead River and 7 located in tributaries to the Clark Fork River or its reservoirs impounded by Cabinet Gorge, Noxon Rapids, and Thompson Falls dams (BO Appendix A, Figure 6).

The 7 local populations tributary to the Clark Fork River include: Rock Creek, Bull River, Swamp Creek, Vermilion River, Graves Creek, Prospect Creek, and Thompson River. Over the last 12 years (2001 – 2012), these 7 bull trout populations have averaged a total of 109 bull trout redds per year. An unknown number of additional bull trout redds are constructed in the 7 tributaries with designated local bull trout populations in the Flathead River drainage. Copper Creek (Gulch) lies in the Lower Clark Fork River Core Area (Bull River tributary) and mitigation activities for bull trout are proposed for that drainage, because it formerly supported a bull trout population it is included in the following discussion.

Appendix A, Figure 6. Lower Clark Fork River Core Area. (Adapted from the Bull Trout Conservation Strategy, USFS 2013).



Bull trout densities in the Lower Clark Fork River (LCFR) Core Area were historically much higher than they are today. Impacts to bull trout populations in the LCFR began in the early part of the 20'h century, and have continued through the present time (Bull Trout Conservation Strategy, USFS 2013). Distributions of bull trout populations are significantly restricted from historical patterns. At least two large streams (Pilgrim Creek and Elk Creek) that once likely supported strong fluvial populations now contain few, if any bull trout. Remaining fluvial populations, however, are geographically distributed throughout the core area which increases the potential for recovery. The proportion of fluvial to resident forms is likely much different than historical, due to the low numbers of fluvial fish in the population. Resident populations are generally isolated by natural conditions.

Bull trout populations in the LCFR Core Area were first exposed to significant human-caused impacts approximately 100 years ago with the construction of Thompson Falls Dam (1916). This dam blocked upstream migration of bull trout from Lake Pend Oreille, and effectively cut off all upstream spawning habitats, affecting hundreds of miles of bull trout populations in core areas upstream of the Lower Clark Fork River. Within the Lake Pend Oreille Core Area, Thompson Falls Dam cut off the Thompson River from the rest of the Core Area. This was a significant impact to bull trout in the core area.

Numerous smaller scale impacts to bull trout gradually occurred throughout the Lower Clark Fork River valley in the early part of the 20th century as well (Bull Trout Conservation Strategy, USFS 2013). These included grazing and agricultural development along many of the important low gradient spawning streams, road and energy corridor development in riparian areas, and logging and road development in tributary streams. These activities had impacts to bull trout and their habitats; however they were not of the same magnitude as construction of Thompson Falls Dam.

In 1952 and 1958, respectively, Cabinet Gorge and Noxon Dams were constructed. These dams also blocked bull trout from upstream access to spawning streams, resulting in only a few smaller tributaries remaining to support the entire Lake Pend Oreille bull trout population. Bull trout continued to move downstream through the dams and reservoirs to Lake Pend Oreille, thus maintaining partial connectivity within the population. With the completion of these two dams, combined with Thompson Falls Dam, the current status of bull trout in the LCFR was defined. The once robust population was now effectively isolated into four distinct units (Lake Pend Oreille, Cabinet Gorge Reservoir and tributaries, Noxon Reservoir and tributaries, and tributaries upstream of Thompson Falls Dam). As a result, the upper-most populations, isolated above Thompson Falls Dam, were affected the most in the short-term.

Over the next several decades, changes in fish species composition within the LCFR, brought about by stocking programs and some illegal introductions, brought an additional impact to the system. Brown trout, brook trout, northern pike, walleye, smallmouth and largemouth bass, and a host of other non-native species became established in the reservoirs and tributaries, creating predation, competition, and hybridization pressures that most likely impacted bull trout populations.

The 1970’s and 1980’s saw a rapid expansion of road construction and logging in areas that were, up to this time, refugia for bull trout populations. Steep slopes in the middle and upper portion of many drainages were logged, resulting in high sediment loads that exceeded the transport capacity of streams. The sediment eventually settled out in lower gradient spawning reaches and larger streams and rivers, causing systemic changes in the stream systems and aquatic communities they supported. Chronic erosion and sediment addition from the extensive road network constructed during this period still occurs today. This period of heavy road construction also resulted in extensive fragmentation of bull trout populations at undersized culvert crossings (Bull Trout Conservation Strategy, USFS 2013).

Bull trout populations had been eliminated or severely reduced throughout much of the LCFR Core Area by the 1990's. Small fluvial populations still existed in many of the larger, less developed watersheds. However, chronic impacts from existing developments, combined with climate change and a drought that caused low flows and warm water, further impacted populations.

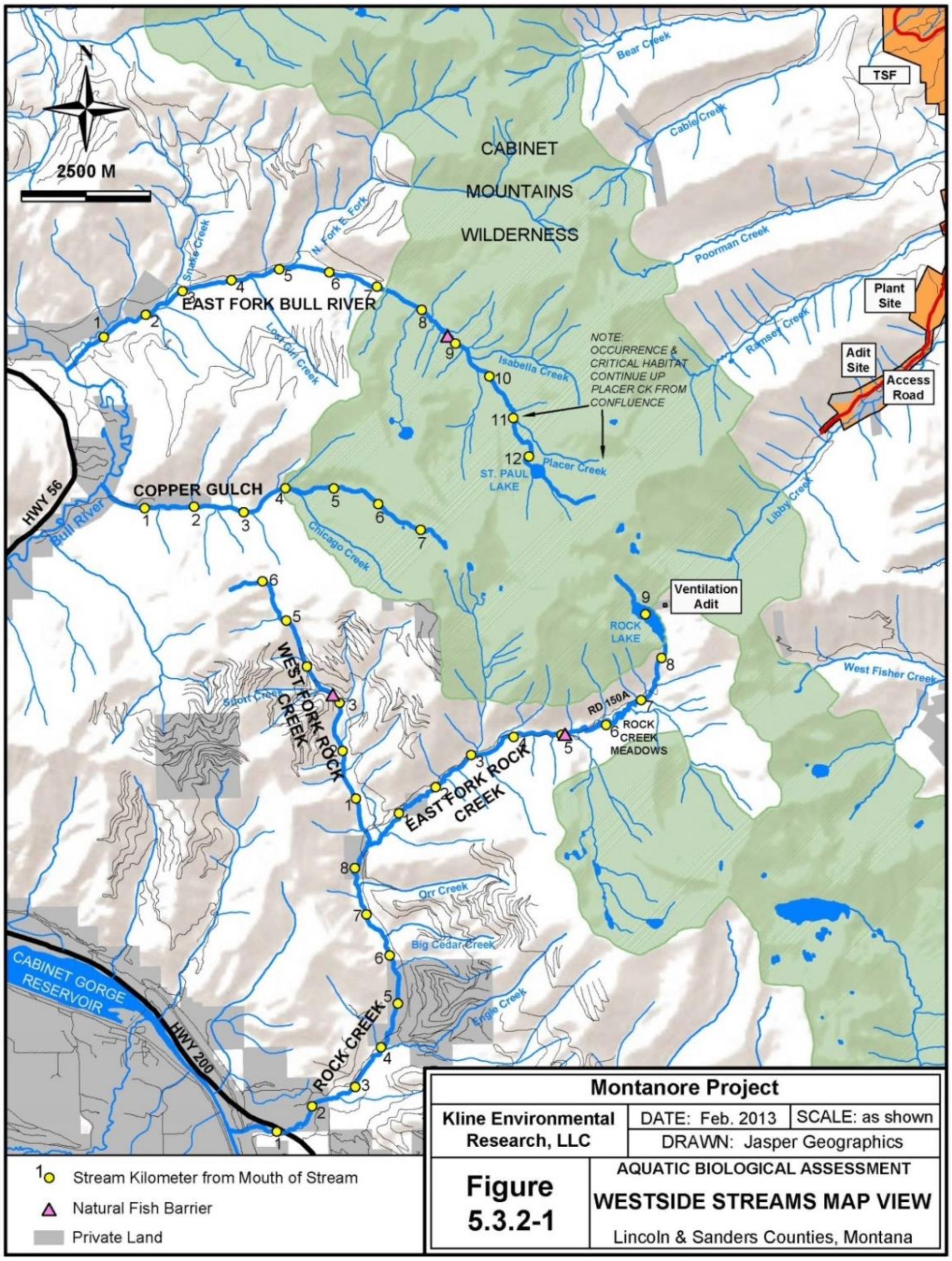
Some of the past impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. Logging and road construction have decreased considerably, but the effects of the existing road networks throughout many watersheds are still prevalent. The drought seems to have subsided. Fishing regulation changes do not allow people to keep, or intentionally fish for bull trout.

Overall, current bull trout numbers in the LCFR Core Area are very low. Since 2001, Avista Utilities Corp. has implemented both upstream and downstream fish passage programs at its two dams, Cabinet Gorge and Noxon Rapids. The upstream fish passage program captures and transports about 35 adult bull trout annually from downstream of Cabinet Gorge Dam to upstream release sites above all three dams. The downstream fish passage program traps juvenile bull trout in Montana tributaries and annually transports and releases several hundred bull trout into the Clark Fork River downstream of Cabinet Gorge Dam (these fish then swim about 9 miles downstream to Lake Pend Oreille where they grow to maturity in 3 – 4 years). These temporary fish passage programs have re-established both upstream and downstream connectivity (albeit at a limited level) to the LCFR Core Area. The overall objective of the Avista Utilities fish passage programs is to eventually restore upstream and downstream fish passage at both dams with permanent fish passage facilities. A permanent fish ladder has been installed at Thompson Falls Dam by PPL – Montana (electric utility); this ladder facilitates upstream migrations of bull trout.

There are seven local bull trout populations on lands administered by the Forest Service in the Lower Clark Fork Core Area. They are: 1) Thompson River, 2) Prospect Creek, 3) Graves Creek, 4) Vermillion River, 5) Swamp Creek, 6) Rock Creek, and 7) Bull River (see BO Appendix A, Figure 6).

The streams in the Action Area that are on the west side of the Cabinet Mountains flow to the Cabinet Gorge Reservoir in the Lower Clark Fork Core Area of the Clark Fork River (BO Appendix A, Figure 7). This is Montana's largest river, with an average annual stream flow of 21,960 cfs at the Montana/Idaho border. The total drainage area is 22,073 square miles (FS 2000). There are three hydroelectric dams within the lower Clark Fork River (LCFR) drainage. The most upstream of these dams, the Thompson Falls Dam, was completed in 1916 and is owned and operated by PPL Montana. The most downstream of these dams, the Cabinet Gorge Dam, was completed in 1952 and is just downstream of the Montana\Idaho border. It currently operates as a re-regulating facility for Noxon Rapids Dam, which was completed in 1958, and inundates that portion of the Clark Fork River between the backwaters of Cabinet Gorge Reservoir and the tailwaters of Thompson Falls Dam. Avista Corporation (Avista) owns and operates the Cabinet Gorge and Noxon Rapids dams.

Appendix A, Figure 7. Montanore Project influence area with affected west side streams identified in bold (Adapted from KNF BA 2013).



Prior to construction of the dams, a number of adfluvial fish species, including bull trout and westslope cutthroat trout, utilized the Clark Fork River as a migratory corridor between Lake Pend Oreille and upstream tributary spawning, nursery, and rearing habitat. A fish ladder was opened at the Thompson Falls Dam during 2011 to allow upstream fish passage (Jourdonnais et al. 2011). The lower two dams are impassable barriers that block access to approximately 58 miles of the Clark Fork River and the associated tributaries for adfluvial fish in Lake Pend Oreille. The decline of bull trout in the Lower Clark Fork Core Area has been attributed, in part, to fragmentation of historically larger, more interconnected populations, and isolation of the remaining populations.

The relicensing application process for the Avista facilities resulted in the Clark Fork Settlement Agreement (CFSA) in 1999, which addressed fisheries management and mitigation, including an evaluation of methods for accomplishing fish passage. Permanent fishways have been designed for the Cabinet Gorge Dam and Noxon Rapids Dam (GEI 2009), although plans have not been finalized and the timeline remains uncertain (FWS 2011b). Upstream passage efforts for adult bull trout began in 2001. Fish are captured downstream of the Cabinet Gorge dam in the Clark Fork River by electrofishing, hook-and-line, and a fish ladder trap, transported, and tracked through Passive Integrated Transponder (PIT) tagging, radio tagging, and genetic analysis (Hintz and Lockard 2007). Adult bull trout were transported to Cabinet Gorge Reservoir beginning in 2001 and to their region of origin based on genetic or previous capture history criteria beginning in 2005 (DeHaan et al. 2011, Bernall and Duffy 2012). The juvenile trap and transport program traps out-migrating juvenile bull trout from tributaries, including East Fork Bull River and Rock Creek, and transports them below Cabinet Gorge Dam (DosSantos 2012, McCubbins et al. 2012, Moran 2012).

The following italicized text is from Moran (2012) and refers to the Avista Montana Project Area, defined as the Cabinet Gorge Reservoir and tributaries, Noxon Reservoir and tributaries, and the Thompson River drainage upstream of Thompson Falls Dam. Areas of genetically identified origin in relation to dams on the LCFR are: Region 1 - Below Cabinet Gorge Dam; Region 2 - Between Cabinet Gorge and Noxon Rapids dams; Region 3 - Between Noxon Rapids and Thompson Falls dams; Region 4 - Above Thompson Falls Dam. These quotes provide additional context for the role of East Fork Bull River and Rock Creek in contributing to the LCFR bull trout population.

> *Recapture analysis, a bull trout life history and age and growth thesis, remote sensing data, redd surveys, and genetic findings illustrate the bull trout of the Montana Project Area exhibit variability in terms of life history and movement patterns. Examples include: juveniles captured in one tributary that genetically assigned to tributaries of upstream regions, juveniles captured in the lower reaches of tributaries that do not support a bull trout population, adult bull trout transported and/or genetically assigned to one region having entered and spawned in tributaries of downstream regions, resident-sized bull trout observed on redds, and one fish genetically determined to have contributed to recruitment in the East Fork Bull River prior to being recaptured below Cabinet Gorge Dam (i.e. matured in Cabinet Gorge Reservoir, spawned at least once, and passed downstream as an adult). Some of these movement patterns are most likely attributable to the fragmented habitat of the LCFR.*

From 2001 – 2011, the total annual number of bull trout redds observed in Montana Project Area tributaries averaged 108; and 20, 58, and 30 for Regions 2, 3, and the Thompson River drainage, respectively. The East Fork Bull River (15), Vermilion River (27), and the Fishtrap Creek drainage (14) have the highest annual averages for Regions 2, 3, and the Thompson River drainage, respectively.

Trends in bull trout redd numbers in the Montana Project Area have exhibited year-to-year variability for tributary and for Region, with the lowest and the three highest annual totals occurring from 2006 – 2011. The higher 2001 – 2003 totals for Region 2 were in response to the experimental transport of an average of 33 adult bull trout to this Region during this time. The 2011 total of 118 for Region 3 tributaries was much higher due to the record numbers of redds observed in five bull trout tributaries of this Region.

Trends in juvenile bull trout captured electrofishing in Montana Project Area tributary monitoring sections and trapping catch per unit effort indicated that juvenile numbers in Cabinet Gorge reach tributaries have been variable, decreased markedly in the upper Bull River, and may have recently increased in the East Fork Bull River and Rock Creek. Similar data from Noxon Reservoir and Thompson River tributaries have also been variable and, with the possible exception of Vermilion River, have not exhibited recent increases.

East Fork Bull River and Rock Creek contributed 21% and 9%, respectively, of the total bull trout PIT tag capture events for the combined data from Lake Pend Oreille tributaries and LCFR tributaries during 1998 through 2011. During 2001-2011, 89 transported adult bull trout were determined to be in spawning reaches during the potential spawning period in East Fork Bull River, and 14 potential spawning bull trout were in Rock Creek during 2003-2011. Based on a genetic parentage study, an average of 17% of juvenile bull trout sampled during 2008-2010 from East Fork Bull River originated from a transported parent (Moran 2012). From 2004 through 2011 a total of 370 adult bull trout have been captured downstream of Cabinet Gorge Dam and were genetically assigned to one of four regions on the lower Clark Fork River. Over this eight-year period the lowest average number of fish assigned to Region 2 (n = 8) and the highest average number of fish assigned to Region 3 (n = 13). East Fork Bull River and Rock Creek are the only current bull trout spawning populations in Region 2, which may limit recruitment in comparison to Regions 3 and 4 (Bernall and Duffy 2012).

Status of Lower Clark Fork Core Area Local Populations within the Action Area

<u>*Rock Creek*</u>

The following was taken from the most recent Watershed Baseline for the Lower Clark Fork River (FS 2000).

Rock Creek is a 4th order drainage that has its headwaters in the southwestern end of the Cabinet Mountains (see BO Appendix A, Figure 7). This watershed drains approximately 21,162 *acres. The mainstem Rock Creek consists of C and D Rosgen channel types through much of its lower reaches (Rosgen 1996). The lower section is typified by low gradient, approximately 2 percent, though much of its length. The watershed contains several areas of sensitive landtypes that are presently a chronic sediment source, particularly in the West Fork Rock and Engle Creeks. This has resulted in a large volume of bedload and reduced transport efficiency. The trophic condition of the watershed is characterized by low overall primary and secondary productivity. No metal toxicity to aquatic life has been documented in the Rock Creek.*

The East and West Forks of Rock Creek have gradients of 10.4 and 7.3 percent, respectively. Rubble and gravel are the codominant substrate in the lower reaches (WWP 1996). The stream channel and its banks are relatively stable and there is considerable bedload movement. Spawning habitat is limited to isolated pockets of gravel behind stable debris or boulders.

The mainstem Rock Creek contains a relatively small amount of LWD relative to other watersheds in the Lower Clark Fork River drainage (WWP 1996). The potential for future recruitment of LWD is greatly reduced due to past riparian harvest and the location of existing roads. Little of the large woody material that enters the active channel is retained. Historic information indicates there was never a strong migratory component in the Rock Creek subpopulation (Pratt and Huston 1993).

The FS (2000) baseline describes the subpopulation for the entire Rock Creek drainage as functioning at risk, due primarily to the absence of a migratory component. More recent information indicates this is not correct. The presence of downstream migrating juvenile bull trout, migratory-sized adult bull trout, the ongoing Avista upstream fish passage transport program, and genetic information from bull trout captured downstream of the Cabinet Gorge Dam provide evidence that migratory bull trout are present and functioning in the Rock Creek drainage (see description of Lower Clark Fork Core Area above).

The following was taken from McCubbins et al. (2012). *The total number of juvenile bull trout captured and catch per unit effort (CPUE) in 2010, was the second highest observed in upper Rock Creek since trapping began in 2001. The average CPUE for upper Rock Creek from 2001 – 2011 (0.36 juvenile bull trout per trap day) was consistently higher than the average of all traps at all sites from 2001 – 2011 (0.13). The higher average catch rates at this site are due to both the comparatively high numbers of juvenile bull trout in upper Rock Creek and the relatively high efficiency at the trapping site. As has been observed for other bull trout tributaries in the Avista – lower Clark Fork River Project Area, the pattern of catch rates in upper Rock Creek traps appears to be influenced by the number of bull trout redds from three years previous. In the case of Rock Creek this relationship has only become apparent over the last four years of trapping (2008 – 2011). This is likely due to the difficulty in accurately identifying bull trout redds in this tributary where suitable spawning substrate is comparatively rare and the more recent practice of including upstream areas in bull trout redd surveys. If this trend continues, captures at this site should increase in 2012, as the redd count in 2009 (6) was the highest yet recorded.*

During the two years (2010-2011) of trapping at (the lower Rock Creek site), westslope cutthroat trout were the most commonly capture species, comprising 58 and 55% of all trout captured. Bull trout were uncommonly captured at this location with four and five being captured combined in screw and weir traps in 2010 and 2011 respectively. Notable were the three adult bull trout captured moving downstream in the lower Rock Creek weir trap in 2011 which were not captured in the upper Rock Creek weir trap. One of these adults, which was 658 mm in length, had never before been captured, but genetically assigned to this tributary. Higher than average stream-flow in 2011 resulted in perennial stream-flow in the channel between the two trapping sites; this area typically becomes intermittent during base stream-flow conditions. Electrofishing and bull trout redd surveys have not been conducted in this middle reach of Rock Creek since 2001 and 2004 respectively; therefore it is unknown whether viable bull trout spawning has occurred in this area during years with higher than average stream-flow. It is anticipated that future trapping efforts at this lower trapping location will provide the best opportunity to capture any out-migrating juvenile bull trout that may have reared in this area.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Rock Creek is "Functioning at Unacceptable Risk" (see BO Appendix A, Table 1). This determination was made with the qualification that "insufficient information" was available. The "Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

East Fork Rock Creek - The following was modified from Horn and Tholl (2011) and refers to resident bull trout. See above for a description of migratory bull trout that applies to the Rock Creek drainage. East Fork Rock Creek represents a functioning stream in good physical condition with a native fish assemblage (see Figure 13). A seasonally dewatered reach has kept brook trout from colonizing to date. Fish populations appear generally stable. This suggests that physical and chemical conditions are stable enough to allow fish populations to regulate themselves through biological mechanisms. If physical factors were annually driving fish populations down, then a trend of substantially varying population estimates would be expected as these influences varied in intensity. This has not been observed in East Fork Rock Creek over the sample period, especially for bull trout which are generally more sensitive to physical stream changes. It may be that recruitment is high enough that stochastic factors play a minor role in population regulation, and biological factors and habitat availability steer fish numbers to the consistent level observed. The consistently observed fish population and biomass estimates may represent a measure of carrying capacity in this stream. In short, East Fork Rock Creek harbors an intact and stable native fish community. This should remain the case unless some outside disturbance occurs. For all fish survey results that were located for East Fork Rock Creek and reported bull trout density per unit area, the average bull trout density was 0.023 fish per square yard or 0.027 fish per square meter (n = 12, 1992-2010).

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) East Fork Rock Creek is "Functioning at Unacceptable Risk" (see BO Appendix A, Table 1). This determination was made with the qualification that "insufficient information" was available. The "Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

West Fork Rock Creek - West Fork Rock Creek flows approximately four miles (6.5 km) to Rock Creek (see BO Appendix A, Figure 7). The lower 1,050 feet (320 meters) is seasonally dry. A natural barrier to upstream movement of fish occurs two miles (3.2 kilometers) from the confluence with Rock Creek. Fish habitat consists primarily of high gradient riffles and pools. Substrate is dominated by gravel and small cobble, with high amounts of fine sediment. The riparian zone is functional, providing moderate amounts of large woody debris. The drainage is subject to high flow events (WWP 1996, FS data reported in Salmon Environmental Services 2012 and in Kline and Savor 2012). Fish surveys were conducted during 1996 using multiple pass electrofishing and snorkel counts. Cutthroat trout and bull trout were reported to occur at densities of approximately 200 and 300 fish per 1,000 m, respectively, throughout the reach that is below the fish barrier. The habitat was estimated to accommodate 22 adfluvial or 50 resident salmonid redds (WWP 1996). During 2012, 2,500 feet (762 meters) in the central portion of the same reach was electrofished using a single pass, resulting in the capture of 42 cutthroat trout and 6 bull trout (FS data reported in Kline and Savor 2012). While the difference in effort during the 1996 and 2012 do not allow direct comparison of results, they do indicate that bull trout abundance was lower during 2012 compared to 1996. In comparing the two species, the number of cutthroat trout that were captured during 2012 was approximately 25% of the 1996 cutthroat trout density estimates, whereas the number of bull trout that were captured was approximately 3% of the 1996 bull trout density estimates. This indicates a substantial reduction in bull trout abundance relative to cutthroat trout.

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) West Fork Rock Creek is "Functioning at Unacceptable Risk" (see BO Appendix A, Table 1). This determination was made with the qualification that "insufficient information" was available. The "Functioning at Unacceptable Risk" rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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.

East Fork Bull River (Bull River local population)

Refer to the above section on the Lower Clark Fork Core Area for descriptions that illustrate the relationship of the East Fork Bull River bull trout population to the Core Area population.

The following paragraph was modified from Horn and Tholl (2011). The East Fork Bull River drains ~71 km^2 from the Cabinet Mountains Wilderness Area to the mainstem Bull River (WWP 1996) (see BO Appendix A, Figure 7). It supports the highest densities of bull trout in the Bull River drainage (WWP 1996) as well as pure westslope cutthroat trout. Increased sedimentation and decreased channel stability within the drainage have been caused by roads, timber harvest, flooding, and other natural events. Problem areas were identified in 1999 (Watershed Consulting 1999) and 2000 (Land and Water Consulting 2001) for potential restoration. In 2001 a ~ 1,200 foot (366 meters) reach (the Stein property) on lower portion of the stream was modified via rechannelization, revegetation and large woody debris installation (Horn 2011). Periodic vegetation enhancement has occurred along the reach since 2002 to maintain riparian condition. In spring 2008 an avulsion caused flows to return to a historic channel on the opposite side of the valley from the restored Stein reach. Fish surveys have continued in that reactivated channel, known as the south channel. Additionally, a major rechanneling project occurred about one thousand feet (several hundred meters) upstream of the Stein reach (site 1) in 2008, known as the east fork slide project. Active suppression of non-native salmonids also occurs in the stream, and began in 2007. Electrofishing was used for three consecutive years to remove non-native trout from the lower 1.9 miles (3 kilometers) of the stream. Over that period several thousand fish were removed from the system (Moran and Storaasli 2009). Formal monitoring of the project will continue through 2013, although general monitoring of the stream is likely to continue for many years.

The following was modified from Washington Water Power (1996). The East Fork Bull River flows approximately 6.3 miles from St. Paul Lake in the Cabinet Mountains Wilderness Area to the Bull River. Average elevation drop is ~3.5%. Fish habitat in the lower portion of the stream is characterized by low gradient riffles and pools, and transitions to high gradient riffles and pools in the central and upper reaches. Substrate is dominated by cobble and rubble in high gradient reaches, with some minor amounts of sand and silt in low gradient reaches. There are generally low amounts of fine sediment. Riparian habitat is altered but functional and contributes to moderately high amounts of large woody debris, although low-cover, non-woody riparian vegetation is common. Compared with the average for the Lower Clark Fork River tributaries, fish densities in East Fork Bull River are high for cutthroat trout and brown trout, similar for bull trout, and relatively low for brook trout. In general, salmonid populations are limited by a combination of low amounts of spawning and rearing habitat and low habitat complexity. Bull trout growth and survival was lower than the average for Lower Clark Fork River tributaries. Genetic samples collected during 1993 indicated that bull trout in East Fork Bull River were not hybridized. Avista genetics data for the Lower Clark Fork Core Area indicate that this remains true.

The following was taken from Bernall and Duffy (2012). *A total of 214 adult bull trout have been transported and released in Cabinet Gorge Reservoir or its tributaries since 2001, including fish transported in multiple years. Between 2001 and 2010 transported bull trout constituted a large proportion, between 27 % and 73 %, of all adult bull trout captured in the*

East Fork Bull River. This trend continued in 2011, two of three (67 %) adult bull trout (> 400 mm) captured in weir traps in the East Fork Bull River being fish transported from Idaho. Weir traps are ineffective at capturing all adult bull trout moving into the drainage, so these numbers do not represent the entire spawning population for each year. But, results from a bull trout parentage study in East Fork Bull River showed that of 923 juvenile bull trout captured from 2008 through 2010, 17.2 % of these offspring assigned to at least one parent that had been transported upstream from below Cabinet Gorge Dam.

The following was taken from McCubbins et al. (2012). *When comparing 2010 and 2011 catch data to previous years, the number of juvenile bull trout captured was quite variable and peaked in 2010. Catch-per-unit-effort (CPUE) in the East Fork Bull River, monitored since 2005, peaked for both westslope cutthroat and bull trout in 2009 and 2010, but decreased to nearer baseline in 2011. As was noted previously, juvenile bull trout CPUE tends to mirror trends in redd counts with a 3-year lag. The most notable exception to this pattern occurred in 2010, in which CPUE was much greater than may have expected based on previous redd counts. This bump in CPUE was believed to be caused by an increase in young-of-the-year and age one bull trout survival facilitated by three consecutive years (2007 – 2009) of non-native salmonid suppression and expanded habitat due to higher flows and cooler water in 2008 and 2009 in this tributary.*

Capture trends at the weirs, despite inefficiencies noted, have depicted some of the contribution of transported adult bull trout to the reproductive potential of the East Fork Bull River. Prior to the adoption of genetically based transport protocols to upstream areas, an annual average of 37 adult bull trout were transported to the Cabinet Gorge Reservoir reach from 2001 to 2003; which resulted in a spike in transported adult captures and redds in the East Fork Bull River during this period. The relative proportion of upstream transported adults to the total number of adults captured during the time period in which sampling was conducted for a genetic parentage study (2004 – 2010) ranged from 0 – 73% with an average of 35%. These percentages of transported adults from weir captures may have overestimated the potential contribution of such fish when compared to the genetic analysis for 923 juveniles captured in the East Fork Bull River from 2009 – 2011; which documented that an average of 17% of these fish had at least one upstream transported parent. Or conversely, the genetic analysis may have underestimated the contribution of transports, due to sampling anomalies or other factors.

Over the eleven year record (2001 through 2011) of trapping adult bull trout in the East Fork Bull River, a total of 65 captures of non-transported adult bull trout have been recorded and 28 of these fish had been captured in previous years at an East Fork Bull River weir.

For all fish survey results that were located for East Fork Bull River and reported bull trout density per unit area, the average bull trout density was 0.011 fish per square yard or 0.013 per square meter (n = 85, 1992-2010).

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) East Fork Bull River is "Functioning at Risk" (see BO Appendix A, Table 1).

This determination was made with the qualification that "insufficient information" was available. The "Functioning at Risk" rating means the current baseline condition of Matrix parameters provide for persistence of bull trout but in more isolated populations and the current conditions may not promote recovery of the species or its habitat without active or passive restoration efforts.

Copper Gulch

Copper Gulch (a.k.a Copper Creek) flows 4.6 miles to Bull River (see BO Appendix A, Figure 7). Fish populations are considered primarily resident due to intermittent flow and degraded conditions in the lower reach of the stream. Bull trout are considered to have been historically present (Pratt and Huston 1993) but are currently absent. During a year 2012 survey, brook trout, brown trout, and rainbow/cutthroat trout hybrids (field identification) were captured in the lower reach. Cutthroat trout were abundant near the upper end of the perennial reach (see below) and were the only salmonid captured (MT Dept. of Fish, Wildlife, and Parks, reported in Kline and Savor 2012).

The remainder of this section on Copper Gulch was taken from Land and Water Consulting (2001). *Channel stability in the lower reach has been negatively impacted by extensive stream channelization and subsequent channel maintenance. For flood control purposes, the reach was bermed and confined to the crest of the alluvial fan in 1972, causing the channel to dewater during low flow periods and aggrade approximately 2 to 4 feet above the historic floodplain. The lower private bridge crossing was negatively impacting flow conveyance and sediment transport by restricting flow during spring runoff. The existing bridge encroached on the channel and prevented the unimpeded transport of water, sediment, debris and ice during peak flows. Suitable spawning, rearing, and overwintering habitat was limited and in poor condition. Factors affecting fish habitat included stream channelization, riparian alteration, channel clearing, and the high gradient nature of the drainage. In general, stream habitat consisted of shallow, riffle dominated habitat types due to a lack of pool-forming structures such as large woody debris. Unstable bedload accumulations prevented distribution of suitable spawning gravel. Suitable spawning substrates may occur in the lower reach upstream of the confluence with Bull River. However, this area is subject to seasonally intermittent flows that make upper reaches unavailable to fall spawners.*

The next surveyed reach extended upstream approximately 0.8 miles to where the stream channel dewatered. There were moderate amounts of large woody debris and relatively functional riparian areas. The reach was classified as Rosgen type B3, characterized by moderate slopes, step-pool bedform features, and moderate entrenchment ratios. Bank erosion potential was rated low to moderate in areas of past riparian logging. Riffles were dominant and pools were deeper than in the downstream reach. Substrate was dominated by cobble and large gravel and had low amounts of suitable size spawning gravels. Fish were observed throughout the reach.

The upper reach was characterized as a high-energy system with moderate amounts of large woody debris, and considerable amounts of bedload accumulations. The reach was more stable *and complex than the lower reach. Spawning habitat was limited to gravel accumulations behind obstructions. Adequate rearing and overwintering habitat was available in the form of deep, low-velocity areas of the channel and substrate interstices. A mid-summer water temperature of 5.5^{o}C was recorded.*

The KNF has determined, using the FWS Matrix population and habitat parameters, that overall (integrated rating) Copper Gulch is “Functioning at Unacceptable Risk” (see BO Appendix A, Table 1). This determination was made with the qualification that “insufficient information” was available. The “Functioning at Unacceptable Risk” rating means the current baseline condition of Matrix parameters contribute to the absence of bull trout from historical habitat, or bull trout are 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 ACTION

Following is the Service assessment of the effects on bull trout and bull trout habitat of the Plan proposed (KNF BA 2013) to offset adverse impacts to bull trout from the Montanore Project. The following discussion also addresses the basis for the Service’s conclusion that the Plan is not likely to be implemented and therefore could not be considered part of the Proposed Action in this BO.

Assessment of Bull Trout Mitigation Plan

As stated earlier in this Appendix, the Service worked with KNF and their designated consultant for a year in developing a mitigation plan that could offset adverse impacts of the Montanore Project. Although, the expected response of bull trout to successful bull trout mitigation measures would likely be an increase in bull trout numbers (instream habitat improvements, removal of non-native fishes, re-establishment of bull trout populations in unoccupied or under-occupied streams, creation of genetic reserves, and other measures), the KNF has not committed to implement these specific mitigation measures unless they are determined to be “needed” in the future to reduce affects. Since no commitment to implement these actions has been provided, the Service may not consider these mitigation actions to ameliorate any of the affects (or to minimize take) identified with the proposed action. Ultimately, the success of mitigation measures can only be verified by long-term monitoring of bull trout populations in the Action Area. Since planning and implementation of mitigation projects could take 5 years or more to accomplish, and since population level responses may need to be verified over two or more bull trout life cycles (7 year life cycle), verification of mitigation projects meeting their objectives could be 20 years or more into the future. Thus, in light of the lack of commitment to implement mitigation measures, the Service may not presume that mitigation will occur and that it will be successful (e.g. bull trout populations will respond positively) prior to adverse impacts occurring to bull trout or bull trout critical habitat.

In addition to specific mitigation measures identified in the Plan, the KNF proposes “adaptive or contingency mitigation” for any potential impacts to bull trout or its habitat that were revealed through monitoring. Any potential impacts that were projected to be minor or negligible in the KNF BA (2013) would be confirmed by monitoring. However, if monitoring determined that significant impacts occurred, then they would be offset by contingency mitigation. That is, if significant adverse effects to bull trout are documented from "minor impacts" during the monitoring program (a Fisheries Monitoring Plan is included in the Plan), then KNF proposes that measures will be taken to offset those unanticipated impacts. This approach presumes an as yet to be defined monitoring program will be adequate to identify unanticipated impacts and it suggests that further consultation with the Service will be required if mitigation for significant effects is needed. Because of lack of commitment to implement a monitoring plan and the uncertainties of future impacts that may or may not be mitigatable, the Service concludes that undefined mitigation actions are not likely to be implemented.

Mitigation Timing and Priority

As stated earlier in the BO (Section II. C. "Proposed Mitigation"), the Service has determined that certain elements of the KNF proposed Bull Trout Mitigation Plan are not likely to be implemented nor likely to be implemented in a timely manner. The reasons for this conclusion are twofold. First, the Bull Trout Mitigation Plan is prefaced by statements indicating a further hydrologic assessment would be completed during the first two years of the project (Resource Evaluation Phase); and, "once the hydrology model results are known, then an aggressive bull trout mitigation program could be focused to address the impacts predicted to occur well into the future" (KNF BA 2013). These statements imply that the proposed further hydrologic modeling would be performed to more clearly quantify the extent of streamflow depletions predicted to occur in the KNF BA (2013) proposed action. If this fourth round of hydrologic modeling (three modeling efforts formed the basis of the KNF BA) predicts streamflow depletions with different timing, duration, and/or quantity from the modeling predictions identified in the KNF BA (2013), then the effects of the new modeling results on bull trout would have to be re-analyzed (additional ESA Section 7 consultation). This would likely delay implementation of mitigation measures identified in the KNF BA (2013). Second, the mitigation proposed for predicted impacts to the Libby Creek bull trout population is inadequate in scope and expected population response to account for the adverse effects identified by the KNF BA (2013) and Service (in this BO). Flower Creek mitigation, which if implemented in a timely manner is likely to offset predicted and anticipated adverse effects to bull trout in Libby Creek, is deferred indefinitely as "a contingency to failed mitigation in Upper Libby Creek". Given the time frames (decades) expected for adverse and beneficial effects to be documented (KNF BA 2013), it is the Service's determination that Flower Creek mitigation proposals are not likely to be implemented in a timely manner.

The KNF Proposed Action includes mitigation measures in the Plan (KNF BA, Appendix A) which are intended to offset potential adverse impacts to bull trout and bull trout critical habitat attributable to the Proposed Action. The KNF BA (2013) estimated the number of bull trout that could be potentially gained (increases over existing bull trout density estimates) by successful implementation of mitigation measures in Libby, Flower, West Fork Rock, and Copper creeks. For Libby Creek, the KNF projected bull trout population increases ("add to existing population") are unlikely to occur (Service conclusion) because of the adverse effect of projected baseflow depletions on the existing bull trout population and critical habitat, and the likely adverse effects of increased water temperatures during low flow periods (bull trout spawning and egg incubation periods). Consequently, the Service does not agree with the priority and timing of mitigation planning and implementation proposed by KNF for the Kootenai Core Area streams.

Service analysis of Libby Creek bull trout mitigation plan implementation and timing:

The KNF proposed Bull Trout Mitigation Plan (KNF BA 2013, Appendix A) identifies time frames during which the proposed mitigation measures would be assessed for feasibility, planning and coordination would be performed, and implementation would be accomplished. Aside from some minor scheduling clarifications, the Service concurs with the KNF proposed Bull Trout Mitigation Plan with one exception. The KNF proposes that predicted and expected impacts to Libby Creek bull trout and their habitat be mitigated "on-site" by 1,476 feet (450 meters) of stream "…habitat improvements to increase the quality of available habitat" by "restoring a braided reach adjacent to the Libby Adit site" (Upper Libby Creek Bull Trout Conservation Project). Within the Kootenai Core Area, a more substantive mitigation project (Flower Creek Bull Trout Conservation Project) "…would be a contingency to failed mitigation in Upper Libby Creek". Because the long-term impacts to Libby Creek bull trout habitat (baseflow depletions) are projected to be most severe during the "Operation Phase" and continue at a severe level on through mine "Closure Phase", monitoring of bull trout population numbers in the habitat mitigation site would not be expected to reflect a response to the mining impact until well into the mining project. In other words, by the time population impacts are determined (for example, over several 7 year bull trout life cycles following mine closure), the population could well be at more than "unacceptable risk" to extirpation (this would make any substantive mitigation, such as the Flower Creek Bull Trout Conservation Project, untimely and unlikely to succeed since the donor stocks in Libby Creek could be well beyond salvage).

Additionally, the KNF proposed mitigation for Libby Creek is not substantial enough to offset the potentially severe impacts to that local bull trout population. The magnitude of potential bull trout population gains and habitat enhancement is not commensurate with the magnitude of potential impacts to those resources. The KNF BA (2013) suggests (see BO Appendix A, Table 2, and KNF BA Table 4) that their proposed mitigation reach of Libby Creek could support between an average of about 38 to 117 bull trout ((the higher estimated population numbers are based on the existing estimated number of bull trout per foot (3.28 feet = 1 meter), taken approximately 4,600 feet downstream from the proposed mitigation site and likely are a gross over-estimate of the actual numbers that could be supported in the proposed mitigation reach)). The KNF suggests that mitigation would be successful if the existing bull trout population level were "maintained or increased". However, bull trout numbers of the isolated bull trout population upstream of Libby Creek Falls are likely only in the 100's, at best, and maintenance of low numbers (10's) in a small reach (1,476 feet or 450 meters constitutes 19% of the KNF estimated bull trout occupied habitat upstream of Libby Creek Falls) would not constitute full "mitigation" for the entire population. Likewise, the objective of the proposed mitigation is to enhance 19% of the critical habitat potentially permanently affected (permanent baseflow depletions) by the proposed action through modification of stream structure through placement of "large formidable wood structures". This type of conservation action may provide a level of benefit to the affected stream reach, as regards desirable bull trout habitat, however, it does not directly benefit the function of critical habitat by replacing the same kind of impact (loss of streamflow is the adverse effect of the proposed action intended to be mitigated). The KNF objectives of the Bull Trout Mitigation Plan are "…to establish conservation actions that in the long-term would fully offset projected impacts from the mine project to bull trout populations and bull trout critical habitat". The proposed Upper Libby Creek Bull Trout Conservation Project falls short of these objectives on both counts (bull trout population and critical habitat). Additional conservation measures would be needed to meet the objectives.

Appendix A, Table 2. Potential benefits to bull trout populations due to proposed bull trout mitigation. (Adapted from KNF BA 2013)

	Stream	Reach Location (meter)		Estimated Number of Bull Trout Gained*	Reach Description (Various reaches are shown to indicate the range of possibilities for each stream)
		Lower	Upper		
Kootenai River	Libby Cr	43500	43950	maintain or add to existing population	Restore braided reach adjacent to Libby Adit Site
	Flower Cr	0	11877	1010	KNF assumed occupied reach
Lower Clark Fork River	W Fork Rock Cr**	0	1746	148	KNF assumed occupied reach
		0	3200	272	Mouth to natural barrier
		0	6661	566	Entire stream, including isolated population above natural barrier
	Copper Cr	670	2150	126	Upper reach that does not dry seasonally
		0	2150	183	Upper reach plus restore habitat in lower reach

*Based on 0.085 bull trout/m (average of existing bull trout density estimates from Tables 5.4.2.1-1 and 5.4.2.1-2).
**Low numbers of bull trout were documented in West Fork Rock Cr during 2012 by FS but were not factored into estimates.

While mitigating projected impacts "on-site" is a laudable objective, the Service has determined the magnitude and nature of projected impacts is such, and the sensitive nature of the subject bull trout population is such (small population size = high risk), that the concept of using limited stream habitat improvements ("large formidable wood structures") to offset the projected impacts would be inadequate to fully offset impacts. Consequently, the Proposed Action (Bull Trout Mitigation Plan), which calls for very long-term evaluation of the stream habitat improvements to determine their success, which may be judged as successful if current bull trout population numbers are maintained, is deemed untimely and of insufficient magnitude and type to offset effects to bull trout. This assessment (Service) is based on the magnitude of the short-term water temperature impacts (20+ years) to the bull trout population and critical habitat and the permanent impact (long-term) of baseflow depletions which would physically eliminate bull trout habitat and potentially disrupt hyporheic stream flows critical to bull trout spawning and egg incubation. These impacts (warming stream waters and depleting baseflows) may have catastrophic impacts to this small and "at risk" bull trout population. Therefore, in order to minimize the "take" of bull trout, the Service requires more timely additional mitigation actions be taken at the early stages of mine development (see Reasonable and Prudent Measures in the BO Incidental Take Statement, above; and Terms and Conditions in Appendix E, below).

Effects on Baseline Conditions (KNF and FWS perspectives)

The KNF BA (2013) analyses of "potential impacts of the Proposed Action on the environmental baseline" (see BO Appendix A, Table 1) predicts improving baseline conditions in several important bull trout occupied streams (and proposed mitigation streams) based on three assumptions about mitigation success. Regarding Libby Creek, the KNF BA "…assumes successful mitigation on upper Libby Cr., and does not rely on contingency mitigation on Flower Creek". As previously noted, the mitigation proposed for upper Libby Creek is of insufficient magnitude, "out-of-kind" compared to the adverse effects (limited stream habitat improvement to offset permanent baseflow depletions and warm water augmentation of adit water to the stream), and local bull trout population level success would be very difficult to verify in such a small mitigation action area. Based on this assumption, the KNF BA concludes that the proposed Flower Creek mitigation proposal (KNF BA 2013) would not be assessed or implemented until failure of the upper Libby Creek mitigation proposal has been documented. The Service views this approach as deficient for the reason previously outlined and it falls well short of the mitigation objective of fully offsetting projected adverse impacts to bull trout and designated bull trout critical habitat.

The KNF BA assessed potential impacts of the Proposed Action on both bull trout habitat and bull trout populations to determine if the Proposed Action would improve, maintain, or degrade the baseline condition. Following are general determinations made by KNF, followed by the FWS opinion of the KNF determination.

- Sediment input to all affected Action Area streams would be reduced overall and indefinitely after closure, but would be increased at some locations during some of the project phases. This would cause temporary negative impacts to bull trout and designated critical habitat, which were considered unquantifiable but adequately mitigated by the long-term reductions. The changes to sediment input are described below for each affected bull trout occupied stream. The Service agrees with the KNF assessment that short-term increases of sediment input followed by long-term decreased levels of sediment input would result in an improved stream habitat conditions in Action Area streams (including bull trout critical habitat). However, it does not necessarily follow that projected 2 – 4 year increases in sediment delivery to bull trout streams will only have "temporary negative impacts to bull trout" populations. The KNF BA (2013) points out: the low bull trout population levels present in bull trout occupied streams (high risk of population loss); the existing conflicts between brook trout and bull trout in both Core Areas that likely contributed to the loss of several local populations of bull trout; and, the likely benefit to brook trout populations of habitat disturbances such as increased sediment loads (see below). Because of these factors, and others like projected permanent baseflow depletions, the Service does not agree with the KNF conclusion that "negative impacts to bull trout…(were) adequately mitigated by the long-term reductions (in sediment)". Successful implementation of other mitigation measures would be needed to achieve some reasonable surety of "adequately mitigated".
- Impacts of potential baseflow changes are described below for each potentially impacted bull trout occupied stream. The Service agrees that significant adverse impacts to bull trout and bull trout critical habitat are likely to occur based on the projected baseflow

depletions in Libby Creek, EFBR, Rock Creek, and other bull trout occupied streams.

- Potential impacts of stream peak flow changes were considered negligible. The Service agrees with this assessment for all affected Action Area streams.
- Potential impacts of water quality changes, other than temperature, were considered negligible. The Service agrees with this assessment for all affected Action Area streams.
- Potential impacts of temperature changes that could result from the combination of factors that could impact temperature were assumed to be minor. The Service agrees with this assessment with the exception of projected increased water temperature impacts related to the addition of warm "adit water" to Libby Creek above the Falls. During baseflow conditions (fall and winter) the adit water is projected to double the baseflow with water that is significantly warmer than the stream water temperature. This impact occurs in a bull trout spawning and egg incubating section of Libby Creek. The Service does not agree that impacts of this level of water temperature change can be "assumed to be minor". The temperature of adit water is well above known water temperatures at which bull trout spawn and well above water temperatures of optimal bull trout egg incubation. Potential impacts include delay or postponement of spawning and decreased egg incubation survival. Both impacts could significantly affect reproduction of the relatively small population of bull trout residing in the impact zone and the upstream portions of Libby Creek.
- Impacts to bull trout or designated critical habitat due to impacts to riparian areas were considered minor**.** The Service agrees with this assessment.
- Potential impacts to bull trout due to benefits to non-native fish species were considered possible. It was assumed that any change (improvement or degradation) to streamflow or sediment inputs would benefit non-native fish species to the detriment of bull trout in streams where non-native species are currently known to co-occur with bull trout or do not occur but have unrestricted access. The Service agrees with this assessment, and suggests that evidence from streams in both Core Areas in the Action Area increases this assessment of impacts from "possible" to "probable".
- Potential impacts to fish passage other than those related to potential streamflow reductions would be negligible or beneficial at road crossings. The Service agrees with this assessment.
- Potential benefits to bull trout populations due to proposed bull trout mitigation are presented in BO Appendix A, Table 2. The Service agrees that BO Appendix A, Table 2 depicts a reasonable estimate of potential bull trout population increases from three proposed mitigation projects. The estimates are based on timely and effective implementation of the mitigation projects, and the estimates of potential gains disregard other factors that could negatively affect the subject bull trout populations. Note that the Service has determined that these three proposed mitigation projects for bull trout are unlikely to be implemented under the Bull Trout Mitigation Plan.

Species Response to the Plan

Although the expected response of bull trout to successful bull trout mitigation measures would be an increase in bull trout numbers (instream habitat improvements, removal of non-native fishes, re-establishment of bull trout populations in unoccupied or under-occupied streams, creation of genetic reserves, and other measures), the KNF has not committed to these specific mitigation measures unless they are “needed” in the future to reduce affects. Since no commitment to implement these actions has been provided, the Service may not consider these mitigation actions to ameliorate any of the affects (and minimize take) identified with the proposed action. Ultimately, the success of mitigation measures can only be verified by long-term monitoring of bull trout populations in the Action Area. Since planning and implementation of mitigation projects could take 5 years or more to accomplish, and since population level responses may need to be verified over two or more bull trout life cycles (7 year life cycle), verification of mitigation projects meeting their objectives could be 20 years or more into the future. Thus, the Service may not presume that mitigation will occur and that it will be successful (e.g. bull trout populations will respond positively) prior to adverse impacts occurring to bull trout or bull trout critical habitat.

Habitat and Critical Habitat Assessment

Potential impacts of the Proposed Action to RMO’s, MPI’s and designated critical habitat PCE’s for each stream in the Action Area were assessed by KNF and are presented collectively in the BO Appendix A, Table 1. Information in the text of the KNF BA (2013) and the information in the KNF BA tables do not necessarily report the same conclusions. For example, Table 5.5-9 (KNF BA 2013) shows Flower Creek’s baseline condition improving from an integrated rating of “functioning at unacceptable risk” to “functioning appropriately” with mitigation implementation, an improvement of two ranking levels. This improvement in baseline conditions is predicted to occur at the beginning of the Operation Phase (about year 6 of the project), however, the text states Flower Creek mitigation implementation is contingent upon failure of upper Libby Creek mitigation which would not be implemented until the Construction Phase with evaluation of the project to follow much later in time (this is also reflected in BO Appendix A, Table 1 which was adapted from the KNF BA). If KNF determined that the proposed Libby Creek mitigation project was a failure, then planning and assessment of potential bull trout benefits from the proposed Flower Creek project would be determined, followed by project design, implementation, and evaluation. Under these conditions, the benefits to the Flower Creek baseline condition could not occur in the magnitude, and not in the short time frame, predicted in the KNF BA (2013). As previously indicated, the Service has determined the KNF proposed Flower Creek mitigation project is not reasonably certain to be implemented for bull trout impacts in Libby Creek.

Regarding the KNF assumed benefits to bull trout populations from timely and successfully implemented mitigation projects, the Proposed Action postpones and qualifies the implementation of potentially the single most beneficial mitigation project considered (Flower Creek). Yet the BO Appendix A, Table 1 (adapted from KNF BA 2013, Table 3) rankings for Flower Creek (and the Libby Creek, Copper Creek, and West Fork Rock Creek mitigation projects) indicate these projects were assumed successfully implemented during the Construction Phase of mining. These ranking assumptions are premature since all proposed mitigation projects must go through a feasibility assessment process, implementation planning and collaboration, construction and implementation, and then long-term fisheries monitoring to determine the level of success (or not), and potentially followed by adaptive management changes or substitute mitigation projects (if a project is determined to be not feasible or monitoring indicates that it failed to meet its objectives). In the best case situation, mitigation projects would provide the benefits depicted to the specific streams in BO Appendix A, Table 2 (adapted from Table 6, KNF BA 2013). However, because of the uncertainties involved in successful mitigation implementation and the limiting qualifications proposed for Flower Creek mitigation, this best case situation is not realistic. Again, the Service finds it unlikely that the KNF proposed mitigation in Flower Creek for bull trout impacts in Libby Creek will be implemented.

Kootenai River Core Area

The KNF (BA 2013) concluded that the Kootenai River Core Area bull trout population was "…expected to benefit from the Proposed Action, with the proposed bull trout mitigation". As stated in the preceding section, this conclusion of beneficial effects to bull trout is overly optimistic because it assumes 1) short-term sediment increases to bull trout streams will be fully mitigated by measures to assure the long-term decreases in sediment levels, and by assuming that bull trout populations would survive and respond favorably to the improving conditions; 2) the proposed limited in-stream mitigation in upper Libby Creek will be successful and of a magnitude sufficient enough to offset the predicted impacts of baseflow depletions in Libby Creek upstream of the barrier falls; and 3) there will be no significant adverse impacts to bull trout and bull trout critical habitat from the warm water augmentation of flows in upper Libby Creek during baseflow conditions (when bull trout are attempting to spawn and bull trout eggs are incubating in the substrate). The KNF BA (2013) does state that, "it is possible that sediment reductions would benefit brook trout to the detriment of bull trout in streams where they co-occur or in streams where brook trout do not occur but have unrestricted access.", and that "mitigation in the Kootenai Core Area also accounts for this possibility." The first statement about detrimental effects of brook trout on bull trout populations is valid, but the second statement appears to be unsubstantiated as a Proposed Action in the BA (the baseline impact assessment at the Kootenai River Core Area level "assumes successful mitigation on upper Libby Cr. and does not rely on contingency mitigation on Flower Creek"). Beneficial and detrimental impacts of the Proposed Action are discussed below for individual streams, and collectively for the Kootenai Core Area.

Libby Creek. As previously stated, the KNF concluded that the baseline condition in Libby Creek would improve with mitigation implementation from a baseline integrated rating of "functioning at unacceptable risk" to a ranking of "functioning at risk". The Service has determined that this conclusion of an increasing beneficial condition in Libby Creek for bull trout and bull trout habitat is not supported for the following reasons.

The isolated population of resident bull trout above the falls on Libby Creek contributes to the population size and genetic diversity of the Kootenai Core Area. It also has value because its isolation provides protection from the threat of competition and hybridization with brook trout. However, this isolated population is vulnerable to loss via catastrophic events such as droughts, landslides, floods, or fire because there would be no opportunity for natural recolonization (Rieman and McIntyre 1995, FS and DEQ 2009). The past losses of bull trout populations in West Fork Rock Creek and Copper Gulch provide examples of the vulnerability of local populations to catastrophic declines.

The KNF BA (2013) claims that the impact of the Proposed Action to the isolated bull trout population and designated critical habitat above Libby Creek Falls would be beneficial to approximately 1,150 feet of occupied habitat downstream of station LB-300 in the short-term due to increased streamflow during low flow conditions and long-term decreased sediment inputs after temporary increases. The assessment of beneficial effects due to increased streamflow did not take into account that the supplemental water entering the stream would have a much higher water temperature than the stream water. As discussed elsewhere (BO Section V – Effects of the Action), significantly warming the stream water during bull trout spawning and egg incubation times may have unintended adverse impacts to bull trout reproduction. The BA further states that impacts to approximately 13,120 feet of occupied and presumably occupied habitat upstream of station LB-300 would be beneficial due to decreased sediment inputs, after temporary increases, and detrimental due to decreased streamflow during low flow conditions. These assessments of beneficial effects to bull trout due to long-term reductions in sediment input to the stream are likely overstated and have been discussed elsewhere. Habitat restoration proposed in the Bull Trout Mitigation Plan upstream of the Libby Creek Falls is intended to mitigate for detrimental impacts associated with potential flow reductions during low flow conditions. As previously stated, the limited amount of instream habitat enhancement is not of the magnitude (or type) to adequately offset permanent baseflow depletion impacts and warm water supplementation impacts to bull trout upstream of Libby Creek Falls. The BA concludes that “a conservative assessment is that the overall impact of the Proposed Action to the isolated resident bull trout and designated critical habitat upstream of Libby Creek Falls would be detrimental without this proposed mitigation (instream habitat enhancement)”. Because of the limited size and nature of the proposed instream habitat mitigation, the Service concludes that the Proposed Action would be detrimental to the bull trout population and to bull trout critical habitat even if this specific proposed mitigation measure was fully successful.

The KNF BA (2013) concluded that downstream of Libby Creek Falls, bull trout and designated critical habitat would benefit from decreased sediment inputs, after temporary increases, and would benefit from short-term increased streamflow during low flow conditions (although the raised water temperature issue was not considered). A conservative assessment is that the overall impact of the Proposed Action to bull trout and designated critical habitat in Libby Creek proper would be detrimental if streamflow is reduced during low flow conditions in the majority of the bull trout occupied reach above the falls. This conclusion is based on the limited occurrence of bull trout and limited evidence of spawning in Libby Creek downstream of the falls in the Action Area. As such, the benefits of sediment reduction throughout the stream in the Action Area might not compensate for the detrimental impacts of reduced streamflow during low flow conditions above the falls. Habitat restoration proposed in the Bull Trout Mitigation Plan upstream of the Libby Creek falls is intended to mitigate for detrimental impacts associated with potential streamflow reductions during low flow conditions. As previously noted, it is unlikely that the proposed in-stream habitat enhancement measure is of sufficient magnitude or type to fully offset adverse impacts to bull trout and bull trout critical habitat. As previously explained, the Service determined it is unlikely that the proposed mitigation in Flower Creek for impacts in Libby Creek contained in the Bull Trout Mitigation Plan will be implemented. For these reasons, the Service has determined that these conclusions of an increasing beneficial condition for bull trout and bull trout habitat in this system are not supported.

Big Cherry, Bear, Cable, Midas creeks, Fisher River, and West Fisher Creek. The KNF BA (2013) concludes that the only significant impact that was identified for Big Cherry Creek, Bear

Creek, Cable Creek, Midas Creek, Fisher River, and West Fisher Creek was temporarily increased input of sediment due to disturbances during road construction, road closures or road use, followed by long-term reductions in sediment input at mine closure. This includes designated bull trout critical habitat in Bear Creek and West Fisher Creek. No specific mitigation measures to minimize take in these drainages is proposed in the Plan; however, the Plan does provide for a Fisheries Monitoring Plan that track bull trout take and potentially provide corrective actions, if necessary.

Ramsey and Poorman Creeks. The KNF BA (2013) concludes that bull trout populations in Ramsey Creek and Poorman Creek would also benefit from long-term sediment reductions after temporary increases, however, conclusions regarding these two streams are complicated by predicted streamflow reductions during low flow conditions. No specific mitigation measures to minimize take in these drainages is proposed in the Plan; however, the Plan does provide for a Fisheries Monitoring Plan that track bull trout take and potentially provide corrective actions, if necessary.

Flower Creek. The KNF concluded that the baseline condition in Flower Creek would improve with mitigation implementation from a baseline integrated rating of "functioning at unacceptable risk" improving to a ranking of "functioning appropriately" (see BO Appendix A, Table 1). The Service concludes that if the proposed bull trout mitigation, including the Flower Creek projects, were to be implemented in a timely manner and were successful, then increased bull trout numbers could offset the risk of bull trout population declines elsewhere in the Kootenai Core Area. However, this conclusion does not appear realistic in that conditions are predicted to improve in Flower Creek to the "functioning at risk" level at the beginning of the Montanore Project (year one) when no mitigation actions have been proposed. Then after about 6 years conditions again improve to the "functioning appropriate" level (at the beginning of the Operation Phase) even though the Flower Creek "contingency mitigation" was assumed not to be necessary unless the in-stream mitigation effort in upper Libby Creek had failed. For reasons previously outlined, and because there is no apparent commitment to pursue Flower Creek mitigation in a timely manner, the Service has determined that these conclusions of an increasing beneficial condition in Flower Creek for bull trout and bull trout habitat are not supported.

Kootenai River Core Area Effects. The Service concludes that restoration of bull trout habitat in Flower Creek to support a secure genetic reserve of bull trout could offset projected long-term losses of bull trout designated critical habitat due to streamflow reductions during low flow conditions (and other adverse effects to bull trout and bull trout habitat). Successful and timely mitigation implementation would also lower the risk of catastrophic mine related incidents affecting the Libby Creek bull trout population, and could contribute materially to the survival and recovery of bull trout in the Kootenai River Core Area**.** Long-term and pre-project monitoring would be required to verify that both the predicted adverse effects of mining and the predicted beneficial effects of proposed mitigation activities were in balance to achieve the goal of adequate mitigation. However, as previously explained, the Service believes it is unlikely that the proposed Flower Creek mitigation contained in the Bull Trout Mitigation Plan will be implemented.

Lower Clark Fork River Core Area

The KNF BA (2013) concludes that the Lower Clark Fork River Core Area bull trout population would benefit from the Proposed Action. This conclusion is based on timely and successful implementation of proposed bull trout mitigation measures in the Plan. The KNF proposed bull trout mitigation projects are intended to offset adverse impacts to bull trout and bull trout designated critical habitat that would occur due to mining caused stream flow reductions predicted to occur during baseflow (low flow) conditions in both the Rock Creek and East Fork Bull River drainages. The Service disagrees with the assessment that bull trout populations in the Lower Clark Fork Core Area would benefit from the Proposed Action because the assessment appears to inadequately consider whether proposed mitigation will be timely and successful in order to address the significant adverse effects of predicted mine related impacts to two major bull trout local populations. Additionally, the KNF effects assessment based on Service Matrix parameters predicts significant and permanent degradation to important local bull trout populations. Beneficial and detrimental impacts of the Proposed Action are discussed below for individual streams, and collectively for the Lower Clark Fork Core Area.

East Fork Rock Creek and Rock Creek (mainstem)

The KNF BA (2013) concludes that bull trout populations and designated bull trout critical habitat would be negatively impacted by predicted streamflow reductions during low flow conditions. Maximum baseflow reductions in East Fork Rock Creek of 9% would occur after mine closure and continue indefinitely. This impact would be significant as this reach supports the known existing spawning habitat for the resident bull trout in Rock Creek. This flow depletion impact would not be adequately mitigated by the long-term reduction in sediment input (KNF BA 2013). Maximum baseflow reductions in mainstem Rock Creek are predicted to be 8% and would occur after the mine closure phase. This predicted flow depletion would increase existing low flow challenges to bull trout, including gaining access to the upper portion of the stream due to seasonally dry reaches blocking spawning migrations. The KNF BA (2013) contends that if predicted flow reductions were to increase the length, duration, or frequency of occurrence of the seasonally dry reaches, this might also decrease the probability of colonization by brook trout which reside in lower reaches of Rock Creek. Brook trout have not been reported to date in upstream portions of the drainage or in the East Fork or West Fork of Rock Creek. The seasonally dry reaches in Rock Creek are suspected as contributing to the absence of brook trout in East Fork Rock Creek (Salmon Environmental Services 2012). As part of the this Proposed Action, the KNF has proposed a brook trout removal mitigation project for the mainstem Rock Creek that would remove the brook trout threat from the upstream population of bull trout (see below). However, the Service has concluded that it is unlikely that the proposed brook trout removal mitigation project for the mainstem Rock Creek will be implemented.

The KNF concluded that the baseline condition in Rock Creek and East Fork Rock Creek ("functioning at unacceptable risk") would degrade during the initial Resource Evaluation Phase (two year period), then improve following mitigation implementation to a rating of "functioning appropriately" during the Construction and Operation Phases (about 20 years). Then at the mine Closure Phase predicted reductions in baseflow effects would cause the rating to degrade permanently to "functioning at unacceptable risk". Note, the KNF BA (2013) indicates two different Matrix ratings for Rock Creek in the summary table (adapted as Appendix A, Table 1 in this BO) and the more technical effects assessment table in the BA (the Service has determined that the technical table information is more accurate).

West Fork Rock Creek - The KNF BA (2013) suggests that proposed bull trout mitigation in West Fork Rock Creek and Rock Creek, if successful, would mitigate the detrimental impacts that would occur if predicted streamflow depletions occurred during low flow conditions. The basis for this KNF statement is if the limiting factors analyses for West Fork Rock Creek so indicate, mitigation measures in this drainage may be able to partially offset potential reductions of bull trout populations and impacts to designated critical habitat in the Rock Creek drainage and the Lower Clark Fork Core Area. In addition, the proposed removal of the brook trout population in lower Rock Creek would significantly lower the risk of brook trout invading the bull trout habitat further upstream. If brook trout removal from Rock Creek is feasible and implemented before brook trout invade upstream bull trout habitat, it could enhance the chances of success of any mitigation actions taken in West Fork Rock Creek and contribute to offsetting potential losses of bull trout in Rock Creek due to predicted baseflow depletions. Additionally, migratory bull trout are known to spawn and rear in the stream reach currently occupied by brook trout in lower Rock Creek. As such, removal of brook trout could contribute to offsetting losses to upstream bull trout populations in Rock Creek. The Service agrees that timely and successful implementation of proposed mitigation actions could mitigate, to some degree, the predicted impacts caused by the mining activities. However, it would be presumptuous to assume predicted impacts would be completely mitigated by the proposed mitigation projects before feasibility analyses have be performed, project implementation has taken place, and monitoring has validated successful accomplishment of mitigation objectives.

The Service concludes that if the proposed bull trout mitigation in West Fork Rock Creek were to be implemented in a timely manner and were successful, then increased bull trout numbers could offset the negative effects and risk of bull trout population declines elsewhere in Rock Creek drainage. The KNF concluded that the baseline condition in West Fork Rock Creek ("functioning at unacceptable risk") would improve to "functioning at risk" during the initial Resource Evaluation Phase (two year period) and Construction Phase (four year period), then improve following mitigation implementation to a rating of "functioning appropriately" during the Operation Phase and thereafter. However, this assessment does not reflect the proposed timing of mitigation actions in that conditions are predicted to improve in West Fork Rock Creek to the "functioning at risk" level at the beginning of the Montanore Project (year one) when no mitigation actions have been proposed. Then after about 6 years conditions again improve to the "functioning appropriately" level (at the beginning of the Operation Phase). The Service concludes that beneficial effects to bull trout could be accomplished in West Fork Rock Creek, but the timing and magnitude of change in "effects condition" may be overstated in the KNF BA (2013).). Further and as previously explained, the Service has concluded that it is unlikely the proposed brook trout removal mitigation project in Rock Creek and mitigation in West Fork Rock Creek contained in the Bull Trout Mitigation Plan will be implemented. For these reasons, the Service has determined that these conclusions of an increasing beneficial condition for bull trout and bull trout habitat in this system are not supported.

East Fork Bull River - The bull trout population and designated critical habitat in East Fork Bull River would be negatively impacted if streamflow reductions during low flow conditions were to occur (KNF BA 2013). No specific mitigation measures to minimize take in these drainages is proposed in the Plan; however, the Plan does provide for a Fisheries Monitoring Plan that track bull trout take and potentially provide corrective actions, if necessary.

Copper Gulch (Creek) - The KNF BA (2013) concludes that proposed bull trout mitigation in Copper Gulch, if successful, would mitigate the impacts that would occur if predicted streamflow in East Fork Bull River were to be reduced during low flow conditions. Fish passage restoration and bull trout reintroduction in Copper Gulch could potentially contribute to offsetting potential losses of bull trout numbers and impacts to designated critical habitat in East Fork Bull River and the Lower Clark Fork Core Area. The Service agrees that timely and successful implementation of proposed mitigation actions could mitigate, to some degree, the predicted impacts caused by the mining activities. However, it would be presumptuous to assume predicted impacts would be completely mitigated by the proposed mitigation project in Copper Creek before feasibility analyses have be performed, project implementation has taken place, and monitoring has validated successful accomplishment of mitigation objectives.

The KNF BA (2013) predicts that the baseline condition of Cooper Gulch for bull trout and bull trout habitat would improve in a condition from a level of "functioning at unacceptable risk" to a condition of "functioning at risk" at the beginning of the Resource Evaluation Phase through the Construction Phase (about 6 years). Then the effects assessment concludes that conditions would improve to "functioning appropriately" at the beginning of the Operations Phase and throughout the remainder of the mine life based on assumed successful implementation and verification of bull trout mitigation measures. The Service agrees with the KNF Matrix assessment. However and as previously explained, the Service believes it is unlikely that the proposed mitigation Copper Gulch (Creek) project contained in the Bull Trout Mitigation Plan will be implemented. For these reasons, the Service has determined that these conclusions of an increasing beneficial condition for bull trout and bull trout habitat in this system are not supported.

Summary of Lower Clark Fork Core Area Effects

The Service concludes that if the proposed bull trout mitigation, including the West Fork Rock Creek, mainstem Rock Creek (nonnative fish suppression), and Copper Creek projects, were to be implemented in a timely manner and were successful, increased bull trout numbers would partially offset the impacts to bull trout population declines (and minimize take) in the Lower Clark Fork River Core Area resulting from mining activities. Restoration of bull trout habitat (Copper Creek) to support a re-introduced population of bull trout would partially offset projected long-term losses of bull trout designated critical habitat due to predicted streamflow reductions during low flow conditions. Long-term monitoring would be required to verify that both the predicted adverse effects of mining and the predicted beneficial effects of proposed mitigation activities were in balance to achieve the goal of adequate mitigation. Conversely, as previously explained, the Service is not assured that the proposed bull trout mitigation including the West Fork Rock Creek, mainstem Rock Creek (nonnative fish suppression), and Copper Creek projects contained in the Bull Trout Mitigation Plan will be implemented and in a timely fashion.

Effects on Critical Habitat

The Proposed Action predicts beneficial effects of an in-stream habitat enhancement mitigation project located in Libby Creek upstream of Libby Creek Falls (KNF BA 2013). The beneficial effects of the project will potentially affect PCE Nos. 3 (food base), 4 (habitat complexity), and 6 (spawning and rearing substrate); the project is predicted to take place at the beginning of the

Construction Phase (about year 3 of the project). This would be a temporary beneficial effect to bull trout critical habitat because the life of the mitigation project and long-term maintenance commitments are unknown. However and as previously explained, the Service believes it is unlikely that the proposed mitigation contained in the Bull Trout Mitigation Plan for Libby Creek will be implemented.

A proposed Fisheries Monitoring Plan (KNF BA 2013, Appendix A) would verify the effectiveness of sediment abatement actions and if corrective or maintenance measures were deemed necessary by the KNF, then needed actions could be implemented through the Bull Trout Mitigation Plan mechanisms. These actions (sediment monitoring and corrective actions) would be beneficial to designated Critical Habitat if corrective actions, when identified as needed, were implemented.

Brook trout suppression in the Rock Creek drainage is a proposed mitigation action for the Montanore Project, and when implemented is expected to improve the baseline condition of designated Critical Habitat. This action would benefit PCE No. 9 (detrimental nonnative fish). The KNF BA (2013) proposes that this beneficial action will take place in about year 6 of project. A proposed Fisheries Monitoring Plan (KNF BA 2013, Appendix A) would verify the effectiveness of suppression actions and if corrective or maintenance measures were deemed necessary by the KNF, then needed actions could be implemented through the Bull Trout Mitigation Plan mechanisms. However, the Service has determined it is unlikely that this mitigation measure of the Bull Trout Mitigation Plan will be implemented in a timely manner.

CONCLUSION

The Service analyzed the effects of implementing the Plan as proposed and discusses deficiencies in the Plan because the Service views the Plan, <u>if modified</u>, as having the potential to reduce impacts ("incidental take") to bull trout from the Mine's adverse effects. The Service review of the objectives of the proposed bull trout mitigation measures indicate that a number of conservation actions in the long-term would fully offset projected impacts from the mine project to bull trout populations and bull trout critical habitat, including impacts initially determined to be minor or negligible (and risk of adverse impacts from catastrophic events). Bull trout mitigation was designed to increase resident and migratory populations in the two potentially impacted bull trout core areas; Lower Clark Fork River and Kootenai River. To this end, the Service has determined that projects were selected that are likely to maintain, create or improve self-sustaining local bull trout populations in stream reaches where they occurred historically but are currently absent, occur at low population densities, are at risk of invasion by non-native fish species, or are at risk of being detrimentally impacted by the proposed mining activities.

Appendix E of this BO contains Terms and Conditions needed to implement Reasonable and Prudent Measures which provide a means for KNF to minimize the extent and magnitude of incidental take of bull trout from activities of the Montanore Project. Appendix E (this BO) consists of the KNF Plan plus changes and modifications added by the Service to assure that adequate and timely minimization measures are implemented to address impacts to bull trout and critical habitat in Libby Creek and other bull trout streams affected by the Montanore Project. To assure implementation and timeliness of mitigation actions and to meet the intent of the ESA, the KNF and applicant must comply with these commitments.

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APPENDIX B. FWS MEMO DATED APRIL 20, 2006

United States Department of the Interior

FISH AND WILDLIFE SERVICE

911 NE 11th Avenue
Portland, Oregon 97232-4181

FWS/R1/AES-TE

Memorandum

APR 20 2006

To: Ecological Services Project Leaders
Idaho, Oregon, Washington

From: Assistant Regional Director-Ecological Services, Region 1
Portland, Oregon

Subject: Jeopardy Determinations under Section 7 of the Endangered Species Act for the Bull Trout

The purpose of this memorandum is to affirm that jeopardy determinations are made at the scale of the listed entity. In the case of the bull trout, the listed entity is the coterminous United States population (64 FR 58910). The preamble to the final listing rule for the bull trout at 64 FR 58930 further discusses application of the jeopardy standard relative to this species:

> Although this rule consolidates the five bull trout DPSs into one listed taxon, based on conformance with the DPS policy for purposes of consultation under section 7 of the Act, we intend to retain recognition of each DPS in light of available scientific information relating to their uniqueness and significance. Under this approach, these DPSs will be treated as interim recovery units with respect to application of the jeopardy standard until an approved recovery plan is developed. Formal establishment of bull trout recovery units will occur during the recovery planning process.

National policy, via the Director's March 6, 2006, memorandum on "Recovery Units and Jeopardy Determinations under Section 7 of the Endangered Species Act" and page 4-38 of the *Endangered Species Consultation Handbook*, establishes that:

> When an action impairs or precludes the capacity of a recovery unit 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, include in the biological opinion a description of how the action affects not only the recovery unit's capability, but the relationship of the recovery unit to both the survival and recovery of the listed species as a whole.

Based on the above, use the following analytical framework to make jeopardy determinations for Federal actions affecting the bull trout:

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1. In the *Status of the Species* section acknowledge that the bull trout is listed as threatened in the coterminous United States, cite the final listing rule and include the text quoted above, and concisely discuss the relationship between each of the interim recovery units and the survival and recovery of the coterminous United States population of the bull trout.

2. In the *Environmental Baseline* section concisely discuss the relationship between the action area and the survival and recovery function assigned to the affected interim recovery unit(s). Currently, the draft *Bull Trout Recovery Plan* recognizes the importance of viable bull trout core area populations in the conservation of the bull trout within the interim recovery units.

3. In the *Effects of the Action* section concisely discuss the significance of adverse and beneficial effects in relation to the role of the action area in the conservation of the bull trout at the interim recovery unit scale.

4. In the *Cumulative Effects* section concisely discuss the significance of adverse and beneficial effects in relation to the role of the action area in the conservation of the bull trout at the interim recovery unit scale.

5. In the *Conclusion* section concisely discuss how the effects of the action, taking into account any cumulative effects, are likely to influence the survival and recovery function assigned to the affected interim recovery unit(s) as the basis for determining if the proposed action is likely to appreciably reduce both the survival and recovery of the coterminous United States population of the bull trout in the wild.

If you have any questions regarding this guidance, please contact Larry Salata at (503) 231-2350.

cc: ARD-ES, CNO
ARD-ES, Region 6

APPENDIX C. BULL TROUT CRITICAL HABITAT PRIMARY CONSTITUENT ELEMENTS FROM 2010 REVISED CRITICAL HABITAT (2010 BT PCES & CROSSWALK)

APPENDIX C – Bull Trout Critical Habitat
Primary Constituent Elements
from 2010 Revised Critical Habitat (2010 BT PCES & CROSSWALK)

Table A. Primary constituent elements for bull trout critical habitat and associated habitat indicators.

PCE #	PCE Description	Associated habitat indicators
1	Permanent water having low levels of contaminants such that normal reproduction, growth and survival are not inhibited	sediment, chemical contamination/nutrients, peak/base flows
2	Water temperatures ranging from 2° to 15°C (36° to 59°F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence	temperature, refugia, average wetted width/maximum depth ratio in scour pools in a reach, streambank condition, change in peak/base flows, riparian conservation areas, floodplain connectivity
3	Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures	large woody debris, pool frequency and quality, large pools, off channel habitat, refugia, average wetted width/maximum depth ratio in scour pools in a reach, streambank condition, floodplain connectivity, riparian conservation areas
4	Substrates of sufficient amount, size, and composition to ensure success of egg and embryo over-winter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine substrate less than 0.63 cm (0.25 in) in diameter and minimal substrate embeddedness are characteristic of these conditions	sediment, substrate embeddedness, large woody debris, pool frequency and quality
5	A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, a hydrograph that demonstrates the ability to support bull trout populations	change in peak/base flows, increase in drainage network, disturbance history, disturbance regime
6	Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity	floodplain connectivity, change in peak/base flows, increase in drainage network, riparian conservation areas, chemical contamination/nutrients
7	Migratory corridors with minimal physical, biological, or chemical barriers between spawning, rearing, over-wintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows	life history diversity and isolation, persistence and genetic integrity, temperature, chemical contamination/nutrients, physical barriers, average wetted width/maximum depth ratio in scour pools in a reach, change in peak/base flows, refugia
8	An abundant food base including terrestrial organisms	growth and survival, life history diversity

	of riparian origin, aquatic macroinvertebrates, and forage fish	and isolation, riparian conservation areas, floodplain connectivity (importance of aquatic habitat condition-indirectly covered by previous 7 PCEs)
9	Few or no predatory, interbreeding, or competitive nonnative species present	Persistence and genetic integrity, physical barriers

Crosswalk to support primary constituent element analysis through the matrix of pathway indicators for bull trout

The crosswalk provides rationale supporting that the proposed PCEs for bull trout critical habitat are thoroughly addressed in the current matrix analysis and that environmental baseline and determination for effects to the species consists of a biological and habitat component addressing in total the PCEs listed in the rule for Critical Habitat.

1. ***Permanent water having low levels of contaminants such that normal reproduction, growth and survival are not inhibited.***

Flow conditions, such as perennial or ephemeral would be analyzed through *changes in peak/base flows,* and addressed in consideration of current base flows. Changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography would be considered. The level of contaminants is addressed directly by the analysis of *chemical contamination/nutrients* and *sediment*. Current listing under 303(d) status should be considered, as well as the causes for that listing. *Sediment* is considered a contaminant especially in spawning and rearing habitat and analysis would apply to this PCE.

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

This PCE is addressed directly by the analysis of *temperature*. It is addressed indirectly through consideration of *refugia*, which by definition is high quality habitat of appropriate temperature. Availability of refugia is also considered in analysis of *pool frequency and quality* and *large pools*. *Average wetted width/maximum depth ratio in scour pools* is an indication of water volume, which indirectly indicates water temperature, i.e., low ratios indicate deeper water, which in turn indicates possible refugia. This indicator in conjunction with *change in peak/base flows* is an indicator of potential temperature and refugia concerns particularly during low flow periods. *Streambank condition*, *floodplain connectivity* and *riparian conservation areas* address the components of shade and groundwater influence, both of which are important factors of water temperature. Stable streambanks and intact riparian areas, which include part of the floodplain, typically support adequate vegetation to maintain thermal cover to streams during low flow periods.

*3. **Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structure***

The analysis of *large woody debris*, such as current values and sources available for recruitment, directly addresses this PCE. Large woody debris increases channel complexity and creates pools and undercut banks. *Pool frequency and quality* would also directly address this PCE, showing the number of pools per mile as well as the amount of cover and temperature of water in the pools. *Average wetted width/maximum depth ratio in scour pools in a reach* is an indicator of channel shape and pool quality. Low ratios suggest deeper, higher quality pools. *Large pools,* consisting of a wide range of water depths, velocities, substrates and cover, are typical of high quality habitat and are a key component of channel complexity (USFWS 1998). An analysis of *off-channel habitat* would describe side-channels and other off-channel areas. *Streambank condition* would analyze the stability of the banks, including such features as undercut banks. The analysis of both *riparian conservation areas* and *floodplain connectivity* would directly address this PCE. Floodplain and riparian functions include the maintenance of habitat and channel complexity, the recruitment of large woody debris and the connectivity to off-channel habitats or side channels (USFWS 1998). Complex habitats provide refugia for bull trout and in turn, *refugia* analysis would assess complex stream channels. All of these habitat indicators consider the numerous characteristics of instream bull trout habitat and quantify critical components that are fundamental to creating and maintaining complex instream habitat over time.

*4. **Substrates of sufficient amount, size, and composition to ensure success of egg and embryo over winter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine substrate less than 0.63 cm (0.25 in) in diameter and minimal substrate embeddedness are characteristic of these conditions**.*

This PCE is addressed directly by analysis of *sediment* in areas of spawning and incubation and considers directly the size class composition of instream sediments, particularly fine sediments ≤63 mm. This PCE is also addressed directly by analysis of *substrate embeddedness* in rearing areas, which is a function of sediment size class and bedload transport. Both of these indicators would assess substrate composition and stability in relation to the various life stages of the bull trout as well as the sediment transportation and deposition. *Large woody debris* and *pool frequency and quality* affect sediment transport and redistribution within a stream and would indirectly assess substrate composition and amounts.

*5. **A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, a hydrograph that demonstrates the ability to support bull trout populations**.*

This PCE is addressed by analysis of *change in peak/base flows,* which considers changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography. Considering *increase in drainage network* and *disturbance history* provides further information. Roads and vegetation management both have effects strongly linked to a stream's hydrograph. *Disturbance regime* ties this information together to consider how a watershed reacts to disturbance and the time required to recover back to pre-disturbance conditions.

*6. **Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity.***

This PCE is addressed by analysis of *floodplain connectivity* and *riparian conservation areas*. *Floodplain connectivity* considers hydrologic linkage of off-channel areas with the main channel and over bank flow maintenance of wetland function and riparian vegetation and succession. Floodplain and riparian areas provide hydrologic connectivity for springs, seeps, groundwater upwelling and wetlands and contribute to the maintenance of the water table (USFWS 1998 Matrix of Pathways). The analysis of *changes in peak/base flows* would address subsurface water connectivity. *Increase in drainage network* would address potential changes to groundwater sources and subsurface water connectivity. *Chemical contamination/nutrients* would address concerns regarding groundwater water quality.

*7. **Migratory corridors with minimal physical, biological, or chemical barriers between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows.***

The biological indicator *life history diversity and isolation* addresses the function of migration and/or subsequent isolation with respect to the population. The biological indicator *persistence and genetic integrity* indirectly reflects the status of migratory corridors. Physical, biological or chemical barriers to migration are addressed directly through water quality habitat indicators, including *temperature*, *chemical contamination/nutrients* and *physical barriers*. The analysis of these indicators would assess if barriers have been created due to impacts such as high temperatures, high concentrations of contaminants or physical barriers. Analysis of *change in peak/base flows* and *average wetted width/maximum depth ratio in scour pools in a reach* would assess whether changes in flow might create a seasonal barrier to migration. An analysis of *refugia,* which considers the habitat’s ability to support strong, well distributed, and connected populations for all life stages and forms of bull trout, would also be pertinent to this PCE.

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

An analysis of *floodplain connectivity* and *riparian conservation areas* would assess these contributions to the food base. Floodplain and riparian areas provide habitat to aquatic invertebrates, which in turn provides a forage base to bull trout (USFWS 1998). This PCE is indirectly addressed through the biological indicator of *growth and survival* and *life history diversity and isolation*. Both of these indicators look at habitat quality and subpopulation condition, which provides information on food base. This PCE is a synthesis of the previous PCEs. It is addressed through the analysis of biological and habitat indicators in that, if a bull trout population either exists or could exist in a watershed, then there is an adequate forage base. A healthy habitat provides a forage base for the target species. Any potential impairment to the forage base has been addressed by way of summarizing the biological and habitat indicators.

9. ***Few or no predatory, interbreeding, or competitive nonnative species present.***

This PCE is addressed specifically by analysis of the biological indicator *persistence and genetic integrity*. This indicator analyzes the probability of hybridization or displacement by competitive species. An analysis of *physical barriers* may indirectly address non-native species in those areas where a barrier may prevent the invasion of non-native species.

APPENDIX D. FWS MEMO DATED DEC 9, 2004

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

In Reply Refer To:
FWS/AES/DCHRS/019634

December 9, 2004

Memorandum

To: Regional Directors, Regions 1, 2, 3, 4, 5, 6, and 7
Manager, California-Nevada Operations Office

From: Acting Director [signature]

Subject: Application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act

Recent litigation has focused on the regulatory standard for determining whether proposed Federal agency actions are likely to result in the "destruction or adverse modification" of designated critical habitat under Section 7(a)(2) of the Endangered Species Act (ESA). On August 6, 2004, the Ninth Circuit Court of Appeals rendered a decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, No. 03-35279, finding that the Service's regulatory definition of "destruction or adverse modification" of critical habitat, at 50 C.F.R. § 402.02, is contrary to law. Previous Federal court rulings have reached similar conclusions (see *Sierra Club v. U.S. Fish and Wildlife Service*, 245 F.3d 434 (5th Cir. 2001) (held regulation to be facially invalid); *American Motorcycle Ass'n District 37 v. Norton*, Civ. No. C03-0209-S.I. (N.D. Cal., Aug. 3, 2004) (California Desert Conservation Area case)). Due to the strategic importance of the 9th Circuit ruling, the potential effects of the ruling on recent and prospective biological opinions, and the need for interim measures to be in place while the Department proceeds with a proposed rulemaking early next year that addresses this ruling, the following guidance is provided to Service biologists conducting Section 7 consultations pending the adoption of any new regulatory definition of "destruction or adverse modification."

Destruction or adverse modification determinations will be made using the analytical framework described below. First, however, I (along with our counsel in the Solicitor's Office) want to emphasize that when we conduct a Section 7 consultation that involves the evaluation of whether a Federal agency action is likely to destroy or adversely modify designated critical habitat, we do **not** cite to or use the regulatory definition of "destruction or adverse modification" at any point in the consultation process. In fact, our biological opinion should state explicitly that we do not rely on this regulatory definition, using this language:

> "This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat."

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Analytical Framework for Adverse Modification Determinations

Until we have promulgated a new regulatory definition of "destruction or adverse modification," our evaluation of effects to proposed or designated critical habitat should consider the statutory concepts embodied in Sections 3 (the definitions of "critical habitat" and "conservation"), 4 (the procedures for delineating and adjusting areas included in a designation), and 7 (the substantive standard in paragraph (a)(2) and the procedures in paragraph (b)). The analytical framework described here will guide Service biologists in applying these considerations in Section 7(a)(2) consultations on Federal actions that may affect designated critical habitat, and to Section 7(a)(4) conferences on proposed critical habitat, when conference is requested by the Federal action agency. The following framework is intended to be applied as a whole since the individual parts have no meaning outside of the context of this guidance.

1. In the "Status of the Species/Critical Habitat" analysis in the biological opinion, discuss the entire designated critical habitat area in terms of the biological and physical features that are essential to the conservation (discussion of "survival" in this and other sections of the adverse modification analysis is not appropriate) of the species. This analysis should identify and discuss the primary constituent elements of the critical habitat (as described in the final rule) and, very importantly, the current condition, the factors responsible for that condition, and the conservation role of individual critical habitat units.

   Many critical habitat designations pre-date the requirement for identification of primary constituent elements that are essential for the conservation of the listed species. In consultations on actions that involve this type of critical habitat, the best available scientific and commercial data should be used to determine and document these elements or habitat qualities.

2. In the "Environmental Baseline" analysis, discuss the current condition of the critical habitat unit(s) in the action area, the factors responsible for that condition, and the conservation roles of the unit(s), with appropriate supporting documentation. In particular, discuss the relationship of the affected unit(s) in the action area to the entire designated or proposed critical habitat with respect to the conservation of the listed species, unless the proposed or final rule designating critical habitat has already clearly done so.

   Based on the results of this analysis, we will have a clear and credible basis for determining the significance of any adverse or beneficial effects of the action (and cumulative effects) on the function and conservation role of the affected unit(s).

3. In the "Effects of the Action" analysis, characterize the direct and indirect effects of the action and those of interrelated and interdependent actions on the proposed or designated critical habitat. Describe how the primary constituent elements or habitat qualities essential to the conservation of the species are likely to be affected and, in turn, how that will influence the function and conservation role of the affected critical habitat unit(s). This part of the analysis should focus exclusively on the effects to critical habitat. Conservation activities (e.g., management, mitigation, etc.) outside of critical habitat should not be

considered when evaluating effects to critical habitat. Based on the analyses under (1) and (2) above, discuss the significance of anticipated effects to critical habitat.

4. In the "Cumulative Effects" analysis, characterize the effects of future, non-Federal actions reasonably certain to occur in the action area in terms of how the primary constituent elements or habitat qualities essential to the conservation of the species are likely to be affected and, in turn, how that will influence the function and conservation role of the affected critical habitat unit(s). Based on the analyses under (1) and (2) above, discuss the significance of these anticipated effects to critical habitat.

5. In the "Conclusion" section, following the standard text, present the reasons why we reached our 7(a)(2) conclusion. Discuss whether, with implementation of the proposed Federal action, critical habitat would remain functional (or retain the current ability for the primary constituent elements to be functionally established) to serve the intended conservation role for the species, based on the analyses under (1) **through** (4) above.

Reevaluation of Existing Biological Opinions

Over the next few months Federal action agencies are likely to examine, in the context of the 9th Circuit ruling in *Gifford Pinchot*, consultations that have been completed on a variety of Federal actions. The Solicitor's Office has advised us that this review should not be premised on the theory that the ruling has necessarily invalidated all existing opinions. We recognize, however, that these reviews may result in a number of requests for reinitiation of formal consultation to examine more closely "no destruction or adverse modification" conclusions. This analytical framework should be used in any reinitiated consultations. Please work with the action agencies to give the appropriate priority to any reinitiated consultations, in light of other consultations with these agencies and your available resources.

This guidance is provided to enhance national consistency in the conduct of Section 7 consultations (and conferences) where effects to designated (and proposed) critical habitat are being evaluated, in light of recent Court decisions; it does not set forth binding legal interpretations. This guidance will be in effect until a new regulation has been adopted or revised guidance issued. Please contact Patrick Leonard, Chief, Division of Consultation, Habitat Conservation Planning, Recovery, and State Grants, at (703) 358-2171 if you have any questions.

APPENDIX E. TERMS AND CONDITIONS (FROM INCIDENTAL TAKE STATEMENT SECTION VIII OF BO)

Appendix E – Terms and Conditions (from Incidental Take Statement section VIII of BO)

Terms and Conditions

The Proposed Action in the KNF BA (2013, Appendix A) includes a Bull Trout Mitigation Plan that proposes specific mitigation measures that could minimize the take of bull trout resulting from adverse effects of predicted water depletions, predicted increased water temperatures in Libby Creek, and predicted increases in sediment. Each mitigation measure is proposed with specific timing for implementation related to dates of KNF authorization of particular mine phases of the Montanore Project. The timing of mitigation implementation is related to uncertainties in determining mitigation measure feasibility and to determining achievement and documentation of biological success of mitigation actions. However, some statements in the KNF's Bull Trout Mitigation Plan text suggest that timing of mitigation measures or prioritization of measures could be dependent upon further studies (hydrology and modeling studies). The Service has determined that timing of implementation measures to minimize take should most appropriately be linked to feasibility assessments and verification of success, rather than to further studies. The Service has further determined that because of the qualifying statements, it is unlikely that KNF's Bull Trout Mitigation Plan will be implemented in its entirety and unlikely to be implemented in a timely manner and therefore cannot be considered to minimize the effects of the proposed action in this BO.

The terms and conditions of this Biological Opinion are intended to do the following: 1) clarify commitments and timing regarding implementation of measures contributing to minimization of incidental take of bull trout (and other details) proposed in the KNF BA (2013), 2) focus appropriate monitoring activities to assure the success of projects to minimize take, and 3) verify that the specified level of take is not exceeded and allow changes to mitigation projects as new information is collected. In addition, several minor modifications to timing of the KNF Proposed Action are included to account for minimization of take measures determined to be necessary by the Service (especially pertaining to proposed mitigation measures identified to offset adverse impacts to bull trout predicted to occur in Libby Creek).

In order to be exempt from the prohibitions of section 9 of the Act, KNF shall comply and shall require MMC to comply with the following terms and conditions which implement the Reasonable and Prudent Measures (see Incidental Take Statement, section VIII, described above). These Terms and Conditions are non-discretionary.

The Following Terms and Conditions are established to Implement Reasonable and

Prudent Measure #1:

1. MMC, under direction of the FS, will implement the following actions prior to and/or during the Resource Evaluation phase of the Montanore Project:

   a. Prior to FS authorization to initiate the Resource Evaluation Phase for the Montanore Project, MMC will prepare for FS approval, in consultation with the Service and Montana Fish Wildlife and Parks (MFWP), a bull trout mitigation guidance plan specific to each bull trout Core Area potentially affected by the Project. The Core Area Bull Trout Mitigation Guidance Plans (Kootenai River and Lower Clark Fork River Core Areas) will identify and quantitatively evaluate potential bull trout population effects, potential habitat effects, and overall bull trout conservation effects of specific mitigation concepts described below in the "Conceptual Bull Trout Mitigation Plan" section. These potential beneficial effects of proposed mitigation actions will be compared to predicted adverse effects to bull trout populations identified in the KNF BA (2013) and this BO. The Core Area Bull Trout Mitigation Guidance Plans will identify success criteria and monitoring effort (see 8, below) needed to verify that objectives of the subject mitigation proposals have been met. The Core Area Bull Trout Mitigation Guidance Plans will be finalized and approved by the FS, following consultation with the Service and MFWP, within 6 months of MMC receiving final authorization from the FS to initiate the Resource Evaluation Phase.

   b. Within 6 months of MMC receiving final authorization from the FS to initiate the Resource Evaluation Phase, MMC will employ or fund a local Bull Trout Mitigation Coordinator to lead MMC planning, coordination, implementation, and monitoring activities. Method of employment and personnel selection for the Coordinator position will be approved by the FS in consultation with the Service. MMC will commit to employment of the Coordinator position (including administrative, staff, and other support), or provide funding in advance, in 5-year increments for the life of the mine and through the Closure and Reclamation phase, or as otherwise agreed by FS in consultation with the Service (assuming the sequential mining phases proceed following the Resource Evaluation Phase). The MMC (Coordinator) will prepare annually, by January 1 of each year, for Forest Service approval, in consultation with FWS, annual work plans, including: identification of data collection needs; proposed feasibility studies; engineering design needs; and implementation planning documents necessary to accomplish mitigation actions identified in Core Area Bull Trout Mitigation Guidance Plans (see 1.a.. above), and/or other mitigation actions determined appropriate by FS in consultation with FWS; and MMC funding needed in the calendar year to fully complete these tasks. Same Coordinator will prepare by March 1 of each year for FS approval, in consultation with FWS, annual completion reports describing activities undertaken in the previous calendar year and the status of those activities and results of any studies conducted.

c. Within one calendar year of issuance of the FS authorization to implement the Resource Evaluation Phase of the Montanore Project, MMC will prepare for FS approval, in consultation with MFWP and the Service (and other stakeholders deemed appropriate by the FS), a feasibility assessment of actions needed (with tasks, costs, scheduling, etc.) to further develop mitigation planning and implementation of the Libby Creek mitigation project, see "Conceptual Bull Trout Mitigation Plan", below. Prior to submittal to the FS for approval of the Libby Creek mitigation project feasibility assessment, MMC will conduct a meeting to facilitate consultation with the MFWP, FS, Service, and other appropriate regulatory agencies and stakeholders as determined by the FS. Final designs by MMC and construction authorizations by FS, if the project is deemed feasible by the FS in consultation with the agencies, will be completed within one year of FS approval of the feasibility assessment.

d. Within one calendar year of issuance of the FS authorization to implement the Resource Evaluation Phase of the Montanore Project, MMC will prepare for FS approval, in consultation with the City of Libby, MFWP and the Service (and other stakeholders deemed appropriate by the Forest Service), a feasibility assessment of actions needed (with tasks, costs, scheduling, etc.) to further develop mitigation planning and implementation of the Flower Creek mitigation project, see "Conceptual Bull Trout Mitigation Plan", below. Prior to submittal to the FS for approval of the Flower Creek mitigation project feasibility assessment, MMC will conduct a meeting to facilitate consultation with the City of Libby, MFWP, FS, Service, and other appropriate regulatory agencies and stakeholders as determined by the FS. Final designs by MMC and construction authorizations by FS, if the project (or components thereof) is deemed feasible by the FS in consultation with the agencies, will be completed within one year of FS approval of the feasibility assessment.

e. Within one calendar year of issuance of the FS authorization to implement the Resource Evaluation Phase of the Montanore Project, MMC will prepare for FS approval, in consultation with MFWP, Avista Corporation (Avista), Revett RC Resources Corporation (Revett), and the Service (and other stakeholders deemed appropriate by the FS), a feasibility assessment of actions needed (with tasks, costs, scheduling, etc.) to further develop mitigation planning and implementation of the Rock Creek Invasive Species Eradication Project, see "Conceptual Bull Trout Mitigation Plan", below. Prior to submittal to the FS for approval of the Rock Creek mitigation project feasibility assessment, MMC will conduct a meeting to facilitate consultation with Avista, Revett, MFWP, FS, Service, and other appropriate regulatory agencies and stakeholders (as determined by the FS). Final implementation plans (prepared by MMC in consultation with the entities, above) and permitting authorizations by FS and other agencies, if the project is deemed feasible by the FS in consultation with the agencies, will be completed within one year of FS approval of the feasibility assessment.

f. Within one calendar year of issuance of the FS authorization to implement the Resource Evaluation Phase of the Montanore Project, MMC will prepare for FS approval, in consultation with MFWP and the Service (and other stakeholders deemed appropriate by the FS), a feasibility assessment of actions needed (with tasks, costs, scheduling, etc.) to further develop mitigation planning and implementation of the Copper Gulch mitigation project, see "Conceptual Bull Trout Mitigation Plan", below. Prior to submittal to the FS for approval of the Copper Creek mitigation project feasibility assessment, MMC will conduct a meeting to facilitate consultation with the affected land owners, MFWP, FS, Service, and other appropriate regulatory agencies and stakeholders as determined by the FS. Final designs by MMC, land owner agreements, and construction authorizations by FS, if the project is deemed feasible by the FS in consultation with the agencies, will be completed within one year of FS approval of the feasibility assessment.

g. Within one calendar year of issuance of the FS authorization to implement the Resource Evaluation Phase of the Montanore Project, MMC will prepare for FS approval, in consultation with MFWP and the Service (and other stakeholders deemed appropriate by the FS) a feasibility assessment of actions needed (with tasks, costs, scheduling, etc.) to further develop mitigation planning and implementation of the West Fork Rock Creek mitigation project, see "Conceptual Bull Trout Mitigation Plan", below. Prior to submittal to the FS for approval of the West Fork Rock Creek mitigation project feasibility assessment, MMC will conduct a meeting to facilitate consultation with the MFWP, FS, Service, and other appropriate regulatory agencies and stakeholders as determined by the FS. Final designs by MMC and construction authorizations by FS, if the project is deemed feasible by the FS in consultation with the agencies, will be completed within one year of FS approval of the feasibility assessment.

h. During the Resource Evaluation Phase and prior to development and signing of MOU(s) (see below), MMC will commit to fund the Bull Trout Mitigation Coordinator position (including needed support; see 1. b.), development of annual work plans, and annual completion reports, development of two Bull Trout Core Area Mitigation Guidance Plans, a Fisheries Monitoring Plan, preliminary mitigation project feasibility assessments (Upper Libby Creek Project, Flower Creek Project, Rock Creek Invasive Species Eradication Project, Cooper Creek Project, and West Fork Rock Creek Project), and any supporting studies needed to complete the tasks as deemed appropriate by FS in consultation with MFWP and Service.

2. MMC, under direction of the FS, will implement the following actions during the Resource Evaluation Phase (which commences at the date of final FS authorization to initiate the Resource Evaluation Phase of the Montanore Mine Project) and prior to MMC receiving FS authorization to begin the Construction phase:

    a. Prior to FS authorization to initiate the Construction phase, MMC will establish a trust fund and/or post a bond, to adequately fund implementation costs (planning, development, construction, and monitoring) during the Construction phase of the overall Bull Trout Mitigation Plan (KNF BA 2013), the two Core Area Bull Trout Mitigation Guidance Plans (specifically including projected costs of implementing the Libby Creek mitigation project, Flower Creek mitigation project, Rock Creek mitigation project, Copper Gulch mitigation project, and West Fork Rock Creek mitigation project (see 1. c. through g, above), and the Fisheries Monitoring Plan (see 8, below). The amount in the trust fund or posted in a bond will be approved by the FS in consultation with the Service (and other stakeholders as determined by the FS), and will be commensurate with projected mitigation planning, coordination, study, monitoring, design, construction, and other conservation activities needed to accomplish the mitigation projects in a timely manner, as will be defined in the Core Area Bull Trout Mitigation Plans and the Fisheries Monitoring Plan (items 1. a., above; and 8, below). If implementation costs during the Construction phase of the above items exceed the amount deposited in the trust fund or posted in a bond, then MMC will contribute additional funds to fully implement those actions in a timely manner as determined by the FS in consultation with the Service.

    b. Prior to FS authorization of the Construction Phase, an initial deposit will be made to the trust fund, 2. a. above, designated for planning, development, and construction of: Upper Libby Creek project (see 1. c. above) which will involve habitat enhancement, restoration and population monitoring; Flower Creek Project (see 1. d. above); the Rock Creek Invasive Species Eradication Project (see 1. e. above); Copper Creek

Project (see 1. f. above); and, West Fork Rock Creek Project (see 1. g. above). If implementation costs during the Construction Phase for these projects exceed the amount deposited in the trust fund, then MMC will contribute additional funds to fully implement and monitor those actions in a timely manner (as determined by the FS in consultation with the Service).

c. Prior to FS authorization of the Construction Phase, MMC will separately commit ((MOU(s), below)) to fund during the Construction Phase all costs associated with the Bull Trout Mitigation Coordinator and support (if that position is filled by a MMC employee or contractor), and to costs of funding activities in 1. h., above (if implementation of 1. h. activities occurs during the Construction Phase; see 1. b. and 1. h.).

d. Prior to FS authorization of the Construction Phase, and not later than two calendar years from FS issuance of authorization to implement the Resource Evaluation Phase for the Montanore Project, MMC will prepare an overall bull trout mitigation audit report detailing and quantifying progress toward accomplishment of bull trout mitigation objectives. Findings and MMC recommendations will be presented for approval by the FS, in consultation with the Service and MFWP. The purpose of the mitigation audit report will be to determine if and what adaptive management changes will be required by the FS to the Bull Trout Core Area Mitigation Guidance Plans, Fisheries Monitoring Plan, or MOU(s) (see below) prior to authorization of the Construction Phase in order to meet the objectives of the KNF proposed Bull Trout Mitigation Plan and terms and conditions of this biological opinion intended to minimize the take of bull trout.

e. Prior to completion of the Resource Evaluation phase, the FS and MMC will develop and sign a Memorandum of Understanding (MOU): The FS will develop a MOU with MFWP, MMC, and other cooperating parties deemed appropriate by the FS. The Service will be an advisor in the development of the MOU. The MOU must be completed prior to the FS issuing MMC a letter of authorization to proceed with the Construction Phase, and not later than two calendar years from the date of final FS authorization to implement the Resource Evaluation Phase for the Montanore Project. The MOU will identify and define FS roles, responsibilities and time lines for insuring diligent implementation by MMC and compliance with tasks identified, and annually approved by the FS, in the Bull Trout Mitigation Plan (KNF BA 2013), Core Area Bull Trout Mitigation Guidance Plans (item 1. a, above), Fisheries Monitoring Plan (item 8, below), and terms and conditions of this biological opinion.

The MOU would require the FS to:

i. Ensure the Core Area Bull Trout Mitigation Guidance Plans and the Fisheries Monitoring Plan are completed, and approved, prior to completion of the Resource Evaluation phase of the mine.

ii. Establish, in consultation with the Service, time frames, consistent with the Bull Trout Mitigation Plan (KNF BA 2013), Core Area Bull Trout Mitigation Guidance Plans, Fisheries Monitoring Plan, mitigation plan development assessments (1. c. through g., above), and terms and conditions of this biological opinion.

iii. Ensure adequate funding is planned for and provided annually, from MMC, to fund the Trust Fund (2. a. and b., above), the Bull Trout Mitigation Coordinator position (including administrative, office, transportation, and needed field equipment expenses), and to fund implementation of the mitigation measures identified in the previous terms and conditions of this biological opinion.

iv. Comply with legal guidelines and permitting processes in a timely manner to meet implementation schedules identified in pertinent plans, including the Core Area Bull Trout Mitigation Guidance Plans and Fisheries Monitoring Plan, and annual work plan schedules approved by the FS.

v. Ensure that the Service is consulted annually to determine if implementation of mitigation measures, and progress toward their accomplishment, is adequate to meet the requirements of the Biological Opinion, including mandatory Reasonable and Prudent Measures and their implementing Terms and Conditions to minimize the take of bull trout.

3. MMC, under direction of the Forest Service, will implement the following actions during the Construction phase and not later than 5 years after FS authorization to initiate the Construction phase:

   a. Within 5 years of MMC receiving FS authorization to commence the Construction Phase, MMC will fully <u>complete</u>, unless otherwise agreed to by FS in consultation with the Service, <u>implementation of mitigation measures</u> identified, and approved by FS in consultation with FWS, in the overall Bull Trout Mitigation Plan (KNF BA 2013), the two Core Area Bull Trout Mitigation Guidance Plans (specifically including the Libby Creek, Flower Creek, Rock Creek, Copper Gulch, and West Fork Rock Creek mitigation projects, see 1. a, and 1. c. thru g, above), and continuation of the Fisheries Monitoring Plan (see 8, below).

   b. Throughout the Construction Phase, MMC will separately <u>commit</u> (see 2. a. and b, above) <u>to fund</u> and otherwise support all costs and activities associated with the Bull Trout Mitigation <u>Coordinator</u> (see 1. b., 1. h., and 2. c., above) (including administrative support), and to completing activities in 1. h. (above), if implementation of 1. h. activities occurs during the Construction phase.

4. MMC, under direction of the FS, will implement the following actions prior to receiving FS approval to begin the Operations phase:

   a. Prior to FS authorization to initiate the Operations Phase, MMC will contribute funds to the trust fund and/or post a bond (2. a, above), to fund any remaining implementation costs during the Operations phase of the overall Bull Trout Mitigation Plan (KNF BA 2013), the two Core Area specific Bull Trout Mitigation Guidance Plans, and continuation of the Fisheries Monitoring Plan. The amount in the trust fund or posted in a bond will be approved by the FS in consultation with the Service (and other stakeholders as determined by the FS), and will be commensurate with projected mitigation planning, coordination, study, monitoring, design, construction, and other conservation activities needed to accomplish the mitigation projects in a timely manner within the Operations Phase of the Montanore Mine Project, as defined in the Core Area Bull Trout Mitigation Guidance Plans and the Fisheries Monitoring Plan (items 1. a. and 8.).

   b. MMC will separately commit to funding costs associated with the Bull Trout Mitigation Coordinator (see 1. b., 1. h., 2. c. and 3. b., above) and administrative support and to costs of funding activities identified in the Fisheries Monitoring Plan (see item 8, below).

   c. Prior to authorization of the Operation phase, and not later than two calendar years from FS authorization of the Construction phase for the Montanore Project, MMC will prepare an overall bull trout mitigation audit report detailing and quantifying progress toward accomplishment of bull trout mitigation objectives. Findings and MMC recommendations will be presented for approval by the FS, in consultation with the Service and MFWP. The purpose of the mitigation audit report will be to determine if and what adaptive management changes will be required by the FS to the Bull Trout Core Area Mitigation Guidance Plans, Fisheries Monitoring Plan, or MOU(s) prior to authorization of the Operation phase in order to meet the objectives of the Plans and terms and conditions of this biological opinion intended to minimize take of bull trout.

5. MMC, under direction of the FS, will implement the following actions during the Operation phase (estimated to last 16 – 20 years following the Construction Phase):

a. During the Operation phase, MMC will fully complete, unless otherwise agreed to by FS in consultation with the Service, implementation of mitigation measures and activities identified, and approved by FS in consultation with the Service, in the overall Bull Trout Mitigation Plan (KNF BA 2013), the two Core Area specific Bull Trout Mitigation Guidance Plans and the Fisheries Monitoring Plan.

b. During the Operation phase, beginning not later than eight calendar years from FS final authorization for MMC to commence the Resource Evaluation Phase for the Montanore Project, MMC will prepare an overall bull trout mitigation audit report detailing and quantifying progress toward accomplishment of bull trout mitigation objectives. A bull trout mitigation audit report will be prepared for FS approval every three years throughout the Operation phase. Findings and MMC recommendations will be presented for approval by the FS, in consultation with the Service and MFWP. The purpose of the mitigation audit report will be to determine if and what adaptive management changes will be required by the FS to the Bull Trout Core Area Mitigation Guidance Plans, Fisheries Monitoring Plan, or MOU(s) during the Operation Phase in order to meet the objectives of the Plans and to document and minimize the take of bull trout.

c. MMC will separately commit to fund and otherwise support throughout the Operation phase all costs and activities associated with the Bull Trout Mitigation Coordinator (see 1. b., 1. h., 2. c., 3. b., and 4. b. above) and administrative support, and to costs of funding activities identified in the Fisheries Monitoring Plan (see item 8, below).

6. MMC, under direction of the FS, will implement the following actions prior to receiving FS approval to begin the Closure and Reclamation phase:

a. Prior to authorization of the Closure and Reclamation phase, MMC will prepare an overall bull trout mitigation audit report detailing and quantifying progress toward accomplishment of bull trout mitigation objectives. The audit report will include documentation of the extent and magnitude of take that occurred to bull trout as a result of the Proposed Action. Findings and MMC recommendations will be presented for approval by the FS, in consultation with the Service and MFWP. The purpose of the mitigation audit report will be to determine if and what adaptive management changes will be required by the FS to the Bull Trout Core Area Mitigation Guidance Plans, Fisheries Monitoring Plan, or MOU(s) (see 2. b, above) prior to authorization of the Closure and Reclamation phase in order to meet the objectives of the Bull Trout Mitigation Plan (KNF BA 2013). If bull trout mitigation objectives have not been met by the final bull trout mitigation audit report during the Operation phase, then MMC will determine the amount of funds needed to be deposited in the trust fund and other MMC commitments needed to accomplish, maintain and monitor implementation of bull trout mitigation measures through the Closure and Reclamation phase. Adaptive management changes to the Bull Trout Core Area Mitigation Guidance Plans, Fisheries Monitoring Plan, or MOU(s) may be required prior to authorization of the Closure and Reclamation phase in order to meet the objectives of the Plans and to minimize the take of bull trout.

b. Prior to authorization of the Closure and Reclamation phase, MMC will contribute adequate funds to the trust fund and/or post a bond, to fund implementation, maintenance, and monitoring costs during the Closure and Reclamation phases (and in perpetuity, if deemed appropriate) of the overall Bull Trout Mitigation Plan (KNF BA 2013), the two Core Area specific Bull Trout Mitigation Guidance Plans, and continuation of the Fisheries Monitoring Plan. The amount to be deposited in the trust fund or posted in a bond will be determined by FS in consultation with the Service (and other stakeholders as determined by the FS) and will be commensurate with projected mitigation planning, coordination, study, monitoring, design, construction, and other conservation activities needed to accomplish the mitigation projects in a timely manner, as determined by the FS in consultation with the Service.

c. MMC will separately commit to funding costs associated with the Bull Trout Mitigation Coordinator and support and to costs of funding activities deemed appropriate by FS in consultation with the Service (and other stakeholders as determined by FS) that will be necessary to achieve full mitigation during the Closure and Reclamation Phases.

7. MMC, under direction of the FS, will implement the following actions during the Closure and Reclamation phase (estimated to last 20 years or more following the Operation phase):

a. During the Closure and Reclamation phase, MMC will fully complete, unless otherwise agreed to by FS in consultation with the Service, implementation of any remaining mitigation measures identified, and approved by FS in consultation with the Service, in the overall Bull Trout Mitigation Plan (KNF BA 2013), the two Core Area specific Bull Trout Mitigation Guidance Plans and continuation of the Fisheries Monitoring Plan.

b. During the Closure and Reclamation phase, MMC will prepare an overall bull trout mitigation audit report detailing and quantifying progress toward accomplishment of bull trout mitigation objectives. A bull trout mitigation audit report will be prepared for FS approval every three years throughout the Closure and Reclamation phase. Findings and MMC recommendations will be presented for approval by the FS, in consultation with the Service and MFWP. The purpose of the mitigation audit report will be to determine if and what adaptive management changes will be required by the FS to the Bull Trout Core Area Mitigation Guidance Plans, Fisheries Monitoring Plan, or MOU(s) during the Closure and Reclamation Phase in order to meet the objectives of the Plans and to minimize the take of bull trout.

c. MMC will separately commit to fund and otherwise support throughout the Closure and Reclamation Phases, as needed, all costs and activities associated with the Bull Trout Mitigation Coordinator and support and to costs of funding activities deemed appropriate by FS in consultation with the Service (and other stakeholders as determined by FS) that will be necessary to achieve full mitigation during the Closure and Reclamation Phases.

8. FS and MMC, in consultation with the Service (and other stakeholders as determined by FS), will agree to integrate the principles of adaptive management by collecting, disseminating where needed, and reviewing new information on bull trout, the results of implementation of the Core Area Bull Trout Mitigation Guidance Plans and Fisheries Monitoring Plan over time, consider the revised numerical groundwater model prepared during the Resource Evaluation Phase and other information related to bull trout near the project area. Based on new information, if appropriate to ensure that the objectives of the mitigation plans and conditions of the Biological Opinion are met (and to verify and document the extent of take of bull trout associated with the Proposed Action), conduct additional analyses or develop alternatives or modifications to the Core Area Bull Trout Mitigation Guidance Plans and Fisheries Monitoring Plan.

9. In order to assure the minimization of take of bull trout by the proposed Montanore Project, the Service requires the following "Conceptual Bull Trout Mitigation Plan" ((modified from the KNF BA (2013) proposed action)) be fully considered during development of Core Area Bull Trout Mitigation Guidance Plans for the Kootenai River and Lower Clark Fork River Core Areas and in development of the Fisheries Monitoring Plan.

Conceptual Bull Trout Mitigation Plan

The following outlines conceptual mitigation projects and some technical mechanisms and details that should be considered for inclusion in Bull Trout Core Area Mitigation Guidance Plans. Development of these Plans by MMC and approval by the FS, in consultation with the Service, is required prior to FS authorization to initiate the Resource Evaluation Phase (see VIII. D. 1. a., above). If initial fish population and habitat surveys, see Fisheries Monitoring Plan

(VIII. D. 10., below), or other studies and considerations on subject streams indicate that any of the proposed conceptual mitigation measures are not feasible, then the Service requires that additional mitigation measures on that stream or on other bull trout occupied or historically occupied streams within the subject bull trout Core Area may be substituted for these initial mitigation measure concepts (see “adaptive management”, VIII. D. 8., above). The Service further requires that any substitute mitigation actions be comparable in function and magnitude to those listed below. It is anticipated that the Bull Trout Mitigation Plan (KNF BA 2013), Core Area Bull Trout Mitigation Guidance Plans, Fisheries Monitoring Plan and supporting MOU(s) and other MMC commitments may be modified or amended on a recurring three year basis throughout the life of the mine (see “bull trout mitigation audit reports”, above).

Locations

Two streams in each Bull Trout Core Area were initially selected for assessment of bull trout mitigation measures to meet mitigation objectives:

- Lower Clark Fork Core Area
  Copper Gulch
  West Fork Rock Creek (and Rock Creek proper)

- Kootenai Core Area
  Flower Creek
  Libby Creek

Lower Clark Fork Core Area

Copper Gulch (a.k.a. Copper Creek) flows approximately 5 miles or 8 kilometers to the Bull River. The lower reach was bermed and confined to the crest of the alluvial fan in 1972, causing the channel to dewater during low-flow periods and aggrade approximately 2 to 4 feet above the historic floodplain. This makes upper reaches unavailable to fall spawners. A private bridge crossing restricts flow during spring runoff. Shallow riffles predominate in the lower reach due to a lack of pool-forming structures such as large woody debris. Unstable bedload accumulations prevent distribution of spawning gravel. The central reach is more stable and complex than the lower reach, with moderate amounts of large woody debris. Spawning habitat is limited to gravel accumulations behind obstructions. Adequate rearing and overwintering habitat is available in the form of deep, low-velocity areas of the channel and substrate interstices. The upper 3.4 miles (5.5 kilometers) exhibits seasonal drying (LWC 2001). Bull trout are considered to have been historically present (Pratt and Huston 1993) but are currently absent. During a year 2012 survey, brook trout, brown trout, and rainbow/cutthroat trout hybrids (field identification) were captured in the lower reach. Cutthroat trout were abundant near the upper end of the perennial reach and were the only salmonid captured (MT Dept. of Fish, Wildlife, and Parks, reported in Kline and Savor 2012).

West Fork Rock Creek flows approximately four miles (6.5 kilometers) to Rock Creek. The lower 1,050 feet (320 meters) is seasonally dry. A natural barrier to upstream movement of fish occurs two miles (3.2 kilometers) from the confluence with Rock Creek. Fish habitat consists primarily of high gradient riffles and pools. Substrate is dominated by gravel and small cobble, with high amounts of fine sediment. The riparian zone is functional, providing moderate amounts of large woody debris. The drainage is subject to high flow events (Washington Water Power 1996, FS data reported in Littlejohn 2012 and in Kline and Savor 2012). Fish surveys were conducted during 1996 using multiple pass electrofishing and snorkel counts. Cutthroat trout and bull trout were reported to occur at densities of approximately 200 and 300 fish per 3,280 feet (1,000 meters), respectively, throughout the reach that is below the fish barrier (WWP 1996). During 2012, 2,500 feet (762 meters) in the central portion of the same reach was electrofished using a single pass, resulting in the capture of 42 cutthroat trout and 6 bull trout (FS data reported in Kline and Savor 2012). While the difference in effort during the 1996 and 2012 do not allow direct comparison of results, they do indicate that bull trout abundance was drastically lower during 2012 compared to 1996. In comparing the two species, the number of cutthroat trout that were captured during 2012 was approximately 25% of the 1996 cutthroat trout density estimates, whereas the number of bull trout that were captured was approximately 3% of the 1996 bull trout density estimates. This indicates a substantial reduction in bull trout abundance relative to cutthroat trout.

Rock Creek (mainstem) flows 5.3 miles to the Clark Fork River. Historic timber harvest resulted in current low levels of instream woody debris and caused adverse changes in channel morphology and substrate composition. The loss of woody debris affects macroinvertebrate production, sediment sorting, spawning gravel retention. There are some sediment sources in the drainage but they do not appear to have a significant effect on fish habitat. Substrate is dominated by cobble, and fine sediment is readily transported out of the mainstem or deposited in side-channels. Westslope cutthroat trout in Rock Creek are assumed to be mainly resident. Bull trout occur in the mainstem and some bull trout redds have been located, but the majority of the bull trout population and spawning occurs in East Fork Rock Creek. There is a seasonally dewatered stretch in lower Rock Creek that apparently keeps brook trout from colonizing the East Fork (Salmon Environmental Services 2012). Intermittent reaches limit bull trout access to potential spawning habitat during the late summer and fall, and may restrict non-native brook trout to below Engle Creek. Capture of a single westslope cutthroat x rainbow trout hybrid at site 2 in 2010 was the first record of a non-native salmonid in upper Rock Creek. To date no bull trout/brook trout hybrids have been documented (Salmon Environmental Services 2012).

Kootenai River Core Area

Flower Creek flows approximately 13 miles (21 kilometers) to the Kootenai River. Headwater tributaries begin in a series of small lakes located on Forest Service lands within the Cabinet Mountains Wilderness. The lower portion flows through the city of Libby, Montana. Two man-made dams, owned and operated by the City of Libby, are located private and State of Montana owned lands in the lower half of Flower Creek. The furthest downstream dam is used as a diversion point for a water intake that feeds by gravity to a water treatment plant. Upper Flower Creek Dam is operated by the City as part of their water supply storage system. The 58-foot high concrete arch dam was completed in 1945. The Upper Flower Creek reservoir has a normal capacity of 221 acre-feet. The upper dam is substandard with regard to failure risk. The City of Libby has begun the process to replace the upper dam within about a 5-year time frame (City of Libby web site). The stream is considered to have substantial fisheries resource value upstream of the dams on lands primarily managed by the Forest Service. Substantial portions of the segment of Libby Creek located between the two dams are located on lands managed by the Forest Service. Bull trout are known to have occurred in Flower Creek historically. Prior to 2012, the only salmonids captured in recent surveys have been brook trout and hybridized westslope cutthroat trout (MFISH). During 2012, one bull trout/brook trout hybrid was captured downstream of the lower reservoir and one was captured upstream of the upper reservoir. This indicates that bull trout are or recently were present in the Flower Creek drainage.

Libby Creek flows approximately 29 miles (47 kilometers) to the Kootenai River. A barrier falls at stream mile 26 (stream kilometer 42) blocks upstream fish passage. Bull trout are the only fish species that have been reported upstream of the falls. The average bull trout density in a reach between the downstream end of the Libby Adit disturbance boundary and the falls is 0.031 fish per square yard or 0.037 per square meter (n = 8, 2003 – 2011). Fish habitat includes low gradient riffle/run complexes with pools formed by boulders, bedrock, and large woody debris, steep riffles, and diversified habitat with large pools due, in part, to many downed trees with attached rootwads. Upstream of the Cabinet Mountains Wilderness Area boundary, the stream is bedrock controlled, cobble substrate is common, the width to depth ratio is low, stream gradient is high, large woody debris is lacking, and there are high quality pocket pools. A fish survey conducted upstream of the Cabinet wilderness Area boundary during 1988 reported no fish. The most upstream report of bull trout is at stream mile 28 (stream kilometer 45) during 2006 (Kline

2007b). These results indicated that there may be a fish barrier near or downstream of the Cabinet Mountains Wilderness Area boundary (Watershed and Kline 2005, Kline 2007b). Within the reach where bull trout occurrence has been confirmed, adjacent to the Libby Adit site, there is a wide cobble dominated reach that displays braiding, channel shifting, and an open canopy.

Actions

Proposed mitigation actions for these streams may include:

- Create genetic reserves through bull trout transplanting to protect existing bull trout populations (Libby Creek and Bear Creek) from catastrophic events;
- Rectify unnatural blockages to bull trout passage that are prohibiting access to spawning and rearing habitat;
- Rectify other factors that are limiting the potential of streams to support increased production of bull trout;
- Eradicate or suppress non-native fish species, especially brook trout that are a hybridization threat to bull trout.

Based on available information on the current condition of the selected streams, factors that influence bull trout populations and the mitigation potential of each stream have been tentatively identified, as described below.

Copper Gulch

Restoration of the aggraded lower reach would be the focus for mitigation. It is anticipated that modification of this reach would provide habitat, and alleviate seasonal drying to allow improved access for migratory bull trout to the central perennial reach where habitat is available to support a viable, self-sustaining bull trout population. An integral part of mitigation planning on Cooper Gulch will be an assessment of the feasibility of eliminating brook trout from the stream, and development of a stream rehabilitation plan, if brook trout removal is feasible. Additional feasibility studies for potential bull trout donor stocks will be required to determine genetic health and availability of nearby bull trout populations (e.g. East Fork Bull River), and development of a genetic management plan (if re-introduction of bull trout is considered). If successfully implemented, fish passage restoration and bull trout reintroduction in Copper Gulch could potentially contribute to offsetting both projected losses of bull trout numbers (minimize take) and offset adverse impacts to bull trout habitat in the East Fork Bull River and the lower Clark Fork River Core Area.

West Fork Rock Creek

Available data for this stream indicates that habitat is underutilized by bull trout compared to previous population density estimates. Additional habitat and population surveys would be conducted to identify limiting factors for bull trout in this stream and to evaluate its potential to provide spawning opportunities for migratory bull trout. If the limiting factors analyses so indicate, mitigation measures in this drainage may be able to partially offset both the projected reductions of bull trout populations (minimize take) and the loss of bull trout habitat in Rock Creek and the Lower Clark Fork River Core Area.

Rock Creek

It has been suggested (Salmon Environmental Services 2012) that bull trout populations in East Fork and West Fork Rock Creek are currently isolated from the threat of brook trout hybridization by an expanse of seasonally intermittent stream which separates the primary bull trout population from a brook trout population downstream of the intermittent stream reach. Removal of the brook trout population in lower Rock Creek (Rock Creek Invasive Species Eradication Project) would lower the risk of brook trout invading the bull trout habitat further upstream. As such this mitigation measure would complement any bull trout habitat or population mitigation measures deemed appropriate in the West Fork Rock Creek (see above). Additionally, if this mitigation measure (brook trout removal from Rock Creek) is feasible and implemented in a timely manner (before brook trout invade upstream bull trout habitat) it could enhance the chances of success of any mitigation actions taken in the West Fork Rock Creek and contribute to offsetting projected losses (minimize take) of bull trout in Rock Creek. Additionally, migratory bull trout are known to spawn and rear in the stream reach currently occupied by brook trout in lower Rock Creek, implementation of a bull trout population enhancing mitigation measure (removal of brook trout) could contribute to offsetting losses (minimize take) to upstream bull trout populations in Rock Creek.

Flower Creek

The highest potential for effective bull trout mitigation (and for effective measures to minimize the take of bull trout in Libby Creek) in the Kootenai River Core Area lies in Flower Creek. There are several possible mitigation options potentially available in Flower Creek: 1) salvage the local bull trout population (if it is still functional) upstream of the water storage dam and rehabilitate the watershed with a non-native species (brook trout) eradication or suppression program, 2) establish a genetic reserve with bull trout from local populations in Libby Creek and Bear Creek in the water supply storage reservoir and upstream in Libby Creek by implementing non-native fish eradication (or suppression) and transferring bull trout to the Flower Creek drainage, 3) rehabilitate the segment of Libby Creek between the two dams with a non-native fish species (brook trout) eradication or suppression program and re-introduce migratory bull trout to the stream, and 4) re-establish a migratory bull trout population above and below the water diversion dam utilizing fish transfer from other bull trout populations, non-native fish eradication or suppression, and selective upstream passage techniques (fish ladder) at the low-head water diversion dam. Re-established bull trout populations could offset (minimize take) projected bull trout population declines in the Kootenai River Core Area, re-established quality bull trout habitat could offset projected permanent losses of bull trout habitat, and establishment of a bull trout genetic reserve that could protect an existing “at risk” bull trout population (Libby Creek) by lowering the risk (minimize potential for take) of catastrophic mine related incidents affecting that population.

Libby Creek

In upper Libby Creek there is an opportunity for some on-site mitigation to partially offset (partially minimize take) the direct effects to bull trout and bull trout habitat of the nearby proposed mining activities. Adverse impacts to the subject stream reach and its small and isolated bull trout population are predicted to occur throughout (and following) the active mine life from relatively warm water effluent from the mine adit entering the stream 1,145 feet (349 meters) upstream of Libby Creek Falls. This effluent will have its greatest effect on changing bull trout habitat (warming the normally cold water) when streamflows are at their lowest (near baseflow conditions); this timing of most severe affect coincides with the most sensitive times for bull trout reproduction (spawning and egg incubation). Other adverse impacts to the bull trout population and its habitat are projected to occur throughout the mine life and beyond due to baseflow depletions in the bull trout occupied reach of Libby Creek upstream of the mine effluent inflow point (approximately 7,216 feet or 2,020 meters of bull trout occupied habitat lies upstream of the effluent discharge point). Adverse effects to bull trout and their habitat from this predicted impact will also have their greatest effect (decreasing streamflow) when normal streamflows are at their lowest (near baseflow) and by potentially disrupting hyporheic flows through the gravels, thus potentially affecting spawning and egg incubation.

The reach of Libby Creek upstream of the falls and adjacent to the Libby Adit site displays braiding and channel shifting. Predicted decreased baseflows would further reduce the quantity and quality of the existing habitat. It is possible that installation of large formidable wood structures in the floodplain and riparian zone could stabilize this reach, restore riparian function, improve spawning and rearing habitat for bull trout by increasing channel depth, complexity and stability, and sediment retention. This proposed mitigation action could potentially improve approximately 1,176 feet or 450 meters of stream habitat and increase the ability of that habitat to support more bull trout. If successful, and if maintained in perpetuity, installation of the habitat enhancement structures could constitute partial mitigation (partial minimization of take) for predicted mining impacts. However, because of magnitude of the two projected impacts (warm water effluent influencing 1,145 feet (349 meters) of bull trout habitat and baseflow depletions affecting 7,216 feet or 2,020 meters of bull trout habitat), this action by itself would not fully mitigate projected impacts. Additional mitigating measures (measures to minimize take) would be needed to meet the objective of the Proposed Action as described in the Bull Trout Mitigation Plan, "…establish conservation actions that in the long-term would fully offset projected impacts from the mine project to bull trout populations and bull trout critical habitat" (KNF BA 2013).

The Following Terms and Conditions are established to implement Reasonable and Prudent Measure #2:

1. Prior to FS authorization to implement the Resource Evaluation Phase for the Montanore Project, MMC will prepare for FS approval, in consultation with MFWP and the Service, a final comprehensive <u>Fisheries Monitoring Plan</u> that addresses all fisheries related monitoring needed to document and verify project effects, including: verification of the extent and magnitude of take (see VIII. A., above) associated with project impacts; long-term effects of baseflow depletions, and effectiveness of mitigation measures intended to minimize take of bull trout; effects of "warm water" supplementation to Libby Creek from mine Adit sources; and short-term effects of projected sediment inputs to bull trout

in the affected streams. The Fisheries Monitoring Plan will identify the techniques, intensity, duration, and frequency of fisheries population and habitat monitoring needed in all affected streams or other water bodies in the Action Area. The Fisheries Monitoring Plan will specifically address monitoring needs of proposed or anticipated bull trout mitigation projects ("before the action" data collection) and will take into account the amount of time and monitoring effort needed to fully assess the effects of the mitigation projects (for example, two bull trout life cycles or 14 years may be needed to verify short-term and long-term effects of particular actions).

2. Prior to FS authorization to implement the Resource Evaluation Phase for the Montanore Project, MMC will make long-term binding arrangements with MFWP (or other entities approved by MFWP and FS in consultation with the Service) for immediate implementation (beginning with final FS authorization to initiate the Resource Evaluation Phase) of the Fisheries Monitoring Plan, including reporting and approval requirements of annual monitoring efforts to the FS. The Fisheries Monitoring Plan will contain provisions for documenting, collecting data, and annual reporting of the actual extent of "take" documented for particular factors noted in the preceding section, above. The "Take Statement" will be approved by the FS and submitted by KNF to the Service by March 1 of each following calendar year.

3. Reporting Requirements

   a. By March l of each year, the Forest shall prepare and submit to the Service an annual report that summarizes actions taken to comply with the above terms and conditions implementing RPMs 1 and 2 during the previous year.

   b. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded , such incidental take represents new information requiring reinitiating consultation and review of the reasonable and prudent measures provided. 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.