Endangered Species Act - Section 7 Consultation

FINAL
BIOLOGICAL OPINION

on the

Effects to Grizzly Bears
From the Implementation of
Proposed Actions Associated with 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 Field Office

March 31, 2014

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SUMMARY

The main impacts of the proposed Montanore mine project to grizzly bear are 1) a narrowing of the north-south movement corridor in the Cabinet Mountains; 2) an increase in risk from potential human-caused mortality; and 3) displacement from suitable habitat areas due to human activity or physical loss of habitat to construction of mine features.

Each of these impacts is addressed through project design elements, such as controlling the time when an activity may occur, and appropriate conservation items. Collectively, the conservation measures are reasonably expected to prevent the loss of multiple grizzly bear over the 30-year life of the mine, thus more than offsetting the loss we anticipate from the project (one grizzly bear).

To mitigate for the narrowing of the north-south corridor, the project includes acquisition of 1,274 acres that are at risk of development within this corridor. Those lands are then to be managed to the benefit of grizzly bear in perpetuity. In addition, motorized trail #935 (East Fork Rock Creek) will be converted to non-motorized, thus creating over 1,000 acres of new grizzly bear core habitat and expanding the distance (east-west) across the north-south corridor between project disturbance sites from 0.9 miles to 3.4 miles. See Appendix C for details.

The potential increase in risk from human-caused grizzly bear mortality is minimized by efforts that will inform and educate mine employees and the public about living in grizzly bear country. They will also improve public support for grizzly bear recovery. The major items include: 1) development of a detailed and enhanced information and education program; 2) hiring a grizzly bear specialist to work specifically in the CYE; 3) hiring a law enforcement officer to work specifically in the CYE; 4) making all garbage collection sites and Forest campgrounds in the CYE bear resistant through fencing and new bear resistant garbage containers; and 5) providing the public with temporary electric fencing kits as needed to deter grizzly bear activity near residences. Details of these measures, along with several other items can be found in the project mitigation plan (Appendix C).

Displacement of grizzly bear from suitable habitat areas is minimized by 1) acquisition of an additional 4,928 acres of grizzly bear habitat that is at risk of development in or near the CYE and requiring those lands be managed to benefit grizzly bear in perpetuity; and 2) controlling the time when power line work may be conducted (outside the spring grizzly bear use period).

In addition, mitigation designed to offset cumulative effects by changing access conditions to create grizzly bear core habitat will also a) contribute to reducing risk of human-caused bear mortality; b) provide undisturbed habitat area for displaced bears; c) improve habitat conditions in the north-south movement corridor; and d) help meet Forest Plan standards for grizzly bear habitat conditions. A total of 7,030 acres (includes acres from Trail #935) of new core habitat will be created.

Implementation of the entire mitigation plan will result in an improved condition over the baseline. This improved condition is anticipated to offset and minimize the impacts of the incidental take anticipated as a result of mine development.

After reviewing the current status of the grizzly bear, the environmental baseline for the action area, the effects of the proposed Montanore Mine Project and the cumulative effects, it is the Service's biological

opinion that the Montanore Project as proposed, is not likely to jeopardize the continued existence of the listed entity of grizzly bears. No critical habitat has been designated for this species, therefore none would be affected.

I. INTRODUCTION

This biological opinion is based on information provided in the Kootenai National Forest's biological assessment (Forest BA 2013) for the proposed action associated with Plan of Operations for the Montanore Minerals Corporation Copper/Silver Mine (Project), 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 ESA 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 ESA 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 biological opinion addresses the impacts to federally listed species of the proposed action.

This biological opinion is based on information provided in the Forest's biological assessments (BAs) (U.S. Forest Service 2013 a, b) for the proposed action, supplemental information to the BAs, related Environmental Impact Statements, personal communications with researchers and experts, and scientific literature, unpublished reports, field investigations, sources of information in our files and other sources of information cited herein. The complete project file for this consultation is found at the Service's Helena, Montana Field Office.

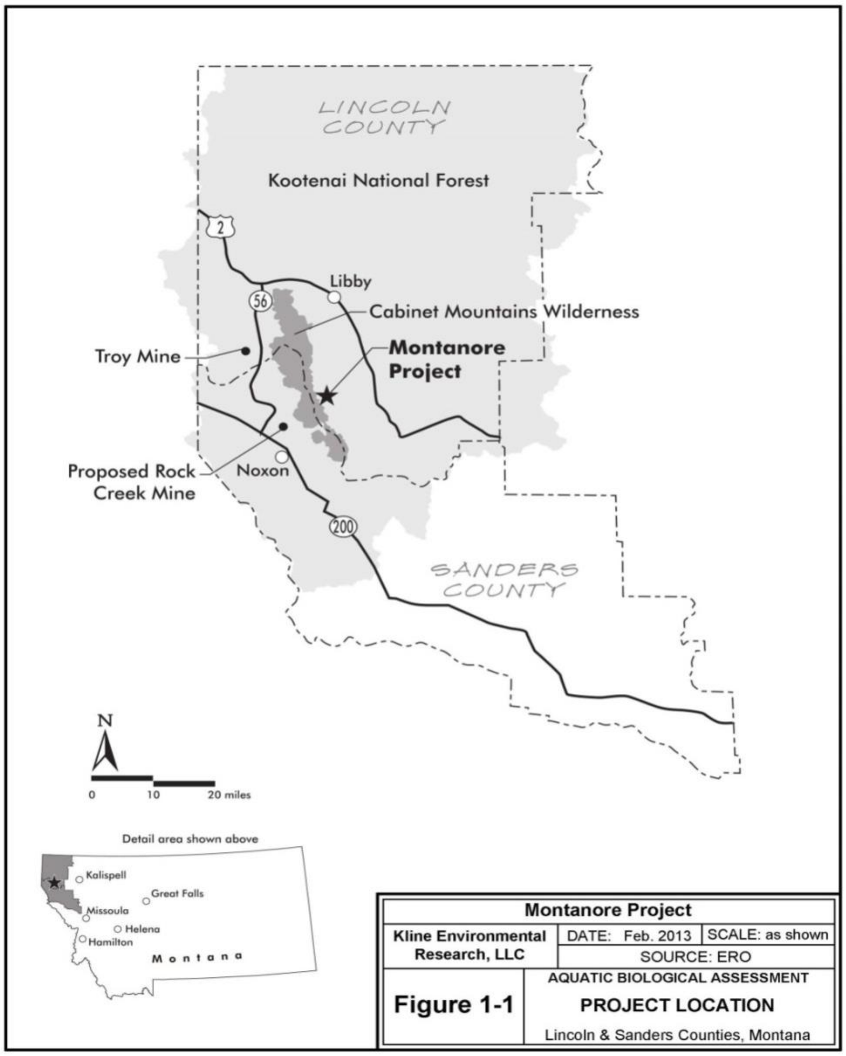
CONSULTATION HISTORY

Consultation Summary

We received the Kootenai National Forest's (Forest) terrestrial biological assessment (BA) and request for formal consultation on July 8, 2011 (Bradford July 5th, 2011). We provided acknowledgement of receiving the BA and initiation of formal consultation on July 18, 2011 (Wilson 2011) In October of 2012, we requested clarification on several points of the July 5, 2011 BA (Vandehey, October 12,2012). We received Supplemental Draft Ba and additional information from the Forest in October 2012, January 2013 (Bradford 2013) and in May 2013 (Lacklen 2013) 2013) Additional communications between the Service and the Forest occurred over the next several months culminating in the receipt of the Forest's final biological assessment on August 9, 2013, at which time formal consultation was initiated. In response to our request (Vandehey, personal communication) the entire consultation package was resent by the Forest, including a revised BA, with all errata incorporated, dated 6th September, 2013, (Bradford, 16 September 2013).

The biological opinion (BO) describes potential direct and indirect effects to grizzly bear (*Ursus arctos*), that may occur as a result of construction and operation of the proposed Project by Montanore Minerals Corp. (MMC). The Project and its potential effects are located in Lincoln and Sanders Counties, Montana, near the cities of Libby and Noxon (Figure 1a). The full section 7 consultation history of grizzly bear on the proposed action are listed chronologically in Appendix A

Figure 1a. Montanore Mine Project Location (Adapted from Forest 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 then changed the name to Montanore Minerals Corporation (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 Forest, the Montana Department of Health and Environmental Sciences (DHES), the Montana Department of Natural Resources and Conservation (DNRC), and the DSL, Montana's Department of Environmental Quality (DEQ) 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 Forest issued its ROD (KNF 1993), the DNRC issued a Certificate of Environmental Compatibility and Public Need under MFSA (Major Facility Siting Act) (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 Cabinet Mountains Wilderness (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, Forest's approval, and the State's certification of the transmission line. In 2002, Noranda notified the Forest 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 Forest has not approved any activities at the Libby Adit that may affect National

Forest System lands. The operating permit 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.

In 2007 the Forest 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 Forest 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 Forest initiated a NEPA analysis that included public scoping for the proposed road use and evaluation drilling at the Libby Adit Site. In 2007, the Forest 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

Details of the proposed action are provided in Appendix B.

Proposed Action

The preferred federal action is the Agency-Mitigated Alternative 3D-R as described in the Montanore Mine Project Final Supplemental Environmental Impact Statement (EIS) (USFS and DEQ 2011) as updated for the Final EIS. The detailed description from this NEPA document is incorporated by reference and summarized in Appendix B.

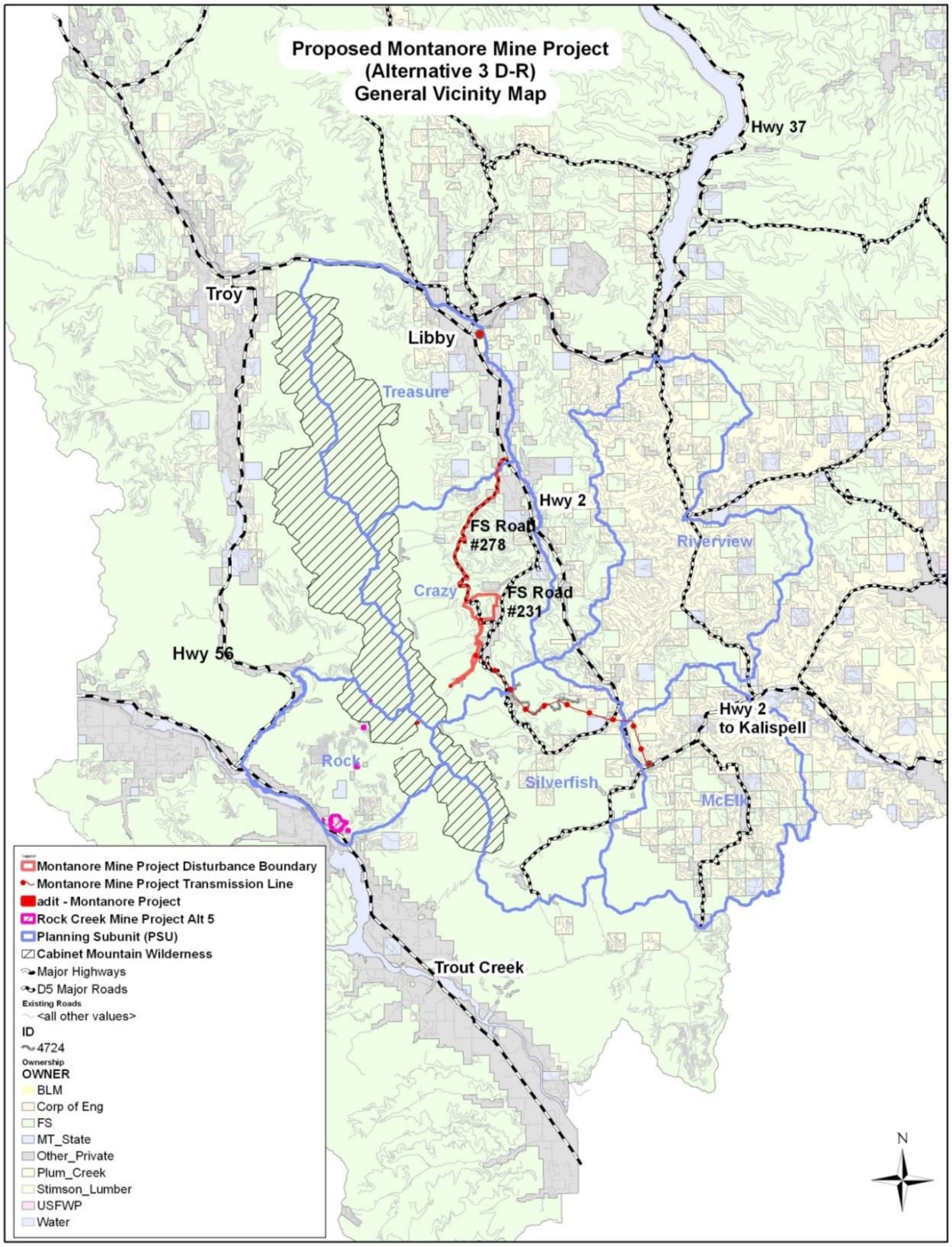
The majority of the project is located on the east slope of the Cabinet Mountains on the Libby Ranger District, Kootenai National Forest (Forest). It is located approximately 15 air miles south of the town of Libby in Lincoln County, Montana (see Figure 1b, Vicinity Map, and Figure 2, Proposed Federal Action Map). Potential effects occur on both the Libby and Cabinet Ranger Districts of the Kootenai National Forest. The above ground workings for the proposed mine would be located approximately 20 air miles south of Libby, MT. The project lies within Libby Creek and West Fisher Creek drainages. It is also located on the west side of the Cabinet Mountain Wilderness in both the East Fork Rock Creek and the East Fork Bull River where the proposed ventilation adit is located by Rock Lake and where mitigation measures will occur.

MMC has submitted an application for a hard rock operating permit to the Montana DEQ and a proposed plan of operations to the Forest setting forth the construction and operating details of their proposed project.

The Montanore Project is an underground copper and silver mine with associated surface facilities and an electric transmission line. MMC, the project proponent, has proposed construction of the Montanore

Project within and adjacent to lands managed by the Forest. The ore body lies beneath the Cabinet Mountains Wilderness Area. All access, adit portals and surface facilities would be located outside of the wilderness boundary.

Figure 1b. Proposed Montanore Mine Project Vicinity



Two “lead” agencies, the Forest and the Montana DEQ, have been designated for this project. Before construction and operation of the proposed project can begin, a number of permits, certificates, licenses or approvals would be required from the two lead agencies and various other federal and state agencies. The lead agencies have selected mine facilities Alternative 3 and electric transmission line Alternative D-R for implementation. The combination of these two alternatives (3D-R), along with all proposed Forest and DEQ mitigation is the Forest and DEQ’s proposed federal action and the subject of this Biological Opinion.

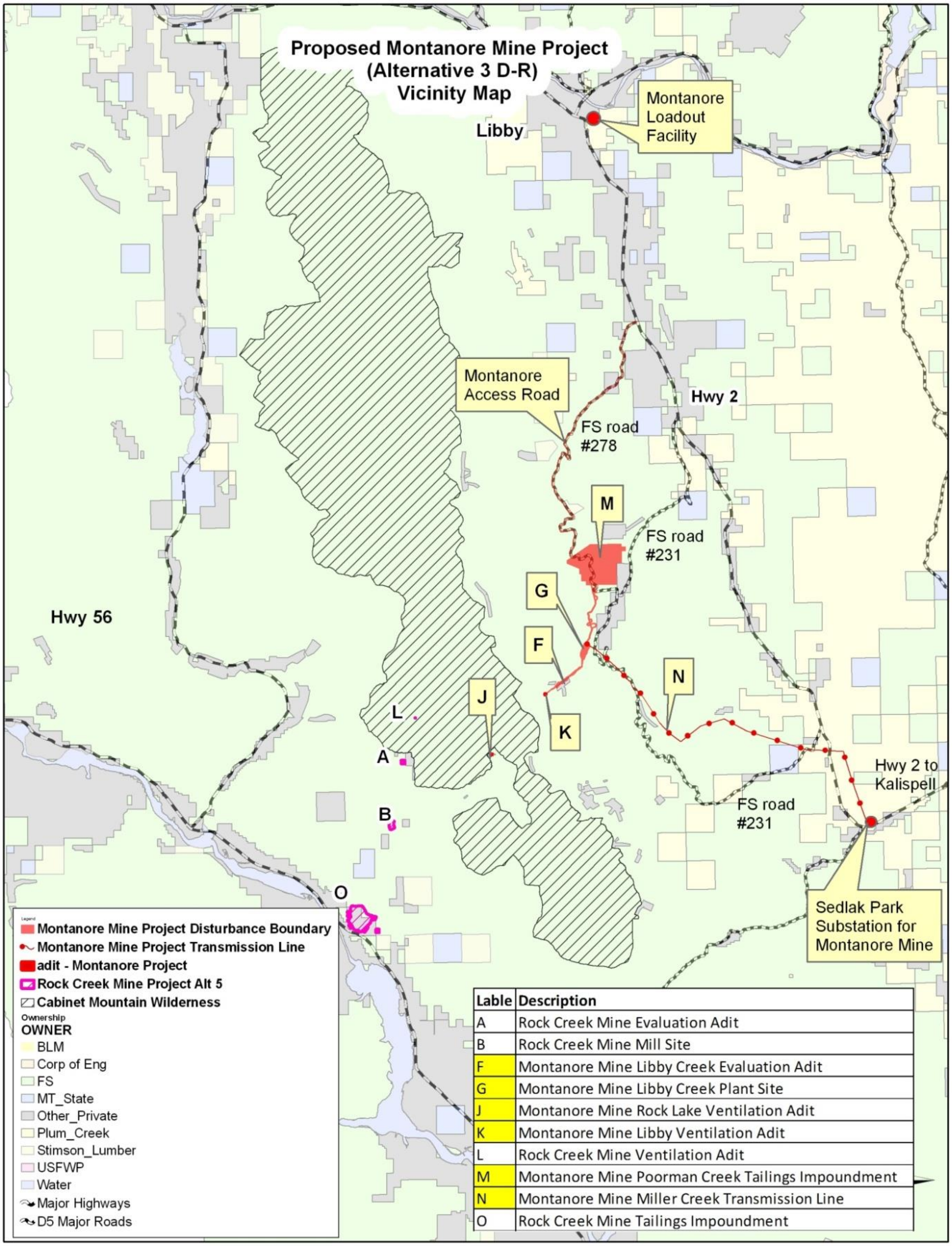
In the proposed federal action five major mine facilities would be developed (Figure 2). MMC would develop a Poorman Tailings Impoundment Site north of Poorman Creek for tailings disposal, build and use the Libby Plant Site located between Libby and Ramsey creeks, use the existing Libby adit, construct two additional adits in upper Libby Creek, and construct a 13.7 mile long electric transmission line. The total operating permit area would be 3,628 acres with a total of 2,582 acres of the permit area being disturbed.

This document will use the term “facilities” to refer to the portion of the project that includes the mine portals and adits, plant site and ancillary features, pipelines, tailings impoundment and associated buildings or other features in this area. The term “transmission line” will refer to the portion of the project that includes the transmission line and support structures, line corridor, temporary access roads and power substations. The following is a summary of the proposed federal action, including mitigation and compensation measures, which are an integral part of the proposed action.

MMC would construct an underground mine, which includes two underground mining adits in the upper Libby Creek drainage, and two ventilation adits, one exiting the surface in the upper Libby Creek drainage and one exiting the surface in the upper Rock Creek drainage near Rock Lake, on the west side of the Cabinet Mountains (Figure 2). This second ventilation adit may or may not be needed. All adits, except the ventilation adit in upper Libby Creek, are located on lands owned by MMC. All portals would be located outside the Cabinet Mountain Wilderness boundary. One mining adit on private land in Libby Creek already exists. MMC proposes to extend this adit during the evaluation phase.

A surface plant site would be constructed in upper Libby Creek about one-half mile northeast of the underground production adits. Ore would be crushed underground and conveyed to the surface plant on an above-ground conveyor belt. Copper and silver minerals would be extracted from the ore by a flotation process. Tailings from the milling process would be transported from the plant site through an underground pipeline to the tailings impoundment located in the Poorman Creek drainage, about three miles north of the proposed plant site. Water would be recycled from the tailings impoundment back to the mill for reuse and the water balance indicates a limited need to discharge water from the project. In the event excess water occurs, it would be processed through the existing water treatment plant located at the Libby adit and then discharged at one of three discharge points in the Libby Creek drainage near the Libby adit that are currently under a Montana pollution discharge elimination system (MPDES) permit.

Figure 2. Montanore Mine Project - Proposed Federal Action Map



Lable	Description
A	Rock Creek Mine Evaluation Adit
B	Rock Creek Mine Mill Site
F	Montanore Mine Libby Creek Evaluation Adit
G	Montanore Mine Libby Creek Plant Site
J	Montanore Mine Rock Lake Ventilation Adit
K	Montanore Mine Libby Ventilation Adit
L	Rock Creek Mine Ventilation Adit
M	Montanore Mine Poorman Creek Tailings Impoundment
N	Montanore Mine Miller Creek Transmission Line
O	Rock Creek Mine Tailings Impoundment

MMC would also construct 13.7 miles of high-voltage electric (230-kV) transmission line to provide power to the mine facilities. A power substation would be constructed at Sedlak Park, where the Bonneville Power Administration's (BPA) existing Noxon-Libby transmission line is located (see Figure 2). The proposed transmission line would be routed north from the Sedlak Park substation, about one half mile from but paralleling U.S. Highway 2. The alignment would turn west crossing U.S. Highway 2, the Fisher River, West Fisher Creek, and National Forest Syustem (NFS) road #231 (Libby Creek Road). The alignment would then head northwest, up and over the ridge between West Fisher Creek and Miller Creek. It would then traverse up the Miller Creek drainage and then along NFS road # 4724 on the south side of Miller Creek. It would then turn north approximately one mile below the confluence with Standard Creek, passing about ½ mile east of Howard Lake toward the plant site in the Libby Creek drainage. Wooden H-frame structures would be used in 92 locations.

For analysis purposes, the lead agencies have assumed the proposed line would require a maximum of 200 feet of clearing along most of the alignment using conventional techniques. A helicopter would be used for timber removal and for placing 16 structures primarily in the upper Miller Creek and Howard Creek drainages adjacent to grizzly bear core habitat, and for all the line and ground wire stringing.

Access to the mine and all surface facilities would be via US Highway 2 and existing NFS Roads #278 (Bear Creek Road), #6210 (Ramsey Creek Road) and #231 (Libby Creek Road). Initial access to the mine site would be NFS # 231 and 2316. MMC would continue to snow plow NFS roads 231 and 2316 to allow access during winter. These segments would remain snowplowed during the evaluation phase and for the first year of reconstruction of NFS road 278, which would occur during the construction phase. In the first 2 years of the Construction Phase, MMC would upgrade NFS roads 278 (Bear Creek Road) and 4781 (Ramsey Creek Road). About 13 miles of the Bear Creek Road (NFS road 278), from U.S. 2 to the Bear Creek bridge, would be reconstructed to applicable road standards set by the either the Forest or Lincoln County. The road would be widened on its existing alignment to 20 to 29 feet wide and chip-and-seal paved. While NFS road 278 was upgraded, the Libby Creek Road (NFS road 231) would be used for access. South of Little Cherry Creek, MMC would build 0.7 miles of new road west of and parallel to the Bear Creek Road that would connect Bear Creek Road with Ramsey Creek Road (NFS road 4781). MMC would construct a new bridge crossing of Poorman Creek just upstream and adjacent to the existing crossing.

As proposed by MMC, the Montanore Project would initially consist of a 12,500 tons/day underground mining operation that would expand to a 20,000 tons/day rate. The plant would operate on a three shifts per day, 24 hours per day, and seven days per week schedule, for 350 days out of the year (two weeks would be used to schedule maintenance repair and security activities. Employment numbers are estimated to be 450 people at full production. Of these, about 350 are likely to be local hires and 100 would be non-local (new residents). Potentially a total of about 430 new residents to Lincoln County could arrive when considering mine workers, their families, support workers and their families. This would be a 2.2% increase in the Lincoln County population from base year 2010 (Lynn Hagarty, USFS, pers. comm. 2013).

The project would consist of four main phases – evaluation, construction, operations and mine closure. Mine closure consists of two phases, an initial phase that involves removal of most of the facilities and transmission line, and a second phase consisting of reclamation, water treatment, and monitoring. Following these is post-closure. In order to ascertain the benefits of mitigation on grizzly bear habitat component measures, the evaluation, construction and operations phase are discussed both without and with incorporated mitigation in the effects section of this document. In actuality the proposed action would only occur with the required mitigation being sequentially implemented as specified in the mitigation plan.

The duration of any particular phase may vary from that analyzed, but prudent estimates of duration based on the best information available were used for the analysis. The maximum estimate of activity duration was used to fully disclose any potential impacts and may over estimate potential impacts. In general the evaluation phase is estimated at two years, construction at three years and potentially up through the fourth year, operations from 16 to 20 years, and the mine closure/reclamation phases up to 20 years (or longer if water quality monitoring still indicates a need for treatment). The following summarizes the main components of each phase and the mitigation associated with it.

A. Evaluation Phase

This phase includes advancing the existing Libby adit and re-initiating the evaluation drilling program that started in 1989. The Libby adit portal is situated on MMC private land. It is currently developed 14,000 feet from the portal entrance and is de-watered down to 7,200 feet from the entrance. Water from the adit is currently being processed through an existing water treatment plant and is discharged through a percolation pond located at the Libby adit site. The underground evaluation phase is expected to last 18-24 months. MMC would employ 30 to 35 people at the Libby Site and would work two 10-hour shifts 7 days per week. The hours of operation would fluctuate based on daily requirements, but would operate 7 days per week. The Libby Adit evaluation program would be the initial phase of the project and would be completed before construction of any other project facility. Components include:

- Dewatering and stabilizing the remaining 7,000 feet of the existing Libby adit decline;
- Advancing the Libby adit by drifting approximately 10,000 feet underground for drilling and drill stations;
- Core sample collection for ore analysis and evaluation;
- Storage of waste rock at the Libby Adit site on MMC land;
- Use of four 850-kv generators to provide power to existing site facilities; and
- Site access via National Forest System (NFS) roads 231 (Libby Creek) and 2316 (Upper Libby Creek), including snowplowing during the winter snow period.

If testing, assessments and studies conducted during the evaluation phase determine that the value of the ore body would not support the mining efforts, the Libby Adit would be closed with a concrete-reinforced hydraulic plug in bedrock, all surface facilities would be removed, and all disturbed sites would be re-graded and re-vegetated.

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

A1. Mitigation required prior to USFS letter to proceed and authorization for MMC to initiate the Evaluation Phase

Specific design features and mitigation developed for this phase would be accomplished by either the Forest or MMC. Actions to mitigate for potential effects of the evaluation phase include all measures in Table 1. These measures will be in place throughout the life of the project and also must be **in place prior to initiation of the evaluation phase**. Table 1 shows the purpose of each pre-evaluation phase mitigation measure, where each item is found in the detailed mitigation plan (Appendix C), what action is required, and who is responsible for the measure.

Those mitigation measures implemented by MMC would be under the direction of the Forest Service, and are designed to reduce the risk of grizzly bear mortality throughout the life of the project. Although they mostly address grizzly bear issues, there are similar benefits to other listed species as well. MMC has developed a wildlife awareness program to educate employees (FS 2013 BA appendix C) and will continue to work with the USFS and MFWP on these and similar programs. The plan was prepared to address wildlife issues as they relate to the evaluation, construction and operation phases of the mine, and was approved by the Forest Service. It would implement procedures and protocols related to many of the following measures.

Table 1. **Mitigation required prior to USFS letter to proceed and authorization for MMC to initiate the Evaluation Phase**

Grizzly Bear Mitigation Required Prior to Initiation of the Evaluation Phase			
Mitigation Purpose	Item	Mitigation Required	Responsible Parties
Minimize displacement and reduce mortality risk during spring season	B.1.a Table 2	Restrict public motorized access on existing open NFS roads 231 and 2316 from April 1 to May 15 for as long as MMC uses and snowplows the two roads. Expected to occur during 2 year evaluation phase and 1-year reconstruction of road #278 during construction phase. Total 3.5 mi. in RZ	Forest [1]
Minimize displacement and reduce mortality risk during spring season	B.1.a Table 2	Restrict public motorized access on existing open NFS roads 4778, 4778E, 5192 and 5192A from April 1 to June 15. Total 9.3 mi (8.4 mi RZ /0.9 mi in BORZ).	Forest [2] MMC[3] LOM
Minimize displacement, increase core habitat, and reduce mortality risk during the bear year within RZ and minimize displacement, reduce mortality risk during spring season within BORZ	B.1.a Table 2 E.1	Reduce motorized access on existing open roads 4776A, 4778C, and 14458; on currently gated roads 4776C, 4776F, 4778C, 6200, 6200D, 6200E, 6200F, 6214, and 6214F, convert gated road (6745) or seasonally open road (4784, if necessary) to a non-motorized trail. Total 20.2 miles (17.7 mi in RZ/2.5 mi in BORZ)	Forest MMC[3] LOM
Minimize displacement and reduce mortality risk, increase core habitat and mitigate for cumulative effects	B.1.b Table 2	If Rock Creek Mine mitigation has not yet restricted motorized traffic with a berm on the Upper Bear Creek road #4784, then MMC would implement &fund this work at this time. Total 3.1 mi in BMU. **MMC will only implement this change if Rock Creek has not yet done so.**	Forest MMC[3], LOM
Reduce Mortality Risk	A.1.a	Install/maintain fencing surrounding the Libby adit	MMC, LOM
Reduce Mortality Risk	A.1.b	Develop a transportation plan designed to minimize mine related vehicular traffic	MMC, Forest LOM
Reduce Mortality Risk by building public support and understanding of grizzly conservation in CYRZ	A.1.c	Fund/develop information & public relations educational program to begin implementation in evaluation phase & continue through life of mine	MMC, Forest FWP, FWS LOM
Reduce Mortality Risk	A.1.d	Prohibit use of salt during winter plowing operations	MMC LOM
Reduce Mortality Risk	A.1.e	Remove road killed animals daily	MMC LOM
Reduce Mortality Risk	A.1.f	Monitor frequency of vehicle killed animals & review with Forest & FWP to determine if additional mitigation measures necessary	MMC Pre-Eval thru 1st 3 years of ops.
Reduce Mortality Risk	A.1.g	Report all grizzly bear, lynx, wolf and black bear mortalities within 24 hours	MMC, LOM
Reduce Mortality Risk	A.1.h	Fund local FWP Law Enforcement Officer, 1st 5 year funded, then fund in 5 year increments for LOM	MMC, FWP LOM
Reduce Mortality Risk	A.1.i	Prior to evaluation phase, MMC would fund Habitat Conservation Specialist.	MMC, FWP, LOM
Reduce Mortality Risk	A.1.j	Prior to evaluation phase, if Rock Creek Mine not yet operating, MMC would fund FWP grizzly bear specialist	MMC, FWP LOM
Reduce Mortality Risk	A.1.k	Fund and maintain up to 35 bear-resistant refuse	MMC

Grizzly Bear Mitigation Required Prior to Initiation of the Evaluation Phase			
Mitigation Purpose	Item	Mitigation Required	Responsible Parties
		containers for employees and mine facilities	LOM
Reduce Mortality Risk	A.1.l	Fund and or maintain electrification of garbage transfer stations adjacent and throughout CYRZ	MMC LOM
Reduce Mortality Risk	A.1.m	Fund initial 10 electric fencing kits then fund 2 more annually as needed	MMC LOM
Reduce Mortality Risk	A.1.n	Require all employees to attend grizzly bear & wildlife awareness training upon hire and annually thereafter (see MMC Wildlife Awareness Plan, Appendix C)	MMC LOM
Reduce Mortality Risk	A.1.o	Agree all mortality reduction measures would be subject to modification based on adaptive management for life of mine	MMC, Forest FWP LOM
Assure compliance with Mitigation Plan requirements	A.3a-b	Ensure MMC complies with Prior to evaluation mitigation plan requirements prior to FS authorization of construction phase	Forest
Assure compliance with mitigation plan requirements	F.1 F.2 F.3 F.4	Develop MOU with MMC and MFWP to establish Oversight Committee, & establish roles, responsibilities & time lines. Committee to develop comprehensive grizzly bear management plan for Cabinet Mtn. portion of CYRZ. Oversight Committee to be operational in pre-eval phase	Forest LOM
Ensure compliance with grizzly bear mitigation plan and requirements	F.3.a	MMC post bond or establish trust fund to cover cost of projected mitigation measures, by phase funding, deposits to be made in 5 year increments	MMC, Forest Oversight Committee LOM
Ensure compliance with GB mitigation plan	F.3.b.	Establish and lead annual stakeholders informational meeting	Forest LOM
Ensure compliance with grizzly bear mitigation plan	F.3.c	Forest agree to adopt adaptive management. actions in response to new information from monitoring	Forest LOM
Reduce displacement & mortality risk by improving north south movement corridor connectivity – specifically mitigates for effects of the Libby Adit effects in the north south corridor.	C.1 C.2.a-e D.1.a Table 4	Transfer fee title or conservation easement in perpetuity of MMC owned 5 acre parcel in East Fork Rock Creek. In addition, **acquisition or conservation easement required** on additional 495 acres, for a total of **500 acres of habitat replacement for Libby Adit displacement effects**.	MMC, Forest

[1] - Seasonal Restriction on 231 and 2316 implemented when Forest authorized w/MMC snow plowing permit Nov 2007

[2] - Seasonal Restriction on 4778, 4778E, 5192 and 5192A implemented when Forest authorized w/MMC snow plowing permit Nov 2007

[3] - MMC would fund the cost of installing and maintaining all access restrictions throughout the life of the project.

Forest: Kootenai National Forest; MMC: Mines Management Corporation; FWP: Montana Fish Wildlife & Parks; FWS: US Fish and Wildlife Service; LOM: Life of Mine; RZ or CYRZ: Cabinet-Yaak Recovery Zone; BORZ: Cabinet Face BORZ

B. Construction Phase

This phase consists of activities related to development of the infrastructure necessary to initiate full mining activities. It includes construction for the mine adits and facilities, the transportation system and the power delivery system. The projected duration of the Construction phase is three years, but some construction may continue into the fourth year and overlap with the first year of the Operations phase. Transmission line construction which occurs in BMU 5, 6, and the Cabinet Face BORZ is estimated to take two years. All activities for both construction seasons of the transmission line are scheduled to occur between June 16th and October 14th, on federal lands, which restricts transmission line related construction activities to outside of the spring and denning periods. Construction season 1 would consist of the southeast half of the route, and construction season 2 includes the northwest portion of the route (MMC 2011) although logging could occur in both seasons along the entire length of the line. The duration of hauling logs with the helicopter is estimated to be 4 weeks of continuous flying, if timber is cut before the helicopter begins hauling (Bauer 2013, personal communication to Trenholm). Due to the nature of the construction, operations, and first part of the reclamation phase within the influence zone of the other facilities and associated roads with the mine construction no timing restrictions on spring range are proposed for the facilities and associated roads in BMU 5.

Helicopters would be used for the following construction operations associated with the transmission line:

- Timber removal from about 60 acres during the 2nd construction season
- Timber removal in steep areas during both seasons
- Installation of 16 structures primarily in the upper Miller Creek and Howard Creek drainages during the 2nd construction season
- Line stringing during the summer and fall periods of both construction seasons
- Annual inspections

MMC would employ 311 people at the Libby Site and would work two 10-hour shifts 7 days per week. The hours of operation would fluctuate based on daily requirements. MMC expects 80% of the construction workers to be hired locally.

Components of the construction phase include:

- Conventional vegetation clearing for project facilities, transmission line corridor, new road construction or reconstruction, conveyor and pipe routes, and tailings impoundment areas. Includes disposal of vegetation and noxious weed control;
- Salvage and stockpiling of soils from disturbed areas;
- Construction of 0.9 miles of new road surface, and upgrading (chip-sealing) about 13 miles of NFS road 278 (Bear Creek Road). Portions of 278 (4 locations) would need reconstruction/realignment on sharp corners to allow safe travel for large vehicle traffic; About 13 miles of Bear Creek Road (NFS road #278), from U.S. 2 to the Poorman Tailings Impoundment Site, would be paved and upgraded to a roadway width of 26 feet. South of Little Cherry Creek, MMC would build 0.7 miles of new road west of and parallel to Bear Creek Road that would connect Bear Creek Road with Ramsey Creek Road (NFS road #4781) with a temporary bridge over Poorman creek.
- Use of NFS road # 231 and 2316 for access until NFS road 278 is upgraded

- Daily transportation of supplies and mine employees by bus and delivery trucks via US Hwy 2 and NFS road #278 (Bear Creek) for 350 days out of the year
- Upgrade Bear Creek crossings to accommodate 100-year flood events and widening to be consistent with roadway width;
- Construction of a permanent bridge over Ramsey Creek on NFS road #6210;
- Use of two diesel generators (only one of which would operate at any time) to supply initial power needs, which would be replaced by a buried 34.5kv transmission line along Bear Creek Road and the Libby plant access road prior to construction of the 230-kV electric transmission line
- Installation of 13.7 miles of an above-ground transmission line and ancillary features, which include 92 structures, 5.0 miles of short, temporary access roads needed for construction and maintenance, and construction of a power substation at Sedlak Park.
- Construction of a second Libby adit paralleling the existing adit, one ventilation adit in the upper Libby Creek drainage, and one ventilation adit above Rock Lake (this adit may not be needed);
- Installation of the underground crusher for initial ore treatment;
- Construction of an above-ground conveyer to transport crushed ore from the Libby adit site to the Libby plant site;
- Construction of Libby plant site and associated facilities, which includes the grinding mill, flotation cells, de-watering system, concentrate storage, administration building, warehouse, tailings thickening tank, mine/yard pond, coarse ore stockpile building, explosives storage building, electrical substation, and parking area for employees and other mine-related personnel or equipment;
- Installation of an estimated 5.1 miles of buried pipe lines for transporting tailings from the plant site to the Poorman impoundment site, and transporting reclaimed water from the tailings impoundment site back to the plant, including pump stations near the Poorman Creek and Ramsey Creek bridges;
- Initial development of the Poorman tailings impoundment site, including the cyclone separators, impoundment dams, water collection system and seepage collection pond; and
- Construction of the Libby load out facility on private land at the Kootenai Business Park in Libby.
- At the end of the construction phase stabilize soil disturbed for facility, transmission line or road construction/reconstruction with a seed mix that does not contain clovers or other plants that would attract black or grizzly bear (except during the reclamation phase).

<u>B1. Mitigation required prior to USFS letter to proceed and authorization for MMC to initiate the Construction Phase</u>

All mitigation actions initiated for the evaluation phase would remain in place through the construction phase except for the restrictions on 2 miles of Libby Creek road (NFS #231) once the Bear Creek road (NFS #278) has been reconstructed.

Construction phase mitigation includes the ongoing habitat enhancement to mitigate for loss of effective habitat (through road access changes), public information and education efforts, sanitation, mitigation law enforcement and bear specialists positions, and other efforts to help reduce the risk of mortality for listed species. Table 2 shows the purpose of each pre-construction phase mitigation measure, where each item is found in the detailed mitigation plan (Appendix C), what action is required, and who is responsible for the measure.

Table 2. **Mitigation required prior to FS letter to proceed and authorization for MMC to initiate the Construction Phase**

Grizzly Bear Mitigation required prior to initiation of the Construction Phase			
Mitigation Purpose	Item	Mitigation Required	Responsible Parties
Reduce constricted area within north south movement corridor, Reduce fragmentation, displacement & mortality risk, increase core habitat and mitigate cumulative effects of 2 mines	B.1.b Table 1 Table 3 D.2a	Restrict motorized traffic year-round by converting gated NFS road 150A (trail #935) (total of 2.9 mi in RZ) (creates 1,065 acres core) to a barriered non-motorized trail. Results in decrease in the main constriction (.9 air miles to approximately 3.6 air miles) area.	MMC[3] Forest
Reduce fragmentation, mortality risk & displacement by improving north south corridor connectivity in Cabinet Mtn. movement corridor – and cumulative effects of 2 mines. Core habitat created	B.1.b Table 3	Restrict motorized traffic year-round by converting gated NFS roads 2317,4781 & 6701, or portions thereof to a trail and barrier (Total 5 mi in RZ); ; Restrict motorized traffic year-round by converting gated roads 2316 and 6702 to berm (1.1 mi). Total 4.2 miles in RZ.	MMC[3] Forest
Mitigate for displacement and mortality risk, and cumulative effect of 2 mines. Core created.	B.1.b Table 3	Restrict motorized traffic year round by converting existing gated NFS roads 4725 to barrier. Total of 4.2 miles in RZ.	MMC[3] Forest
Big game mitigation to increase security and reduce open road densities which also reduce displacement and mortality risk in BORZ recurring use area	E.2 Table 3	Restrict motorized traffic year-round on seasonally restricted road 14442 with a berm, and restrict motorized access on currently open roads 6205D, 6787B, 6209E, 4776B with a berm. Total of 10.2 mi in BORZ.	MMC[3] Forest
Habitat replacement for displacement effects 3,073 acres affected by increased disturbance associated with haul route, tailings impoundment and facilities. Replace at 1:1 ratio	C.1, C.2a-e Table 4	Purchase or acquire conservation easements in perpetuity on 3,073 acres within the Cabinet portion of the CYRZ (and other lands as described & identified on the priority list (and mitigation credit process for within the constricted corridor). MMC would coordinate with Forest, FWP and FWS to modify priorities as needed.	MMC Forest
Habitat replacement for direct physical loss of 1,567 acres from facilities, roads, tailings impoundment, and other features. Replacement at 2:1 ratio.	C.1, C.2a-e Table 4	Purchase or acquire conservation easement in perpetuity on 3,134 acres within Cabinet portion of CYRZ, or other lands as identified on the priority list (and mitigation credit process for within the constricted corridor). MMC would coordinate with Forest, FWP and FWS to modify priorities as needed.	MMC Forest
Confirm effectiveness of mitigation measures	F.5	Fund ongoing research & monitoring of bear movements in Cabinet Mountains conducted/directed by FWS	MMC FWS LOM
Confirm connectivity between south Cabinet Mountains & NCDE	D.3	Fund 3 years of bear monitoring along US Hwy 2 south of Libby conducted by FWS	MMC FWP
Reduce Mortality Risk by	A.1.c	Continue to fund & develop information &	MMC,

Grizzly Bear Mitigation required prior to initiation of the Construction Phase			
Mitigation Purpose	Item	Mitigation Required	Responsible Parties
building public support and understanding of grizzly conservation in CYRZ		public relations educational program started prior to evaluation phase. Full funding and implementation prior to construction phase	Forest FWP, FWS LOM
Reduce mortality risk	A.2.a	See item A.1.j. to determine if additional grizzly bear specialist needed at this time, positions may have been filled prior to evaluation phase. If Rock Creek has not funded second grizzly bear specialist position, then MMC fund	Forest
Reduce mortality risk	A.2.c	Fund initial 100 bear resistant garbage containers plus additional 20 per year for distribution to general public, and maintain and replace for life of mine	MMC FWP
Reduce mortality risk	A.2.d	Coordinate with Forest to fund acquisition and maintenance of bear resistant garbage containers for all developed campgrounds in the entire Cabinet Yaak Recovery Zone	MMC Forest LOM
Reduce mortality risk	A.2.e	Appropriate use of clover in planting roadsides, no use on open roads	MMC Forest
Reduce mortality risk by monitoring public attitude Adaptive management	A.2.c.	Fund and implement a long-term public attitude and input survey so I&E program can respond	MMC FWP
Assure compliance with Mitigation Plan requirements	A.3a-b	Ensure MMC complies with prior to construction phase mitigation plan requirements	Forest
Assure compliance with mitigation requirements	F.3.a	Trust or bond established in Pre-evaluation phase with payments made in 5-year increments(F.3.a)- MMC post bond or make payment to trust fund to cover cost of construction phase mitigation	MMC Oversight Committee LOM
Assure compliance with mitigation requirements	F.4	Continue development and revising of Grizzly bear Management Plan and processes contained within as necessary	Forest, Oversight Committee LOM

[3]MMC would fund the cost of installing and maintaining all access restrictions throughout the life of the project.

Forest: Kootenai National Forest; MMC: Mines Management Corporation; FWP: Montana Fish Wildlife & Parks; FWS: US Fish and Wildlife Service; LOM: Life of Mine; RZ or CYRZ: Cabinet-Yaak Recovery Zone; BORZ: Cabinet Face BORZ

C. Operations Phase

This phase consists of the actual mining and milling operations. It is expected to occur over 16-20 years; however, the exact length of the mining operation period is unknown at this time. Poor market conditions, lower recovery rates, or a smaller reserve tonnage than is currently estimated, could reduce the estimated duration of the operation phase. Conversely, operations could extend beyond the 20-year estimate should the market conditions be better, the recovery rates or reserve tonnage be higher, or the production rate be lower than currently estimated. Regardless, the 16-20-year production period is a reasonable estimate, and the effects of the proposal as evaluated would not be markedly different if this period were reduced or extended by several years.

MMC would employ 450 people at the Libby Site and would work three 8-hour shifts 7 days per week 350 days a year with the remaining 2 weeks providing time for maintenance work. As proposed by MMC, the Montanore Mine Project would initially consist of a 12,500 tons/day underground mining operation that would expand to a 20,000 tons/day rate. Components of the operations phase include:

- Daily transportation of supplies and mine employees by bus and delivery trucks via roads US Hwy 2 and NFS road #278 (Bear Creek) for 350 days out of the year;
- Maintenance repair and security activities that would occur during the remaining two weeks of the year;
- Accessing and extracting ore from the mine;
- Treating wastewater discharges from mine and facilities in water treatment plants;
- Crushing the ore underground;
- Transporting ore to storage or to the surface plant facilities via the above-ground conveyor;
- Processing ore and extracting copper and silver minerals by flotation process;
- Transporting silver/copper concentrate from the plant via trucks to Libby load out facility (at peak production, estimated at 420 tons of concentrate or 21 truckloads per day), then shipping concentrate by rail to out-of-state smelting facility;
- Transporting mill tailings through a pipeline to the thickener plant to be condensed and deposited behind the Poorman impoundment site. The deposit would gradually fill up behind the impoundment dam covering 462 acres at the end of the operations phase;
- Continued construction of impoundment dams as fill progresses to estimated height of 230 feet;
- Appropriating up to 410 acre feet per year of ground water at a maximum rate of 1,125 gpm from Libby Creek alluvium;
- Treating waste water discharges from mine and facilities in a water treatment plant;
- Continued noxious weed control and treatment; and
- Collection of seepage water below dam and transportation via pipeline back to the plant facilities for water treatment and discharge.

Other than depositing tailings behind the impoundment dam, there would be no additional physical habitat alteration expected during the operations phase of the project.

C1. Mitigation required prior to initiation of Operations Phase

- Remove temporary roads constructed to facilitate access for transmission line installation. Roads on NFS lands would be barriered and/or decommissioned. Some roads on private or state lands would be gated and restricted to the public.
- To limit potential effects of sound, MCC would operate all surface and mill equipment so that sound levels would not exceed 55 dBA, measured 250 feet from the mill for continuous periods exceeding one hour. Vehicle backup beepers may exceed 55 dBA 250 feet from the mill. Intake and exhaust ventilation fans would be adjusted to generate sounds less than 82 dBA measured 50 feet downwind of the portals. If necessary, specially-designed low-noise fan blades or active noise suppression equipment would be used that would reduce fan noise to about 16 dBA, which would

not be audible over ambient noise levels (Big Sky Acoustics 2006). Some or all of these MMC actions could be implemented as early as the construction phase.

All of the other project mitigation would be in place by the end of the construction phase and would continue through the operations phase.

D. Mine Closure and Reclamation Phase, and post-closure

These activities are designed to establish a post-mining environment compatible with Kootenai Forest Plan land use direction. Detailed activities are described in MMC's Reclamation Plan. Post-mining conditions would provide long-term site stability, protect surface and ground water, enhance wildlife habitat, provide for public health and safety, and establish self-sustaining plant communities where possible and appropriate.

Mine closure and reclamation activities would consist generally of two phases. Phase 1 includes the transmission line removal of 16 structures, re-opens roads and includes helicopter use which is expected to take from several weeks up to one bear season. The second phase would involve the removal of underground and surface facilities, closure of underground workings, and reclamation of surface disturbances in accordance with the approved operating plan. Phase 2 does not include helicopter use. Included in this Phase would be the beginning of the dewatering and capping of the tailings impoundment. The permitting agencies estimate that the dewatering of the tailings impoundment may last from 5 to 20 years (dewatering/seepage collection would extend through the second phase). Most of the activity associated with mine closure and reclamation occurs within phase 1 and within the first two to three years of phase 2.

Components of the initial Phase 1 and the first two to three years of Phase 2 include:

- MMC expects the post mining closure phase (described as Phase 1 and the first 2 to 3 years of Phase 2) to last about 3 years. Total employees would be about 200 for the first 2 years and would decline to about 125 in year three.
- Closing the adits/portals with two or more concrete or water-retaining plugs. Portal openings would be re-graded to slope and vegetated;
- Dismantling and removing all project facilities (except the Libby Adit water treatment plant and pump back stations located on the Poorman Impoundment area), above-ground ancillary features, pump stations and unneeded roads. Some features such as concrete foundations, buried utilities and pipelines may be buried on private lands, but would be removed on NFS lands;
- Dewatering and capping of the tailings impoundment;
- Removing all waste material from NFS lands and disposing of wastes at a proper waste facility as described by MDEQ Solid Waste Management direction;
- Removal of the transmission lines, poles and access roads;
- Re-grading disturbed areas to desirable post-mining conditions and slopes;
- Depositing stockpiled soil in borrow areas, tailings impoundment and other disturbed sites; and
- Re-vegetating and stabilizing all exposed soil areas, including borrow areas, unnecessary roads and impoundment areas.

Long-term aspects of Phase 2 of mine closure and reclamation would involve the following:

- MMC expects the reclamation and monitoring phase (described as the long-term aspects of Phase 2 in the BAs) to last about 20 years with total employment (about 80 jobs) to peak in the first 2 years of this phase and to decline to about 30 jobs thereafter. Human activity associated with facility maintenance and monitoring is expected to be limited and indistinguishable from current recreational use. This phase consists of longer term maintenance of specific facilities, such as the Libby Adit water treatment plant or the seepage collection and pumpback system facilities at the tailings impoundment. MMC estimated 3 to 5 people would be working during this time (Klepfer, February 2012). Depending upon water monitoring results and agency decisions, monitoring activity could vary (i.e. minimal such as 3 times a year, or daily) (DEIS, SEIS Appendix H, Water resources conceptual monitoring plans; personal communication Lynn Hagarty, Bobbie Lacklen March 2012).

- During Phase 2 long term MMC would maintain and operate the seepage collection and the pumpback well systems until non-degradation criteria or Montana BHES Order limits were met without additional treatment. Long-term treatment may be required if water quality standards were not met. MMC would continue water monitoring as long as the Montana Pollutant Discharge Elimination System MPDES permit is in effect. As long as post-closure water treatment operated, the agencies would require a bond for the operation and maintenance of the water treatment plant. The actual length of time these closure activities would occur is not known, but may be decades or more.

D1. Mitigation required during the reclamation and closure phase

- Activities for transmission line removal on federal lands will occur between June 16 and October 14 to reduce grizzly bear mortality and displacement risk during the spring and den seasons.

No other wildlife-specific mitigation associated with mine closure and reclamation and post-closure are discussed in this DRAFT BO, however, wildlife would benefit from mine-related roads that would be stored and/or decommissioned. Mine related roads being closed with the Poorman impoundment disturbance area are: 5181, 5181A, 5185, 5185A, 6201, 6212, 6212H, 6212L, 6212M, 6212P, 14404, road 14404 and 14403 within the Libby Creek plant site disturbance area, and road 5170, a spur road off Poorman Creek Road 2317 south of the impoundment. All mitigation requirements that were identified as required during the life of the mine would remain in place through the reclamation period.

III. STATUS OF THE SPECIES

A. ESA Listing Status

In 1975, the Service listed the grizzly bear as a threatened species in the contiguous United States (40 FR 31734-31736, July 28, 1975). The Service subsequently developed a grizzly bear recovery plan in 1982, and revised it in 1993 (U.S. Fish and Wildlife Service 1993).

Since the original listing of the grizzly bear, the Service has completed three, 5-year status reviews (46 FR 14652, February 27, 1981; 52 FR 25523, July 7, 1987; 56 FR 56882, November 6, 1991). None of these reviews warranted a change in the listing status of the grizzly bear. Since then, the Service has undertaken a number of actions to review the status of individual grizzly bear populations.

On March 13, 1990, the Service received a petition requesting the grizzly bear in the North Cascades Ecosystem (NCE) be reclassified from threatened to endangered. We made a positive 90-day finding on the petition and initiated a status review of the NCE grizzly bear population (55 FR 32103, August 7, 1990). On January 28, 1991, we received a petition requesting that we reclassify the grizzly bear populations in the CYE, SE, and the Northern Continental Divide Ecosystem (NCDE) from "threatened" to "endangered." Then, on February 4, 1991, we received a petition requesting that grizzly bear populations in the SE, CYE, Yellowstone Grizzly Bear Ecosystem (YGBE) and NCDE recovery zones be reclassified from threatened to endangered. In 1992, we made a positive finding on the January and February (1991) petitions regarding the CYE and SE and initiated a status review for these two ecosystems (57 FR 14372, April 20, 1992). This same finding found that there was not substantial information presented about the YGBE or NCDE recovery zones and that the request to uplist the NCE population was already being addressed through initiation of a status review in 1990 (see 55 FR 32103, August 7, 1990).

In July 1991, the Service released a 12-month finding that reclassification of the North Cascades population from threatened to endangered was warranted but precluded (56 FR 33892, July 24, 1991). In 1993, we published a 12-month finding that the grizzly bear population in the CYE was warranted for up listing to endangered status while the population in the SE was not (58 FR 8250, February 12, 1993). This warranted status for the CYE, like the NCE population, was determined to be precluded by higher priority actions. In 1998, we re-affirmed this position, publishing a notice that the North Cascades population and the CYE populations are warranted for endangered status, but precluded by higher priority actions (63 FR 30453, June 4, 1998). In 1999, after a Court remanded our finding regarding the SE population back to the Service, we released a 12-month finding that both the CYE and the SE populations were warranted for endangered status but precluded by higher priority actions (64 FR 26725, May 17, 1999). Since then, the NCE, SE, and the CYE populations have remained warranted for reclassification from threatened to endangered status but precluded by higher priority actions (64 FR 57534, October 25, 1999; 66 FR 54808, October 30, 2001; 67 FR 40657, June 13, 2002; 69 FR 24876, May 4, 2004; 70 FR 24870, May 11, 2005; 71 FR 53756, September 12, 2006; 72 FR 69034, December 6, 2007; 73 FR 75176, December 10, 2008; 74 FR 57804, November 9, 2009)

B. Species Description, Life History, Population Dynamics

Grizzly bears are large (averaging 400-600 lbs for males, and 250-350 lbs for females) and long-lived (up to 40 years old) (Storer and Tevis 1955), but usually no more than 15-25 years in the wild. Grizzly bears are omnivorous, opportunistic feeders that require caloric intake in excess of maintenance requirements, particularly in later summer and fall, in order build fat levels to survive denning.

Generally solitary, grizzly bears avoid one another, except during the mating season when male and female bears tolerate one another. Grizzly bears do not defend territories, but instead have home ranges they share with other grizzly bears, although social systems influence movements and interactions among resident bears. Home range sizes for adult female grizzlies vary from 50 to 150 square miles; an adult male can have a home range size as large as 600 square miles (Schwartz et al. 2003).

Grizzly bears in the contiguous United States spend 4 to 6 months in dens, typically beginning in October or November (Craighead and Craighead 1972; Nagy and Gunson 1990; Hellgren 1998). The bears hibernate for as long as 7 months. During this period, they do not eat, drink, urinate, or defecate. Over the course of the den season, a bear may lose 30 percent of its body weight. All of this weight is stored as fat, which is acquired during the 2 to 4 months prior to entering dens. During the pre-den period, bears increase their food intake dramatically and may gain as much as 3.64 pounds per day (Schwartz et al. 2003). Kasworm et al. (2010 pp. 58-59) reported denning chronology for radio-collared grizzly bears in the CYE from 1983 to 2009. Den emergence for female grizzly bears ranged from the 3rd week of March to the 3rd week of May and peaked between the 2nd and 4th weeks of April (Kasworm et al. 2010 p. 58). Den emergence for male grizzly bears ranges from the 4th week of March to the 4th week of April and peaks between the 2nd and 3rd weeks of April (ibid). Female grizzly bears entered their dens between the 3rd week of October and the 2nd week of December Kasworm et al. 2010 p. 59). Male grizzly bears entered their dens between the 1st week of November and the 4th week of December (ibid).

Mating occurs from May through July, and cubs are born inside the den in late January or early February. Cubs remain with their mother for 2 to 3 years (Foresman 2001). The age at which females produce their first litter varies from 3 to 8 years, with litter size varying from one to four cubs. Grizzly bears have one of the lowest reproductive rates among terrestrial mammals. Grizzly bear females cease breeding successfully some time in their mid to late 20s (Schwartz et al. 2003).

C. Habitat Requirements

Grizzly bears are opportunistic omnivores and will eat fish, berries, grasses, leaves, insects, roots, carrion, small mammals, fungi, nuts, and ungulates. The bears are selective in their seasonal use of various kinds of forage and, therefore, move across the landscape as they follow the growth and abundance of preferred forage items (Blanchard 1983; Mace et al. 1996; Waller and Mace 1997; McLellan and Hovey 2001).

Grizzly bears are habitat generalists. Basic habitat requirements include the availability of food, security (from humans and other bears), and den sites (Archibald et al. 1987; Heinrich et al. 1995; Mace et al. 1996, 1999; Linnell et al. 2000) (Table A1). While biologists agree that preferred habitats of grizzly bears are early seral, fire-successional types, the proximity of security cover is also an important variable that has been shown to influence the use of foraging habitat. Given equal foraging opportunities, under cover and in the open, bears prefer to feed under cover.

Grizzly bears are selective in their seasonal use of various kinds of forage and, therefore, move across the landscape as they follow the phenological development and abundance of their preferred forage items. As a result, the productivity of grizzly bear populations is likely more strongly influenced by the availability of high quality food resources than by density-dependent regulating factors (Interagency Grizzly Bear Committee (IGBC) 1987, pp. 51-59). It has also been observed that grizzly bears of all ages will congregate readily at plentiful food sources and form a social hierarchy unique to that grouping of bears (U.S. Fish and Wildlife Service 1993).

Table A1. Grizzly bear habitat requirements and key habitats.

Habitat requirement	Key Habitats
Spring foraging[1]	Low-elevation mesic vegetation
Summer, autumn foraging[1]	Moderate- to high-elevation mesic vegetation
Security cover and isolation from humans[2,3]	Cover provided by vegetation and topographic breaks; absence or low density of roads and trails
Denning habitat[4]	Remote, high-elevation areas with slopes greater than 30 degrees; friable, deep soils; and snow accumulations

Sources:
1 Mace et al. (1996); Mace et al. (1999); McLellan and Hovey (2001); Nielson et al. (2002); Waller and Mace (1997a).
2 Archibald et al. (1987); Kasworm and Manley (1990); Mace et al. (1996); Mace et al. (1999); Mattson et al. (1987); McLellan and Shackleton (1988, 1989); Wielgus et al. (2002).
3 Mace and Waller (1997); White et al. (1999); Graves (2002).
4 Pearson (1975); Servheen (1981); Zager and Jonkel (1983); Podruzny et al. (2002).

With the exception of a few forest vegetation types, such as horsetail associations, the majority of vegetative food items preferred by grizzly bears occur in early seral communities where forest cover is absent or relatively sparse (Hamer and Herrero 1983). Foraging areas that are consistently described in the literature as favored by bears include avalanche chutes (Zager 1980; Mace et al. 1996; Waller and Mace 1997; Ramcharita and McLellan 2000; McLellan and Hovey 2001), fire-mediated shrub fields (Almack 1985, 1986; Hamer and Herrero 1987a, b; McLellan and Hovey 2001), and riparian areas (Servheen 1983; McLellan and Hovey 2001). Avalanche chutes may be used at any time of year, but seem to attract bears particularly in the spring. These areas are usually quite wet (due to deep snows that melt later than in other areas), and they contain both valuable forage species and a tangle of vegetation that provides visual screening. Fire-mediated shrub fields often contain soft-mast (e.g., berry) producing shrub species, an important food source for foraging bears in mid-summer and early fall. Riparian areas are primarily used in spring and early summer when habitats at higher elevations are still covered with snow or plant growth is otherwise delayed. Grizzly bear foraging habitat associated with riparian areas and shrub fields is scattered throughout the action area.

When bears emerge from their dens in the spring, their fat stores have been severely depleted; therefore, foraging to rebuild energy reserves is their primary focus. It is important that bears have adequate spring foraging opportunities close to their dens, especially when cubs have been born, to build up fat stores quickly. In their study of radio-collared female grizzly bears, Mace et al. (1999) found that the upper elevation limit observed for habitat use in spring was 4,900 feet. Waller and Mace (1997) defined the spring period as the period from den exit to July 15 based on apparent changes in food habitats and behavior. In the CYE the spring period is considered April 1 through June 15th.

In addition to foraging habitat, habitat that provides ample hiding cover and some degree of isolation from humans and human-associated activities are necessary habitat components for grizzly bears (Archibald et al. 1987; Mattson et al. 1987; McLellan and Shackleton 1988, 1989; Kasworm and Manley 1990; Mace et al. 1996, 1999).

Human activities and encounters with bears can result in direct mortality of bears, as well as indirect negative effects by displacing bears to less suitable habitats (Mace and Waller 1998; McLellan et al. 1999; Benn and Herrero 2002; Wakkinen and Kasworm 2004; Schwartz et al. 2006). The most effective way to minimize the risk of adverse interactions between humans and bears is to provide spatial separation between areas of human activity and areas of bear activity. In areas where such separation is not possible, providing large areas of secure habitat that include seasonal habitats may reduce the potential for contact and minimize risk of disturbance and illegal mortality (Mace and Waller 1998). Managing public motorized access to grizzly bear habitat is one of the most common and effective ways to maintain a level of separation between grizzly bears and humans.

While hiding cover allows grizzly bears to avoid contact with humans, the cover is sometimes necessary for bears to avoid contact with other bears. Strict territoriality among grizzly bears is not known, and intraspecific defense behavior generally tends to be limited to defense of limited food concentrations, defense of young, and surprise encounters (U.S. Fish and Wildlife Service 1993). Adult male bears are known to kill juveniles, and adults also occasionally kill other adults. Females with cubs require spatial separation from aggressive males. This is particularly true in spring, when cubs-of-the-year are most prone to attack. Data are insufficient to fully assess the effects of predation on younger bears by adult bears (U.S. Fish and Wildlife Service 1993), particularly when considering potential indirect effects of various human activities that may displace a sub-adult bear into the home range of an aggressive adult bear. Female grizzly bears with cubs often select rugged and isolated habitats for this reason (Russell et al. 1979; Reynolds and Hechtel 1980; Banci 1991). Shrub and tree cover, as well as topographic landscape features, are commonly used as security from humans or other bears (McLellan and Hovey 2001; Wielgus et al. 2002), and dispersing sub-adult bears may be forced to choose poor home ranges that may be equally dangerous to their survival (U.S. Fish and Wildlife Service 1993).

Another key habitat requirement for grizzly bears is the presence of suitable den habitat. Den site characteristics are variable, but several researchers have described dens located at high elevations in remote areas with slopes greater than 30 degrees, soils that are deep, and aspects where snow accumulates (Pearson 1975; Servheen 1981; Zager and Jonkel 1983; Podruzny et al. 2002). Sloped sites are often selected because they facilitate easier digging and are generally stabilized by trees, boulders, or root systems of herbaceous vegetation. In addition to excavating dens, grizzly bears den in natural caves and hollows under the roots of trees. While individual den sites are rarely reported to be used for more than one winter, numerous researchers have observed that dens rarely occur singly, but are concentrated in areas that apparently possess appropriate environmental conditions (Craighead and Craighead 1972a).

Females and their cubs remain in the den site area for several weeks after emergence from dens (Haroldsen et al. 2002, p. 33; Mace and Waller 1997, pp. 37-38). Females with cubs have high energetic needs, and cubs have limited mobility for several weeks after leaving the den. Disturbance levels that cause a female to prematurely leave the den in spring or move from the den area could impair the fitness of the female and safety of the cubs.

D. Habitat Linkage

An important habitat component for wildlife is the presence of habitat linkages. Servheen et al. (2001) define habitat linkages as "the area between larger blocks of habitat where animals can live at certain seasons where they can find the security they need to successfully move between these larger blocks of habitat." The main factors generally considered to affect the quality of linkage zones are major highways, railroads, road density, human site development, availability of hiding cover, and the presence of riparian areas (Servheen et al. 2001 and 2003;U.S. Forest Service 2005). The importance of maintaining habitat linkages is an issue recognized by federal, state, and county governments; conservation organizations; and many others (Servheen et al. 2001). It is an issue encompassing not only wildlife conservation but also human safety and economics, since vehicle-wildlife collisions on highways result in many human fatalities and injuries each year and cost millions of dollars in property damage (Servheen et al. 2001).

Habitat linkage and connectivity are important components of grizzly bear habitat (Servheen et al. 2001, 2003; U.S. Fish and Wildlife Service 1993). Maintaining linkage and connectivity between small, isolated grizzly bear populations can benefit grizzly bears in several ways, including (1) allowing immigrant grizzlies to bolster a resident population in an area that has been affected by catastrophic events or negative environmental conditions, and (2) preserving genetic diversity by reducing negative effects from inbreeding. Task 37 in the federal *Grizzly Bear Recovery Plan* (U.S. Fish and Service 1993) called for the evaluation of linkage potential between grizzly bear recovery zones.

Grizzly Bear Dispersal, Movements, and Genetic Health

Because grizzly bears live at relatively low population densities and are vulnerable to excessive human-caused mortality, human-caused fragmentation of historically contiguous populations into isolated "remnant" populations is a management reality on the current ecological landscape (Forman and Alexander 1996; Proctor et al. 2012; Lindenmayer and Fischer 2006). It is a widely accepted tenet in conservation biology that extinction risk of isolated populations is reduced even through minimal levels of connectivity (Soule 1987). At greatest risk of extinction are small isolated populations with less than 100 individuals. Such populations are more susceptible to extinction through demographic processes such as human-caused mortality, natural mortality, and lower population growth rates as well as environmental processes such as poor food years, climate change, and habitat loss. While the Selkirk and Cabinet-Yaak grizzly bear populations contain less than 100 individuals each, they are not entirely isolated from Canadian populations. Small populations benefit greatly from both demographic rescue (i.e., the immigration of female bears) and to a lesser degree genetic rescue (i.e., immigration of male bears). Although reconnection of these isolated populations is challenging (Forman and Alexander 1996; Lindenmayer and Fischer 2006), metapopulation theory directs that connectivity is the best long-term conservation practice to increase the resiliency, redundancy, representation, and overall probability of persistence of remaining grizzly bear populations in the lower 48 States (Boyce 2000).

Proctor et al. (2012) compiled and analyzed all known genetic and movement data for grizzly bears in 10 different study areas. They assessed the current state of genetic fragmentation within and between these study areas and used genetic assignment testing and movement data from radio-collared animals to compile what is known about current levels of male and female movement.

Samples from coastal British Columbia and the Selkirk Mountains south of Canadian Highways 3 and 3A (i.e., the SE) have unique genetic material that is dissimilar to other grizzly bear populations in southern Canada and the northern U.S. In the Selkirks, this difference is most likely due to genetic drift acting on a small isolated population over several generations because of anthropogenic pressures (Proctor et al. 2012).

Although Proctor et al (2012a) found differences in heterozygosity among the several study areas and U.S. recovery zones, there have been no detectable consequences on grizzly bear morphology, physiology, ecology, or biology related to these differences in genetic variability as evidenced by normal litter size, little evidence of disease, an equal sex ratio, and physical characteristics such as body size and weight (Wakkinen and Kasworm 2004; Schwartz et al. 2006a; Kasworm et al. 2008; Mace and Chilton 2008).

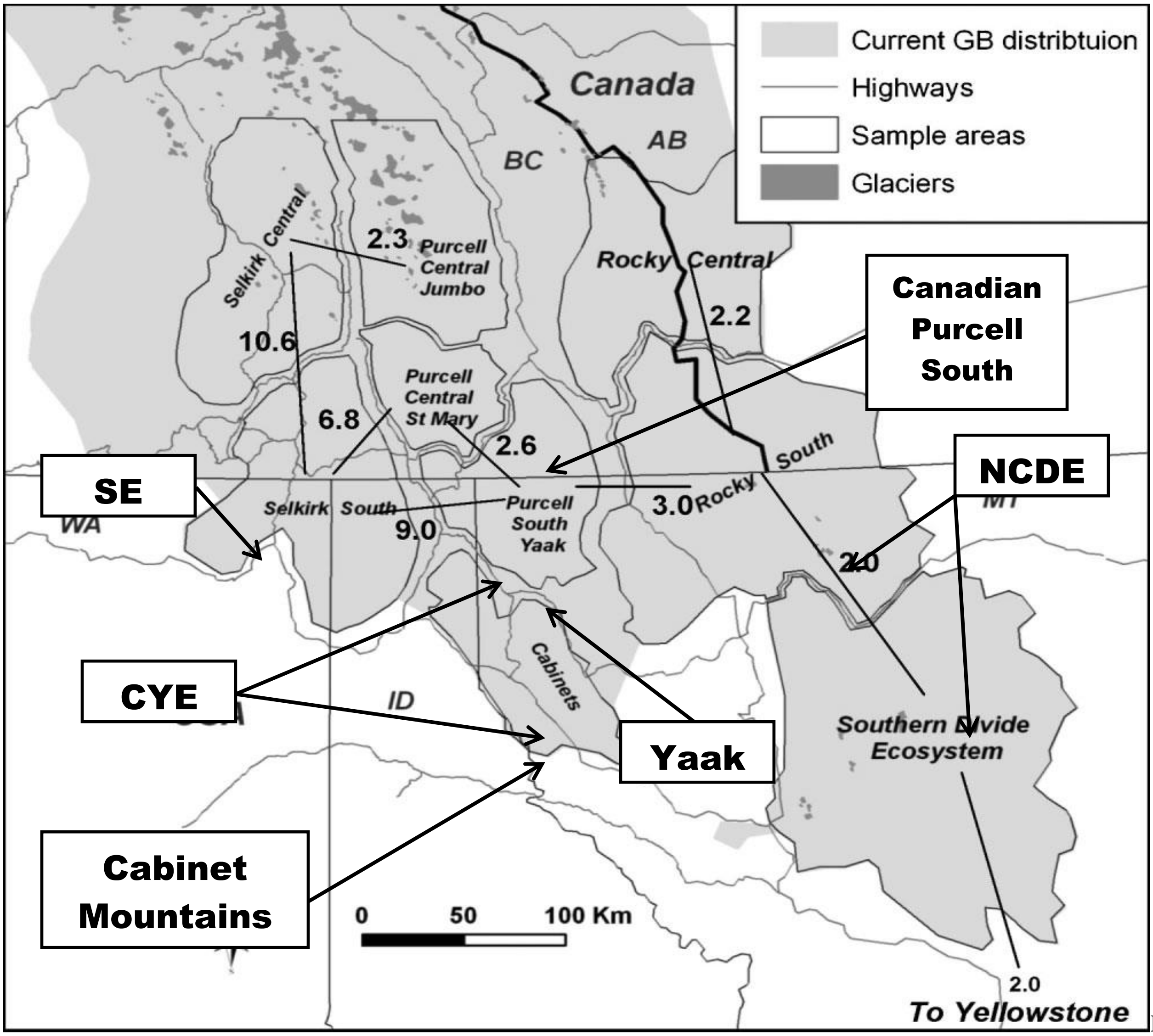
These genetic differences are not the result of natural selection in varying environments or indicative of historical conditions. Instead, they are artifacts of human pressures (Proctor et al. 2012). Grizzly bears face high mortality risk when moving between secure blocks of habitat. This mortality risk and very low population sizes resulting from past range contraction and mortality have resulted in genetic fragmentation. Each of these fragmented populations may possess genetic material missing from other populations. Maintenance of this genetic material is important to the long-term ability of this region's grizzly bears to respond to environmental changes.

Because grizzly bears have low reproductive rates (Nowak and Paradiso 1983; Schwartz et al. 2003b), long generational times (i.e., 10 years), and are slow to disperse across landscapes (McLellan and Hovey 2001), there can be a lag time between fragmentation and detectable genetic differentiation. Proctor et al. (2012a) identified several small and fragmented populations in the trans-border area as being of immediate conservation concern (including the SE and CYE). Their analyses indicated fragmentation was associated with major highway corridors and patterns of human settlement and development in low-elevation valleys. The east-west fragmentation they observed between the both the Yaak portion and Cabinet Mountain portion of the CYE and NCDE may be due, in part, to Lake Koocanusa reservoir, which has separated these recovery zones since the 1970's. Furthermore, grizzly bears in the Yaak portion of the CYE grouped more closely with bears from Canada in the Southern Purcell Mountains than bears in the Cabinet Mountain portion of the ecosystem. The reservoir is indicative of a more recent bottleneck to movement that precedes listing the grizzly bear under ESA and subsequent recovery efforts. It is also quite likely that high mortality began with white settlement of the area in the late 1800's and continued into the era of rapid resource extraction from 1940-1980's, severely reducing the number of grizzly bears in both CYE and the intervening habitat separating the CYE and NCDE populations (35 mi (56 km). This high mortality would have also minimized the potential for successful movement of bears between areas now identified as recovery zones.

The cluster analyses by Proctor et al. (2012a) showed grizzly bears in the Cabinet Mountains sub-population of the CYE were genetically more similar to grizzly bears in the NCDE than the Yaak sub-population of the CYE. The Cabinet Mountain sample (n = 16) included in the Proctor et al. (2012a) study included 5 bears directly descended from augmentation bears transplanted into the Cabinet Mountains from the NCDE since the early 1990s (Servheen et al. 1995, Kasworm et al. 2007b). Thus, the augmentation bears' descendants would be expected to group more closely with the NCDE bears. However, the bears that pre-date the 1990s augmentation and represent original (not introduced or translocated) Cabinet bear genotypes, also clustered tightly with NCDE bears, suggesting an historic close link between bears in the Cabinet Mountains portion of the CYE and NCDE ecosystems. Proctor et al. (2012a) offered three scenarios that could result in such a clustering pattern. First, the Cabinet Mountain bears may have always remained connected with NCDE bears at a level undetected through telemetry or tag returns. Second, the bears of the Cabinets were extirpated since white-settlement and recolonized from bears out of the NCDE (through metapopulation function). Third, perceived isolation of the Cabinet bears has occurred recently enough (and without continued migration of bears) that no genetic signal is yet apparent. While the correct scenario is unknown, we have found no evidence of natural movement into, or successful reproduction with, bears in either the Cabinets or Yaak subpopulations of the CYE by bears from the NCDE. In addition, three of the bears included in the Proctor et al. (2012a) analyses pre-date the 1990s augmentation effort in the CYE, were a family group of which the male and female parents were born in the 1950s. Therefore, it appears that the close genetic association of the Cabinet Mountains subpopulation with the NCDE, as well as the recent increase in bear numbers within the CYE is a direct result of the grizzly bear augmentation program. Additional genetic sampling in the Cabinet Mountains since the Proctor et al. (2012a) analysis supports this conclusion (Kasworm et al. 2012 and Wayne Kasworm, USFWS, Pers comm. 2013).

Proctor et al. (2012a) assessed genetic distance adjusted for geographic distance ($D_{LR;}$ see Fig. A1a for description) between adjacent populations and found a statistically significant difference between potential natural (D_{LR} = 1.2) and human-created (D_{LR} = 3.9) barriers to migration. The genetic distance between populations were lowest (<1.0) in the northern-most undisturbed mountains of their study area. Grizzly bear populations separated by ice fields and Continental Divides (i.e., potential natural barriers) were generally between 1.0 and 2.0. The areas within the trans-border region with human-created barriers had the highest values of genetic distance (2.0 – 3.0); these highest values were observed between the Selkirk South (US designated SE recovery area) and adjacent populations (Fig. A1a). No genetic distances for the Cabinet Mountains subpopulation were provided as sample sizes were too low for meaningful results, and 6 of 16 samples were from descendents of a translocated female from the Rocky South area (Kasworm et al. 2007). North of the trans-border region Proctor et al. (2012a) found some evidence for natural fragmentation along the heavily glaciated sections of the Continental Divide, but fragmentation associated with roads and human settlements predominated. With regard to the concerns of this biological opinion, it should be noted that the adjusted genetic distance between the Yaak subpopulation – NCDE (3.0) is greater than between the southern NCDE – YGBE (Fig. A1a).

Figure A1a1 Grizzly bear (GB) genetic distance



By Paetkau et al. 1997 and adjusted for geographic distance (D_{LR}/100 km), for GB sample areas in the trans-border area (from Proctor et al. 2012a). Squares indicate name of US designated recovery zone, population or sub-population used in this biological opinion.

It is useful to supplement movements identified from genetic assignment tests with telemetry and body tag returns when possible, to provide a more complete indication of population connectivity. Proctor et al. (2012a) used population-assignment methods to detect individual migrants between immediately adjacent trans-boundary populations. Their findings corroborated observations of inter-area movements from telemetry and tag returns. In general, Proctor et al. (2012a) found males move more frequently and over longer distances than females. This result is expected based on what we know about female home range size and dispersal behavior. Females usually establish smaller home ranges than males, and female offspring typically establish home ranges that overlap with their mother's (Waser and Jones 1983; LeFranc et al. 1987; Schwartz et al.2003b). In doing so, female grizzly bears generally disperse over much shorter distances than males (McLellan and Hovey 2001; Proctor et al. 2004a). The majority of migrants that moved from one population to another were males (33, 28 telemetry-tags and 5 genetic assignment), with fewer females (14, 12 telemetry and 2 genetic assignment) observed moving between these fragmented populations (Proctor et al. 2012a). These findings were further corroborated by the pedigree analyses completed in Proctor et al. (2012b), that confirmed male dispersal events across highways and developed valleys in the trans-boundary populations but none by females. These male movements demonstrated connectivity amongst the adjacent SE and Canadian populations, and Yaak subpopulation. There was no evidence of connectivity between the Yaak and Cabinets subpopulations.

Population connectivity should be examined in both a genetic (requires males only) and demographic (requires females) framework. While male movements can enhance genetic variability and reduce genetic fragmentation (Miller and Waits 2003; Proctor et al. 2005), female movements are necessary to enhance a small population's growth rate by producing off-spring (Proctor et al. 2012a). This concept is relevant to grizzly bear recovery in the NCE, SE, and CYE recovery zones, all of which contain small populations and appear to be demographically or genetically isolated to varying degrees.

Proctor et al. (2012a) documented increasing genetic and demographic fragmentation across Canada Highway 3. If allowed to continue, this fragmentation could lead to a loss of the current connectivity between U.S. and Canadian grizzlies shown in Proctor et al. (2012b). Canada Highway 3 is currently at least a partial barrier to population connectivity by minimizing female crossings (Proctor et al. 2005; Proctor et al. 2012a). Maintaining and increasing movements by females (i.e., demographic rescue) from the Canadian south Purcell and Purcell central populations into the small U.S. populations (SE and CYE) is critical to the long-term conservation of these populations. Recovery could be accomplished via natural movements or translocating bears. The clustering of grizzly bears north (Yaak subpopulation) and south (Cabinets subpopulation) of US Highway 2 with bears of Canadian versus NCDE origin, respectively, in the CYE may also be a result, in part, of such transportation corridor driven fragmentation.

Subpopulation reconnection may be occurring in the eastern and southern portions of the NCDE population as determined by Kendall et al. (2009). Proctor et al. (2012a) found a high number of migrants and weak clustering between the northern and southern NCDE subpopulations separated by U.S. Highway 2, reflecting minor fragmentation of historic and unknown origin (possibly mortality patterns). Waller and Servheen (2005) documented similar movements in their study of collared bears across U.S. Highway 2. Using techniques comparable to Proctor et al. (2012a), Kendall et al. (2009) found evidence of clustering on either side of the more developed western portion of U.S. Highway 2, but not across the minimally settled eastern section. Telemetry data in Proctor et al. (2012a) revealed similar patterns. The distribution of U.S. Highway 2 crossing events was heavily skewed to the eastern section, in contrast to the western section where development and traffic were 3 times greater than in the east (K.Kendall, US Geological Survey, unpublished data).

Another aspect of connectivity Proctor et al. (2012a) examined was known habitat use by grizzly bears in intervening habitats (i.e., linkage zones). This habitat use is relevant to understanding how and where grizzly bears in between US recovery zones may be linked in the near future. Proctor et al. (2012a) found 4 males and 1 female using habitat between the Selkirk and Purcell Mountains, although there was no evidence of migration and successful reproduction by bears between the two mountain ranges.

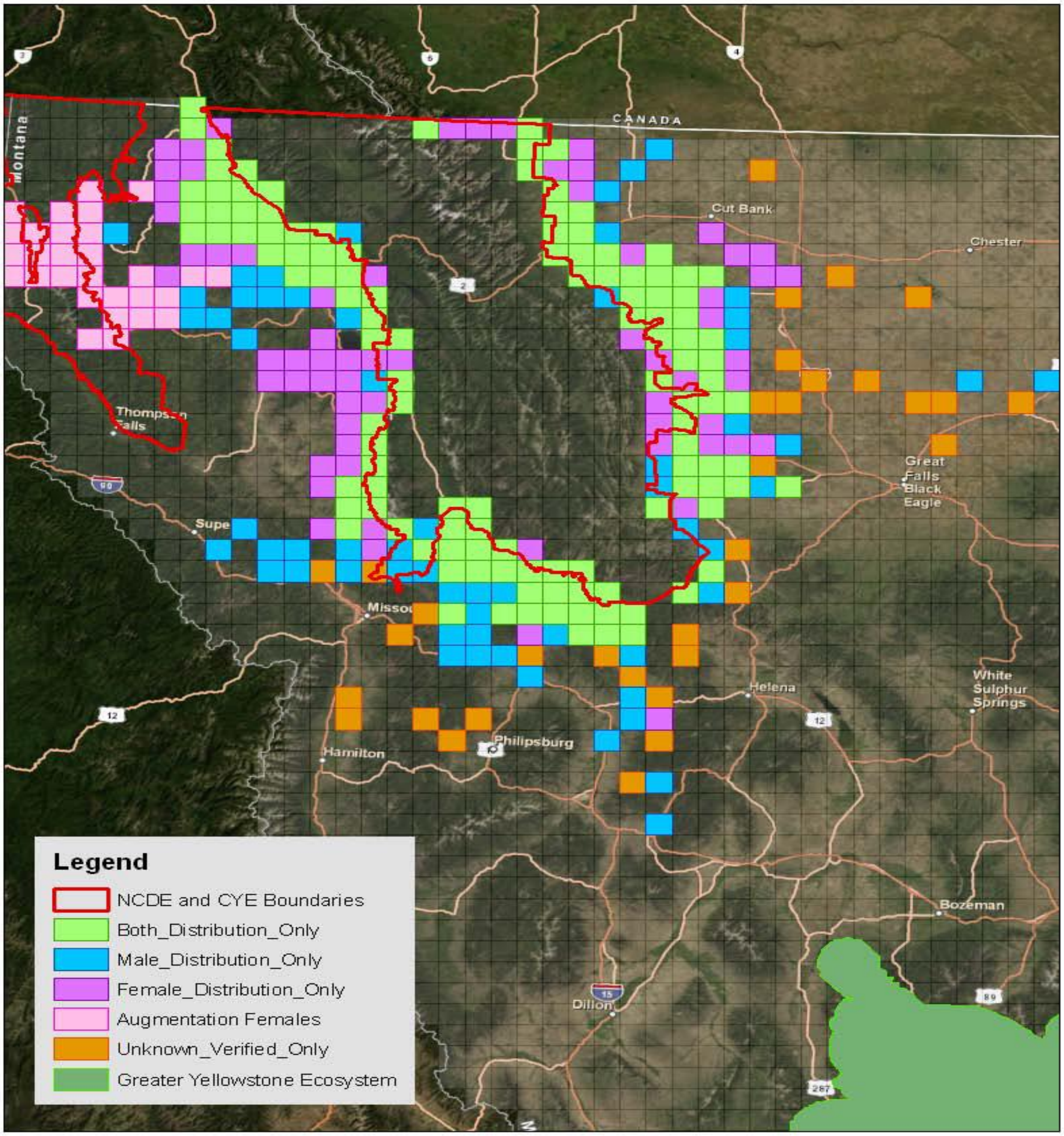
Mace and Roberts (2012; Figure. A1b) documented the distribution of grizzly bears in and adjacent to the NCDE recovery zone based on a compilation of telemetry data, mortality data, and DNA detections and found that both male and female grizzly bears are occupying habitat between the NCDE and CYE. We have documented one female grizzly bear with a cub that regularly uses habitat between the NCDE and CYE. She and her offspring spend most of their summer in the Salish Mountains of Montana with the western edge of her home range about 5 miles (8.1 km) from the CYE recovery zone across Koocanusa Reservoir, while denning within the boundaries of the NCDE recovery zone (Kasworm et al. 2008). In fact, there have been several different grizzly bears with cubs documented using habitat west of Highway 93 between the CYE and NCDE, since 2002 (U.S. Fish and Wildlife Service, unpubl. data 2011).

Currently, it is not possible to tell if movements observed reflect increased habitat connectivity from recovery efforts, or an increase in detection effort and technology (e.g., radio-transmitter collars; genetic techniques) (Proctor et al. 2012a; Proctor et al. 2012b). These promising detections of grizzly bear movements should be tempered given that detected movement may not translate to migrants breeding successfully. Without successful reproduction, there is no genetic or demographic rescue-effect. However, larger individual sample sizes and new genetic analysis techniques have allowed pedigree analysis to examine this issue (Proctor et al 2012b). Pedigree analysis has identified several triads (mother-father-offspring) that span adjacent grizzly bear populations in the trans-border region (Proctor et al 2012b). This triad evidence indicates multiple breeding events between adjacent populations by male parents, and multiple dispersal events by male and female offspring between the US and Canada (see Figure A1a) for reference to juxtaposition of these populations and subpopulations), including: (1) the Yaak subpopulation and Canadian Purcell Central – St Mary population; (2) the Yaak and Canadian Purcell South (not included in the US designated CYE recovery zone) subpopulations; (3) the Selkirk South (US designated SE recovery zone) and Canadian Purcell Central – St Mary; and, (4) the Selkirk South and Canadian Purcell South. Of particular note, the pedigree analysis by Proctor et al. (2012b) confirms some of these movements across recognized highway and developed valley barriers in the US and Canada. This effort is ongoing and may provide a means of monitoring gene flow among populations into the future.

Most of the research and monitoring in the CYE, NCDE, SE, and YGBE has occurred specifically to achieve the goal of the revised recovery plan – the conservation, recovery and delisting of grizzly bear in the conterminous 48 states. The need to improve habitat linkage among grizzly bear ecosystems to improve population connectivity, reduce human-caused mortality, as well as risk for migrant bears have been well documented (Proctor 2003, Proctor et al. 2012a). Information presented in this section emphasizes the importance of maintaining genetic and demographic connectivity with Canadian populations and the small populations of the NCE, SE, and CYE, while highlighting the importance of recovering these small populations in order to provide a founding source of grizzly bears for the Bitterroot Ecosystem (BE; no grizzly bears known to be present at this time). Also of relevance, the NCDE appears to be well connected to Canadian populations genetically and its large population size means female movements from Canada into the NCDE are not absolutely required for demographic health to be maintained, although such female movements are beneficial. Similarly, the YGBE has a large enough population size that demographic rescue is not required. Instead, 1-2 male migrants every 10 years (i.e., genetic rescue) are adequate to maintain current levels of genetic diversity in the YGBE (Miller and Waits 2003). While the Yaak subpopulation of the CYE has been shown to be of conservation concern due to human-caused fragmentation of the grizzly bear population (Proctor et al.

2012a), the pedigree analysis conducted by Proctor et al. (2012b) provides clear evidence of ongoing genetic connectivity with bears in the southern Purcell Mountains of Canada. While it appears that continued augmentation will be necessary for the Cabinet Mountains subpopulation in order to achieve recovery goals in the CYE, translocating bears into the Yaak portion of the ecosystem is not needed at this time.

Figure A1b. Distribution of grizzly bears in and adjacent to the NCDE federal recovery zone (1989-2011 based on telemetry data, mortality data, and DNA detections in 2004 (from Kendall et al. 2009) *in* Mace and Roberts 2012*.



Occupancy was based on presence within 10 km2 grid cells.

E. Range-wide Status

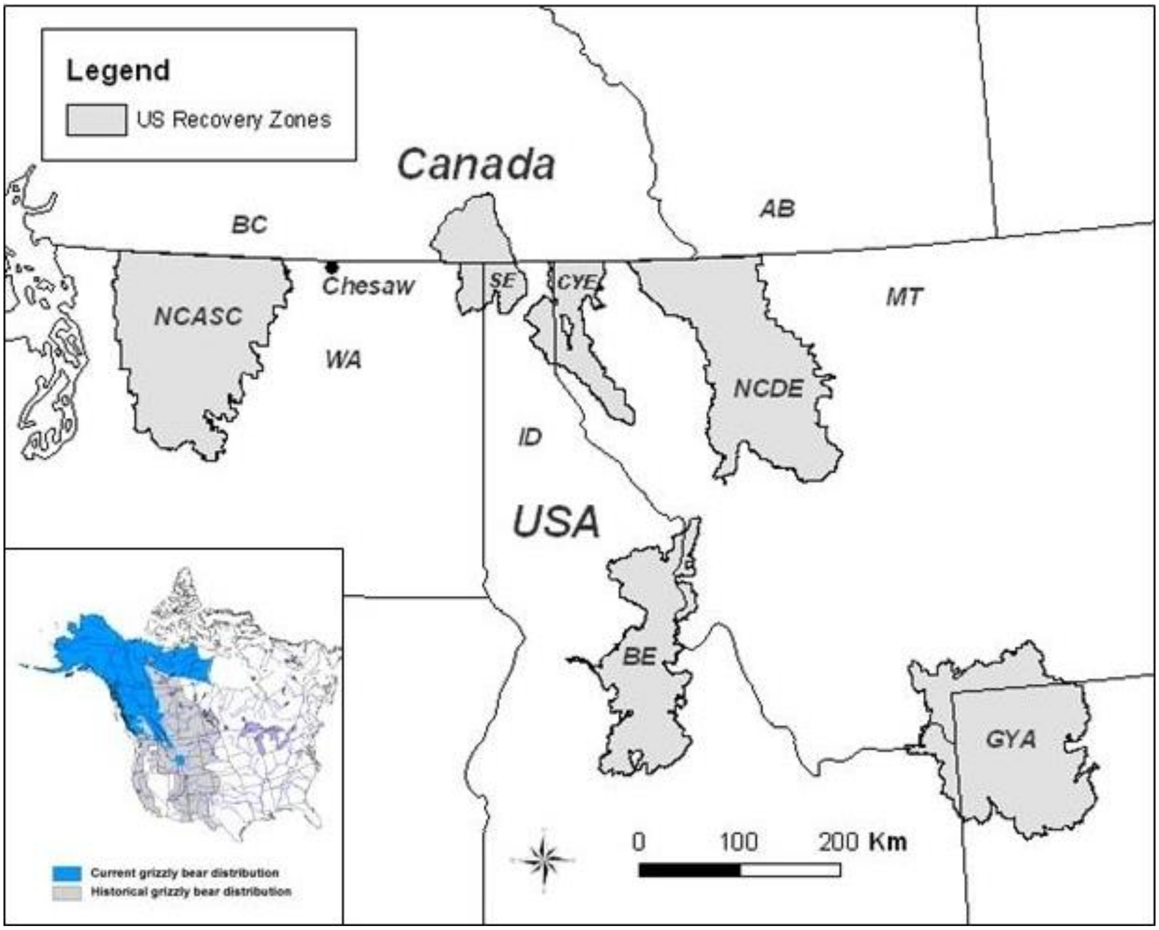
When grizzly bears in the lower 48 States were listed under the ESA in 1975, the vast reduction in range, increase in trail and road construction, increase in recreation, livestock use of National Forest lands, unsustainable human-caused mortality, lack of data regarding populations, and isolation were identified as factors affecting their conservation status (40 FR 31734, July 28, 1975). To date, all of these threats have been addressed to varying degrees in different areas.

New information regarding grizzly bear biology, current status, and threats has become available over the years since listing. This research and information has been valuable in addressing the impacts and management of roads, trails and recreation and livestock management. These risks have been largely addressed in the YGBE, NCDE, CYE and SE. It has also indicated the need for public information and assistance programs, along with attractant storage, to limit human-caused mortality of grizzly bears. We have population data for the YGBE, NCDE, CYE and SE. Proctor et al. (2012) compiled and analyzed all known genetic and movement data for grizzly bears in southern Canada and the NCDE, CYE, SE, (North Cascades Ecosystem) NCE, and YGBE populations. As discussed earlier, genetic data indicate population fragmentation in the recent past (Proctor et al. 2012). Movement data demonstrated that males move more frequently and over longer distances than females (Proctor et al. 2012).

The grizzly bear recovery plan identified six grizzly bear recovery zones (Figure A2 below), defined as areas within which the population and habitat criteria for achievement of recovery will be measured (U.S. Fish and Wildlife Service 1993). Although there are six grizzly bear recovery zones, only five are occupied.

The current range and distribution of grizzly bears in the lower 48 States is fluid as dispersal is occurring and the specific distribution has not been quantified systematically across all ecosystems. Grizzly bear observations, conflicts and mortalities have been documented in areas far outside of recovery zone boundaries.

Figure A2. Current Grizzly Bear Recovery Ecosystems.



*YGBE (GYA) = Greater Yellowstone Area; NCDE = Northern Continental Divide Ecosystem; CYE = Cabinet-Yaak Ecosystem; SE = Selkirk Ecosystem; BE = Bitterroot Ecosystem; NCASC (NCE)= North Cascades Ecosystem.

* Inset map illustrates historic (grey shade) and current grizzly bear distribution (dark blue). Adapted from Proctor et al (2012).

Table A2 summarizes population estimates and growth rates by recovery zone. There are approximately 1,500 grizzly bears in the lower 48 States: 765 in the NCDE (2004); 600 in the YGBE (2012); 45 in the CYE (2012); 30 in the U.S. portion of the SE (2007); and less than 20 in the NCE. The population in the YGBE is increasing at two percent annually. The population in the NCDE has been increasing by approximately three percent annually since 2004 (Mace and Roberts 2012). In 2004 the SE grizzly bear population was slowly increasing at a rate of 1.9 percent annually (Wakkinen and Kasworm 2004). However, the best available data indicate the CYE population is declining slightly at *negative* 0.8 percent annually (Kasworm 2013). Sub-adult and adult female survival has the largest influence on population trend in all ecosystems (Mace and Waller 1998; Mace and Roberts 2012, Kasworm et al 2012 and Wakkinen and Kasworm 2004).

The CYE recovery zone encompasses the action area considered in this biological opinion, and so is discussed in more detail. The NCE, NCDE, YGBE, SE and BE recovery zones are not affected by the proposed Montanore project.

Grizzlies occur both within the formally designated recovery zones and continue to expand into adjacent habitat in the NCDE and YGBE and elsewhere (Wittinger et al. 2002; U.S. Forest Service 2009c; Mace and Robert 2012).

Table A2. Estimated grizzly bear population size and population growth rate by recovery zone.

Recovery Zone	Estimated Population Size	Trend (percent change annually)
Greater Yellowstone Area	593[a]	+ 2 percent [b]
Northern Continental Divide	765[c]	+ 3 percent [h]
Cabinet-Yaak	>/=42[d]	– 0.8 percent [e]
Selkirk	80[f]	+ 1.9 percent [g]
North Cascades	< 20	Unknown
Bitterroot	0	n/a

[a] Interagency Grizzly Bear Study Team 2012 Annual Report; [b] Haroldson 2012; [c] Kendall et al. 2009; [d]Kasworm et al. 2012; [e] Kasworm 2013; [f] Proctor et al. 2012; Wakkinen 2010; [g] Wakkinen and Kasworm 2004; [h] Mace and Roberts 2012

Following is a description of the six recovery zones and the status of the grizzly bear in each.

Status of Yellowstone Grizly Bear Ecosystem

The grizzly bear population in YGBE in northwest Wyoming, eastern Idaho, and southwest Montana (9,200 sq mi) was estimated at nearly 600 bears (Haroldson 2009). It is approximately 240 miles from the BE and at least 75 miles from the grizzly bear population in the NCDE. In 2008, the total population size for the YGBE population was estimated at 593, with a 95 percent confidence interval between 533 and 652 in 2011 (Haroldson 2012). The YGBE population was increasing in size approximately 4-7 percent annually from 1983 to 2001 (Haroldson 2009; Harris et al. 2006, Haroldson 2012). Population growth slowed to 0-2 percent from 2002 to 2011 (Haroldson 2012). The population is considered healthy and at or near recovered levels. For details regarding YGBE demographic features, refer to the Yellowstone Final Rule (72 FR 14866, March 29, 2007), the latest Interagency Grizzly Bear Study Team Annual Reports (online at http://nrmsc.usgs.gov/products/IGBST), and Schwartz et al. (2006) (Temporal, spatial, and environmental influences on the demographics of grizzly bears in the Greater Yellowstone Ecosystem - Wildlife Monographs).

Status of Northern Continental Divide Ecosystem

In 2004 the grizzly bear population in NCDE of north central Montana (9,600 square miles) was estimated at 765 bears (Kendall et al. 2009). At its nearest, portions of the NCDE are approximately 45 miles from the BE or 15 miles from the CYE.

The USGS conducted an extensive DNA-based study to estimate the grizzly bear population size in 7.8 million acres of occupied grizzly bear range in and around the NCDE recovery zone. A final total grizzly bear population estimate of 765 grizzly bears was reported based on the 563 grizzly bears detected in 2004 (USGS 2008). Both the raw count of 563 individual grizzly bears and a total population estimate of 765 for 2004 illustrate the conservative nature of the recovery plan minimum population estimate of 304 grizzly bears in 2004. The DNA-based estimate is scientifically robust, and is more than two times the recovery plan estimate for that year.

In 2004, Montana Fish, Wildlife and Parks also initiated a NCDE grizzly bear trend monitoring project (Mace and Chilton 2009). The purpose of this program is to estimate population trend by monitoring the survival and productive rates of radio-instrumented female grizzly bears. Thus far, a total of 115 individual females have been captured and monitored (Mace and Roberts 2012). Results reveal an annual growth of about 3 percent since 2004, indicative of an increasing grizzly bear population in the NCDE (Ibid.). When considered in the context of Kendal et al. (2009), this trend indicates a robust population nearing or at recovery levels.

<u>Status of North Cascades Ecosystem</u>

The NCE of north central Washington (9,500 square miles) is estimated to contain less than 20 bears (Almack et al. 1993). The nearest population of grizzly bears is immediately north in Canada with an estimated 23 individuals but populations to the east and west of the Cascades in Canada are considered extirpated (North Cascades Grizzly Bear Recovery Team 2004).

<u>Status of Bitterroot Ecosystem</u>

The BE of east-central Idaho and western Montana (5,600 square miles) does not contain a grizzly bear population at this time (U.S. Fish and Wildlife Service 1996; 2000; 65 FR 69624, November 17, 2000).

<u>Status of Selkirk Ecosystem</u>

The SE is located primarily in northern Idaho but includes portions of Washington and Canada also. It encompasses (over 2,200 square miles) of the Selkirk Mountains of northeastern Washington, northern Idaho, and southern British Columbia. Approximately 47 percent of the recovery zone is in British Columbia with the remainder in the U.S. The 1993 Recovery Plan defined a portion of the SE within Canada so that it was at least 2,000 square miles in size to accommodate the Recovery Plan's goal of establishing a population of 100 grizzly bears in the SE (U.S. Fish and Wildlife Service 1993). In Canada, land ownership is roughly 65 percent Crown (public) land and 35 percent private. In the U.S. portion of the SE, land ownership is approximately 80 percent Federal, 15 percent State, and 5 percent private lands. Within the SE, 3 percent (39,976 acres) is designated Wilderness Area.

Proctor et al. (2012) compiled data from multiple sources and conducted DNA-based population surveys (Proctor et al. 2007) to estimate a population size of 88 grizzly bears in the SE, with 30 in the U.S. and 58 in Canada (Proctor et al. 2012). The estimate for the U.S. portion of the SE is based on expert opinion (Wakkinen 2010a). The IDFG is currently working on a population estimate for the U.S. portion of the SE that will present a more scientifically rigorous estimate. In 2004, it was estimated that the population of grizzly bears in the SE was slowly increasing at a rate of 1.9 percent annually (95 percent confidence interval = 0.922-1.098) (Table A2) (Wakkinen and Kasworm 2004). As in the CYE, Wakkinen and Kasworm (2004) found that sub-adult female survival had the largest influence on overall population trend.

Status of Cabinet Yak Ecosystem

The proposed Montanore project would occur in the CYE. Therefore, considerably more information is provided below for this recovery zone than for the previous five.

The CYE Recovery Zone is approximately 2,609 square miles in size and is located primarily in northwestern Montana with small portions in northern Idaho. Land ownership in the CYE is approximately 90 percent Federal, 5 percent State, and 5 percent private lands. The Kootenai National Forest manages approximately 72 percent (see USFS 2009b) of forest service lands within the CYE recovery zone, with the Idaho Panhandle and Lolo National Forests administering the remaining. All of the national forest lands within the Cabinet Mountains portion of the Cabinet-Yaak recovery zone are part of the "action area" for this consultation and are described in more detail in the "Environmental Baseline" section. Major private land owners in the recovery zone include Plum Creek and Stimson Timber Companies.

The relative distribution of grizzly bears across this ownership pattern is unknown, but is believed to be proportionate to land ownership (i.e., approximately 90 percent of the grizzly bear population lives on the 90 percent of public land within this recovery zone). In Canada, the portion of British Columbia directly north of the Cabinet-Yaak recovery zone is largely Crown land (public) with the exception of the Moyie and Kootenay River valleys. Within the CYE recovery zone, 5.6 percent (94,272 acres) is designated Wilderness Area. The Cabinet Mountains lie south of the Yaak River drainage and contain about 60 percent of the recovery zone.

During 2004 to 2009 the CYE recovery zone minimum population estimate was at least 42 grizzly bears (Kasworm et al. 2010) and remained at that level for the 2006-2011 period (Kasworm et al 2012). During 2006-2011, there were a minimum of approximately 21 individuals in the Cabinet Mountains and 21 individuals in the Yaak portion of the recovery zone (Kasworm et al. 2012).

The current population estimate of 42 grizzly bears is improved from our 1999 estimate of 30-40 in the CYE, with 15 in the Cabinet Mountains portion (64 FR 26725, May 17, 1999). Lack of native bears identified since 1989 in the Cabinets suggest that the population may have been well below the previous estimate of 15 individuals for the Cabinet Mountains. Twenty-six of the 32 bears genotyped since 2002 are known to be augmentation bears or their offspring. Thus augmentation results are encouraging. The augmentation effort appears to be the primary reason that grizzly bears now remain in the Cabinet Mountains (Kasworm etal 2012).

For the period from 1983-1998, calculated finite rates of increase (lamda; $\lambda = 1.067$) suggested an increasing population (Wakkinen and Kasworm 2004). Survival rates for adult and sub-adult females were 0.948 and 0.901 respectively, at that time.

High rates of known mortality from 1999 to 2009 (3.36 mortalities per year) suggest the population had most likely been decreasing (Kasworm et al. 2010; Wayne Wakkinen, Idaho Fish and Game, pers. comm. 2011 *in* USFS 2011b). However, since 2009 improved sub-adult female and adult female survivorship has lessened the rate of decline (i.e. improved).

Since 1999, there appears to have been an increase in the numbers of bears killed on private lands in the CYE recovery area. Of total human-caused mortalities of collared grizzly bears in the CYE, human-caused mortality on private lands in the U.S. accounted for 23 percent of trend mortality. Human-caused mortality on U.S. public lands accounted for 14 percent of trend mortality. Human-caused mortality in British Columbia accounted for 10 percent of trend mortality.

The human-caused mortality in the U.S. and in British Columbia from 1999 to 2006 accounted for 47 percent of this decline and appears to be largely responsible for the decline in the rate of increase. However, during 2009, adult female survival and sub-adult female survival had increased to 0.933 and 0.781 respectively and resulted in an improving population trend estimate since 2006. Kasworm (2012) reported continued improvement in survival rates. Improving survival by reducing human-caused mortality is crucial for recovery of this population (Proctor et al 2004b).

Since 2006 the status of the population has improved. Kasworm et al. (2013) reported the most recent CYE grizzly bear population trend estimate using only native bear data (i.e. data from bears augmented into the Cabinet Mountains was not used). Approximately 90 percent of the native bear data used in population trend calculations came from bears monitored in the Yaak River portion of this population and the result is most indicative of that portion of the recovery area. The estimated finite rate of increase (lamda;λ) for 1983-2012 was 0.992, approaching stability(λ = 1.0 indicates stability)(95 percent C.I. 0.893-1.073). This represents improvement since 2006, when the estimated finite rate of increase was 0.920.

Sub-adult female survival and adult female survival accounted for most of the uncertainty in λ, with reproductive rate, yearling survival, cub survival, and age at first parturition contributing much smaller amounts. The sample sizes available to Kasworm et al. to calculate population trend were small and small samples sizes yield wide confidence intervals around any calculated trend estimate (λ). The probability that the population was declining was 57 percent (Kasworm et al 2013).

Status of Recovery Criteria

The Service is in the process of updating the demographic recovery criteria in the 1993 recovery plan as there are new science and techniques available. This task has been completed for the YGBE grizzly bear population (U.S. Fish and Wildlife Service 2007a) and the NCDE grizzly bear population (IGBC 2013). Until the update for the CYE is complete, we use the 1993 demographic criteria.

The Recovery Plan estimated that a recovered population in the CYE recovery zone would consist of a minimum of about 100 individual grizzly bears and grizzly bears would also live in and use areas outside the CYE recovery zone. Therefore, Recovery Plan population parameters include bears observed up to 10 miles outside the recovery zone boundary (U.S. Fish and Wildlife Service (USFWS) 1993, p.83).

Demographic recovery criteria were developed to address overutilization and human-caused mortality (listing Factors) within each recovery zone and a 10 mile surrounding buffer by ensuring a sufficient population size and distribution. These demographic recovery criteria include measures for population size, distribution, and sustainable mortality:

Following are 1993 demographic criteria and the updated mortality data in recent years for the CYE. The 1993 CYE demographic criteria are: (1) six females with cubs over a running 6-year average both inside the recovery zone and within a 10 mile area immediately surrounding the recovery zone, excluding Canada; (2) 18 of 22 BMUs occupied by females with young from a running 6-year sum of verified sightings and evidence; and (3) known human-caused mortality not to exceed 4 percent of the population estimate, based on the most recent 6-year sum of females with cubs. Furthermore, no more than 30 percent of total human-caused mortality shall be females. These mortality limits cannot be exceeded during any two consecutive years for recovery to be achieved. Presently, grizzly bear numbers are low in this ecosystem therefore the goal for human-caused mortality is zero.

Table A3. Status of the Cabinet-Yaak recovery zone during 2007-2012 (Kasworm 2013) in relation to the demographic recovery targets from the grizzly bear recovery plan (USFWS 1993).

Recovery Criteria (USFWS 1993)	Target or Limit	2007-2012 Revised Values
Females with cubs (unduplicated sightings)	6	2.8 females with cubs (6 year average)
Distribution of females with young (BMUs occupied)	18 of 22	13 of 22 BMUs occupied (6 year average)
Human caused mortality limit (4 percent of minimum estimate)	1.6 (although goal is 0)	1.7 bears (6 year average)
Female, human-caused, mortality limit (30 percent of total mortality)	0.5	0.5 female bears (6 year average)

In the CYE, only one of the four 1993 demographic recovery criteria has been met (Kasworm 2013) (Table A3 above). The population goal of 6 females with cubs has not been met; the 6-year running average was 2.8 females with cubs. The distribution criterion has not been met with only 13 of 22 BMUs occupied by females with young. Demographic criteria for total human caused mortality was met each year from 2008 to 2011 (Kasworm etal 2012, p.18), but was not met in 2012. The running 6-year average (2007-2012) of total human caused mortality was 1.7 animals/year (sustainable limit is no more than 1.6) including 0.5 females each year (ibid). However, female mortality has met the recovery criteria of no more than 30 percent of total mortality criteria in both 2011 and 2012. In 1993, when the population estimate was less than 15 bears, the female mortality *goal* was set at zero. Although in reality unlikely to be achieved, due to the current small population size (estimated at 42), the female mortality *goal* remains zero.

F. Factors Affecting Grizzly Bear Status in the Cabinet Yak Ecosystem

Human-Caused Grizzly Bear Mortality in the Cabinet Yak Ecosystem

In 2010, Wayne Kasworm, a USFWS grizzly bear researcher in the CYE, prepared an unpublished synopsis regarding factors affecting the CYE grizzly bear population (Kasworm 2010). That report was subsequently used in a court declaration (Kasworm 2010b). In summary the report (Kasworm 2010) and court declaration (Kasworm 2010b) looked at data from 1983 through 2009. The synopsis indicates:

1) the CYE grizzly population “bottomed out” by several measures in 2006; and

2) that the CYE population has been improving since 2006.

Data (displayed below) from the three years (2010-2012) since that report further support the fact that the CYE grizzly population is improving (Kasworm etal 2011, 2012, Kasworm 2013).

Kasworm 2010 states "In two 2004 peer-reviewed journal papers we analyzed and described the needs for recovery in the Cabinet-Yaak recovery area (Proctor et al 2004, Wakkinen and Kasworm 2004). The three things directly related to grizzly bear population that we determined need to be done to achieve recovery were: 1) limit mortality (particularly females), 2) augment the Cabinet Mountains population with young female bears (but need to consider males for genetic purposes), and 3) enhance or maintain linkage areas for bears to move naturally between the Yaak River drainage and the Cabinet Mountains and between recovery areas (this would eliminate the need for augmentation in the longer term)."

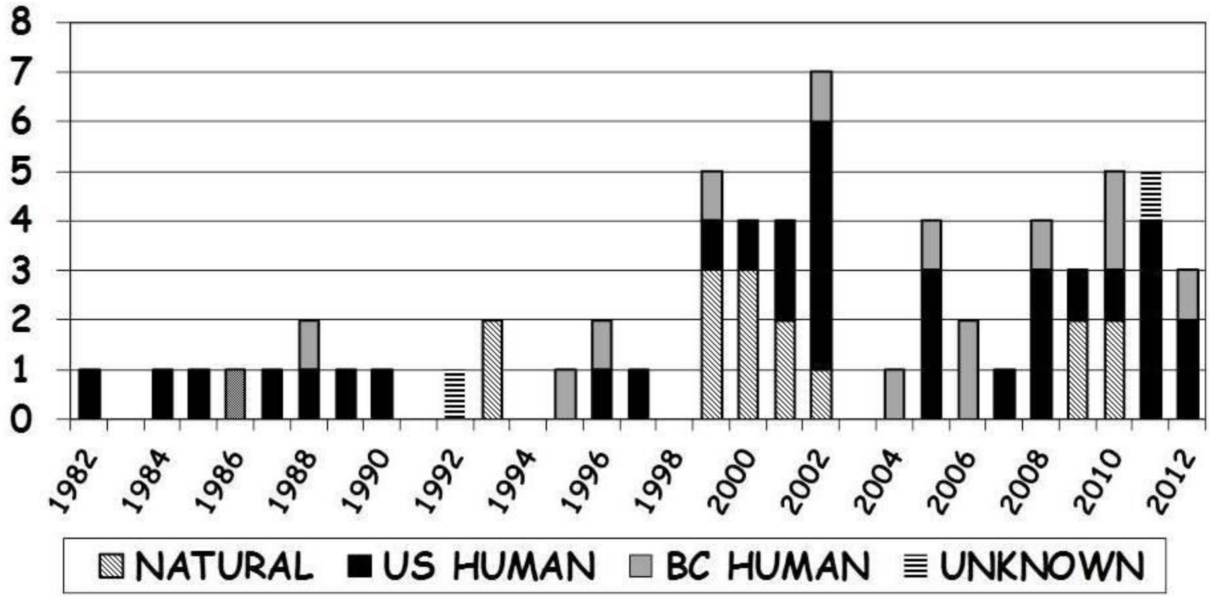
Detailed analysis of grizzly bear mortality in the Cabinet Yak Ecosystem

Kasworm (2010) indicated "Known human-caused mortality in the CYE averaged about one animal per year from 1982-1998 (Figure A3). During 1999-2002, known mortality jumped substantially from both natural and human causes. Human-caused mortality increased to an average of five animals per year. Some of this may have been related to the poor berry production from 1998 to 2003. During 2003-2009 human-caused mortality remained at elevated levels, but natural mortality has declined and average mortality dropped to slightly more than 2 animals per year."

Kasworm (2010 Fig.2 p.2; 2010b Fig 2 p.12) shows causes of human related grizzly bear mortality are quite varied. They include defense of life, grizzly bear hunting in British Columbia north of the recovery zone (though there have been hunting regulation changes in BC to reduce this), poaching, management removals, mistaken identification (ID) by hunters, capture and associated predation from research actions, train collision, and unknown but human-caused mortality. This last category represent bears that are found dead, killed by gunshot as evidenced by a bullet, but exact cause is unknown and may be related to poaching, mistaken ID, or spiteful killing. Much of the human-caused mortality during 1999-2006 involved sub-adult females.

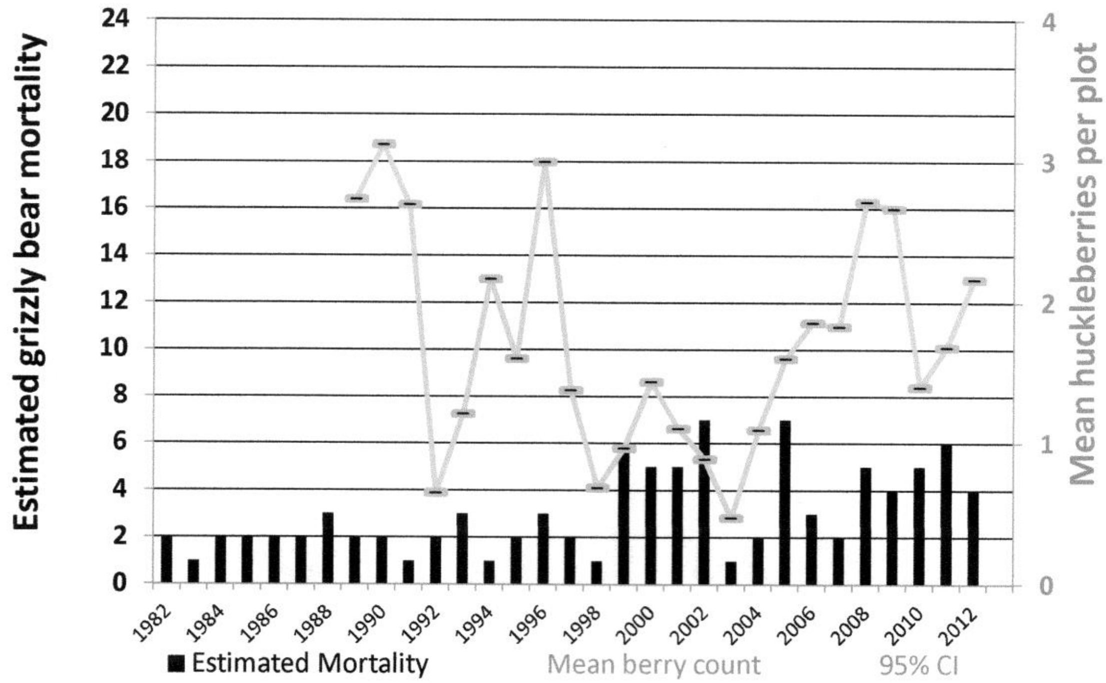
Analysis of the sex and age of mortality by Kasworm (2010 Fig.3 p.2; 2010b Fig.3 p.13) determined that much of the known natural mortality in this recovery zone has involved cubs while human caused mortality has been about equal between females and males. Female mortality has been about 60 percent of total mortality among the adult and sub-adult age classes. The loss of these females affects the population's ability to grow.

Figure A3. Known grizzly bear mortality in the CYE from 1982-2012 (Kasworm 2013).



Some of this increase in human-caused mortality may have been related to poor berry production from 1998 to 2004 (Figure A4). There appears to be a strong relationship between poor huckleberry production and total mortality in this area. In particular, Kasworm (2010, 2010b) states that several years of poor food production appears to be associated with a larger number of mortalities. Food stress may increase not only natural mortality, but also human-caused mortality, as it may cause bears to approach human settlements while looking for food. Conflicts with people over unsecured food sources (garbage, pet or livestock foods, birdfeeders, etc.) may result in human-caused mortality.

Figure A4. Known and estimated unreported grizzly bear annual mortality from all causes in or within 16 km of the Cabinet-Yaak recovery zone (including Canada) and all radio collared bears by cause, 1982-2012 and huckleberry production counts, 1989-2012.



Survival analysis and reproductive data is used to calculate a "rate of change" in the population. Only radio collared bears are used in this analysis because they typically have known fates. Furthermore, only female adults and sub-adults plus all yearlings and cubs are used in the calculation of trend. As long as there are sufficient males for breeding, males are not as important to the ability of the population to increase. Sub-adults are bears aged 2-4 years.

Survival rates have been calculated for radio collared native grizzly bears in the CYE from 1983-2012. All Cabinet Mountain augmentation bears were removed from the sample and almost all of the remaining individuals were from the Yaak River portion of the population. A survival rate of 1.0 means all bears in that category survived and there was no mortality. From 1983-2009, Kasworm (2010, 2010b) shows the survival rate for adult females in the CYE was 0.93, adult males 0.88, sub-adult females 0.78, sub-adult males 0.75, yearlings 0.85, and cubs 0.58. Kasworm (2013) updates calculated survival rates through 2012 as: adult females 0.940; adult males 0.895; sub-adult females 0.811; sub-adult males 0.750; yearlings 0.900; and cubs 0.571. Survival rates in all sex and age classes show improvement except cubs. While cub survival is typically low, yearling survival is higher. It also appears that first time mothers are less successful at raising cubs than older, more experienced mothers. Sub-adult survival naturally decreases from yearling survival as bears are on their own without the protection of their mothers.

Reproduction is a measure of female cubs produced per adult female per year. In the CYE area Kasworm (2013) shows the reproductive rate is 0.372. Sex ratio of observed cubs is assumed to be 50:50.

The observed rates of survival and reproduction are used to calculate a rate of change in the population (lambda). This calculation is essentially births - deaths = population change and is measured against a stable population depicted by lambda equaling 1.0. This calculation only involves female adult and sub-adult survival plus all yearling and cub survivals.

In 2006 lambda reached its lowest point (0.920) since calculations started. This meant an annual rate of decline of 8.3 percent. The point estimate of lambda for all data from 1983-2009 was 0.962 (Kasworm 2010, 2010b). This equates to a declining population at an annual rate of -4.0 percent. The updated lambda for 1983-2012 is 0.992 which corresponds to a *negative* 0.8 percent annual rate of change. (Kasworm 2013). Thus lambda has improved and moved closer to stability (1.0). Again an indication that the CYE grizzly bears population status is improving.

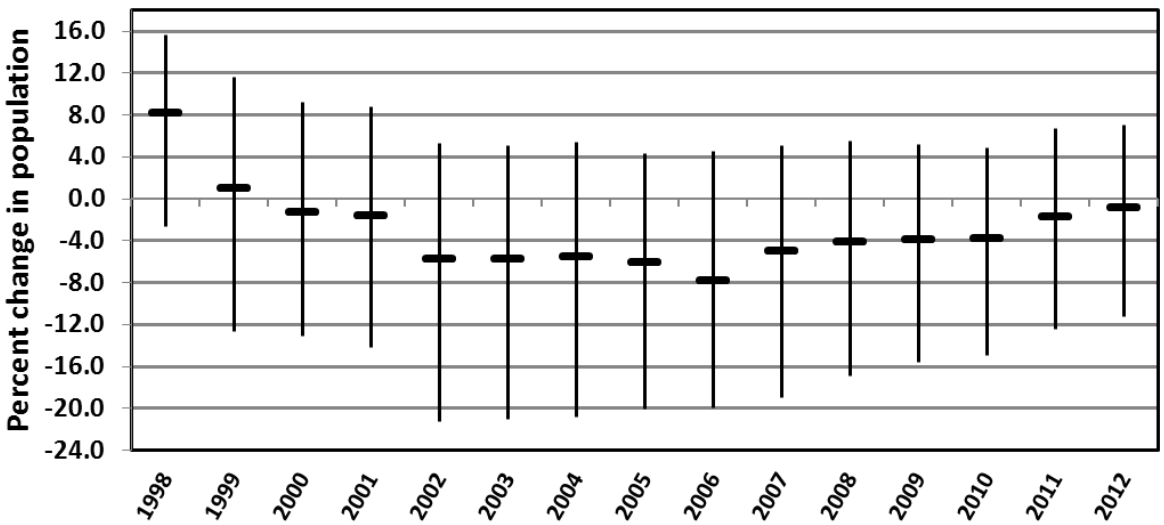
The current data show a 57 percent probability of a declining population (Kasworm 2013). However, data from the last six years indicate an improving situation (Table A4, Figure A5). This is determined by looking at the distribution of the confidence interval for the point estimate of the annual rate of change in relation to a stable population (rate of change = 0). The current point estimate of the rate of change is *negative* 0.8 percent. It is the central value around which the confidence interval extends, analogous to a statistical mean or average.

Table A4: Probability of population decline, finite rate of increase (lambda, λ) and point estimate rate of change in the CYE grizzly bear population 1983 to that year

Year	**Probability of Decline**	**Lambda ***	**percent Rate of Annual Change**
2005	91 percent	0.929	-7.4 percent
2006	94 percent	0.920	-8.3 percent
2007	87.8 – 90.6 percent	0.936 – 0.946	-6.7 to -5.5 percent
2008	78 percent	0.960	-4.0 percent
2009	78 percent	0.962	-3.8 percent
2010	78 percent	0.963	-3.7 percent
2011	64 percent	0.984	-1.6 percent
2012	57 percent	0.992	-0.8 percent

* Lambda (λ) of 1 equals a stable population
Table A4 data from CYE Annual Reports (Kasworm et al. 2006 thru 2013) and Wayne Kasworm pers. Com. 2013

Figure A5. Point estimate and 95 percent confidence intervals for cumulative annual calculation of population rate of change for native grizzly bears in the Cabinet-Yaak recovery area 1983-2012. Each entry represents the annual rate of change from 1983 to that date. (Kasworm 2013)



The probability of decline (57 percent currently) will vary over time based largely on the point estimate for the rate of change in relation to a stable population, but also on the confidence intervals associated with survival and reproduction. Probability of decline reached its peak in 2006 (Table A4) and has since decreased (improved) to its current level of 57 percent (Kasworm 2013). Table A4 also reveals continued improvement in both the rate of increase and the rate of change in the CYE population since 2006.

Since probabilities of decline, including the current probability of decline of 57 percent, are probabilities, not rates, as the figures increase, it indicates more statistically rigorous evidence of the population trend for that calculation of the cumulative data. The larger numbers do not demonstrate higher <u>rates</u> of decline, or <u>more imminent</u> population extinction, but simply higher confidence in which direction the population is trending given the cumulative data. The point estimate of the rate of change is a better measure of the progress of the population and the point estimates have improved since 2006 (Fig. A5)(Kasworm et al 2012 p. 38, Kasworm 2013). All three measures of population progress, shown in Table A4, are improving.

Beginning in 1999, increasing mortality (natural and human-caused) started to depress the point estimate for the rate of change calculation until 2006 (Fig.A5) where the rate of change reached its lowest point of *negative* 8.3 percent). According to Kasworm (2013) the cumulative (1982 to the year) population rate of change for 2007 through 2012 show an improving trend (Table A4, Fig A5). The rate of change has improved to *negative* 0.8 percent.

Since 1999, there appears to have been an increase in the numbers of bears killed on private lands in the CYE recovery area (Kasworm 2013). To further quantify this issue, we calculated the mortality rates for all radio collared bears based on location of death (1.0 - survival rate = mortality rate).

Mortality rates of all sex and age classes of native, non-management radio collared grizzly bears ≥2 years-old were summarized by cause and location of death (Table A5). Rates were categorized by public or private land and human or natural causes. Rates were further stratified by death locations in British Columbia or U.S. and broken into two time periods. The two periods (1983–1998 and 1999–2012) correspond to a decline in population trend (λ) beginning in 1999. Grizzly bear survival of individuals greater than 2 years-old decreased from 0.899 during 1983–1998 to 0.856 during 1999–2012. Some of this decrease could be attributed to an increase in point estimates for natural mortality probably related to poor berry production during 1998–2004. A large increase in mortality occurring on private lands (0 to 6 percent) within the U.S. also contributed heavily to this increase in overall mortality and may also be related to poor berry production that may have caused bears to search more widely for foods that may occur on private lands. Several mortalities occurring during 1999–2012 were associated with sanitation issues on private lands. Several deaths of management bears occurred on private lands, but were not included in this calculation. Management bear captures are not included in the calculation because they were not caught originally in a research mode. While it is true that management bears tend to have higher mortality rates than research bears, once captured the trap is removed and therefore this is a biased sample of the bears that exist in the population. In addition, most of the management bears that have been captured are males and they are not counted in the trend calculation. This is the similar approach used in trend calculation in the other ecosystems. Point estimates for human caused mortality occurring on public lands in the U.S. and British Columbia in 1999-2012 decreased from the former time period (1983–1998). This apparent decrease in mortality rates on public lands (from 6.1 to 4.0 percent) is particularly noteworthy given the increase in overall mortality rates. Although the specific reason for this decline is unknown, implementation of access management on U.S. public lands could be a factor.

Table A5. Survival and cause-specific mortality rates of native radio collared grizzly bears ≥2 years-old by location of death based on censored telemetry data in the Cabinet–Yaak recovery zone, 1983–2012.

Parameter	1983–1998	1999–2012
Individuals / bear-years	23 / 48.9	35 / 44.4
Survival[b] (95 percent CI)	0.899 (0.819–0.979)	0.856 (0.758–0.954)
Mortality rate by location and cause		
Public / natural	0	0.024
U.S. public / human	0.061	0.040
B.C. public / human	0.040	0.020
U.S. private / human	0	0.060
B.C. private / human	0	0

Notably, mortality on private lands in the U.S. has become the largest source of human-caused mortality in the CYE. Grizzly bears are now being killed by humans at disproportionately higher numbers on private lands than on Forest Service lands. The CYE is about 90 percent public land, yet human-caused mortality on public land accounts for only about 14 percent of the trend mortality.

General Causes of Grizzly Bear Mortality in the Cabinet Yak Ecosystem

In the entire CYE (including 16 km buffer) over the past 30 years (1982 through 2012) there have been a total of 65 known grizzly bear mortalities from all forms, on all ownerships, or slightly over 2 bears per year (including Canada) (U.S. Fish and Wildlife Service 2004; USFS 2010b; USFS 2011b; Allen and Kasworm 2012). Of the 65 total grizzly bear mortalities documented (including Canada), 49 (75 percent) were human-caused, and 16 (25 percent) were from natural causes. Forty-eight of the total 65 total mortalities (74 percent) were documented in the U.S. Of the 48 total bear mortalities in the U.S., 36 (75 percent) were human-caused, and 12 (25 percent) were natural causes.

Focusing on human-caused mortality in the U.S. (N=36), 21 were documented on National Forest lands and 15 were documented on non-federal lands. This amounts to about 58 percent of human caused mortality on national forests lands and 42 percent on non-federal lands. However, the vast majority, 87 percent, of the U.S. portion of the recovery zone is federal. Only 13 percent is non-federal. Thus known human-caused grizzly bear mortality is occurring at a disproportionately higher rate on non-federal lands than on federal lands. Human-caused mortality occurs at a substantially higher rate than would be expected on non-federal lands. There is about 7 times more federal land than non-federal land in the U.S. portions of the CY ecosystem. Yet the human-caused mortality rate is four times higher on non-federal land (15 human-caused mortalities on approximately 339 square miles = 0.04 mortalities per square mile) than federal land (21 human-caused mortalities on approximately 2270 square miles = 0.009 mortalities per square mile).

Across the CYE of human-caused mortalities -six were management removals; required when grizzly bears seek out and find unsecured anthropogenic attractants such as garbage, bird feeders and pet food near homes and businesses (i.e. sanitation) (Table A6). At least 67 percent of human-caused grizzly bear mortalities (49) involved the use of firearms (33 mortalities). Specific causes were: poaching (8), mistaken identity (7), self-defense (6), legal hunting in British Columbia (3) and unknown but found with a bullet in them (9) (Wayne Kasworm pers.com. 2013) (Table A6). Notable is the fact that about 57 percent (19 of 33) of total gun-related mortalities occurred on National Forest lands of the CYE even though national forest lands account for nearly 90 percent of the recovery zone in the U.S.; therefore, gun-related mortalities are lower than would be expected on U.S. federal land.

Table A6. Number of known grizzly bear mortalities by cause in the CYE from 1982 through 2012 (Kasworm 2013).

Type of Mortality	**Canada**	**United States**		**Total**
	BC	**USFS**	**Other [1]**	
Natural				
Conspecific predation [2]	0	3	0	3
Other	4	9	0	13
Subtotal	**4**	**12**	**0**	**16**
Human				
Poaching	0	2	6	8
Mistaken Identity	0	6	1	7
Self Defense	1	4	1	6
Management Removal/Sanitation	5	0	1	6
Legal Hunting (BC only)	3	0	0	3
Trapping (for other species/incidental)	1	1	0	2

Research	1	1	0	2
Train Collision	0	0	3	3
Motor Vehicle	0	0	0	0
Unknown	2	7	3	12
Subtotal	**13**	**21**	**15**	**49**
Total	**17**	**33**	**15**	**65**

[1] Other = includes private, state, and railroad lands. [2] Conspecific = grizzly bears killing grizzly bears.

Human caused (firearms) grizzly bear mortality risk: As detailed above, in the entire CYE since 1982, there have been a total of 65 known grizzly bear mortalities across all ownerships (including Canada). Of the total human-caused mortalities (49), about 33 (67 percent) are known or suspected to involve guns. Some mortalities are still under investigation; at least 12 human-caused are undeterminable. Of the gun related mortalities, 16 (48 percent of gun mortalities) were non-malicious (mistaken identities, self-defense, and legal hunting in BC); but 8 (24 percent of gun mortalities) were deemed poaching. The latest data (Kasworm et al 2012) indicates a decline of human-caused grizzly bear mortality on public lands and an increase of such cases on private lands.

Food and Attractant Storage: Attraction of grizzly bears to improperly stored food and garbage is identified as one of the principal causes of grizzly bear mortality, especially on private lands. The Forests are currently implementing sanitation programs. In 2002, pursuant to guidance from the IGBC, the Forest and the Idaho Panhandle National Forest (IPNF) developed a comprehensive sanitation program; including a food storage order on public land to help reduce bear habituation to humans and to minimize the potential for bear/human conflicts. These programs include, among other things, public education, and a food storage order on national forest system lands within and around the recovery zone. The Forest signed a food storage order on June 3, 2011. Implementation of this decision provides a crucial overall improvement to baseline conditions relative to mortality risk on National Forest lands. The IPNF and Lolo National Forest (LNF) also implemented their food storage orders in 2011. In addition several garbage collection sites have been relocated and/or fenced.

Public Opinion: Public opinion, knowledge, and attitude, specifically of those people living in and near the CYE also play a significant role in grizzly bear mortality risk. A public opinion and knowledge survey (Canepa et al. 2008) was conducted in Lincoln and Sanders County, Montana to measure public understanding of grizzly bears and management in the Cabinet Mountains and Yaak Valley portions of the CYE. In summary the key results are:

- Primary reason some respondents oppose having grizzly bears in the CYE is fear.
- Respondents are aware of most common reasons grizzly bear might attack a human.
- Majority not aware of how many people are actually attacked by a grizzly bear each year.
- Surveyors were unable to locate documentation of any grizzly bear attacks on humans in CYE
- 90 percent of respondents felt people can prevent most conflicts with grizzly bears.
- Most respondents would accept changes to current garbage disposal methods.
- Support for grizzly bear population recovery increased from 57 to 75 percent if augmentation is not used.
- 33 percent of respondents are unaware of current road restrictions due to grizzly bear management on National Forest lands
- 69 percent of respondents stated that grizzly bear recovery efforts had not negatively affected their recreation or employment opportunities.

- 49 percent of respondents supported current road restrictions while 42 percent opposed them.
- 58 percent of respondents opposed any additional road restriction while 31 percent support them.
- 57 percent of respondents support grizzly bear recovery in CYE but support decreased to 44 percent if recovery entails achieving the population goal of 100 bears.

Overall, the majority of respondents support grizzly bear recovery in the CYE, but are concerned about specific management actions related to key issues (road restrictions, augmentation and final population goals). However, many respondents lacked specific information about these issues or areas of concern. Moving forward with management actions related to these areas of concern would contribute to reducing grizzly bear mortality risk. Results of the survey indicate that greater public support and reduced bear-human conflicts may be achieved through accurate information related to grizzly bears and recovery being made more readily accessible to the general public, including:

- simple techniques for living safely in grizzly bear country;
- information about bear food habits, abundance, habitat, and spatial needs;
- improved hunter awareness programs;
- information on grizzly-human conflicts and human injury rates;
- information on the augmentation program and its goals;
- actual road densities on public lands; and
- the grizzly recovery program in general.

The survey results indicate a need for a full time biologist/manager to provide the public with accurate information about general grizzly bear biology.

Forest Plan Direction. Forest Plan direction in the form of goals, objectives and standards plays an important role in providing secure grizzly bear habitat and minimizing displacement of bears from suitable habitats.

Land ownership patterns in the Cabinet-Yaak grizzly bear recovery zone are dominated by national forest system lands. These lands are managed according to Land and Resource Management Plans (Forest Plans). Forest Plans are programmatic documents for each national forest and are required under the National Forest Management Act of 1976 (P.L. 94-588). Each contains a myriad of resource management and protection direction, much of which provides incidental benefits to the grizzly bear even outside of recovery zones. Specific benefits derived from the plans of the IPNF, KNF, and Cabinet portion of the LNF are detailed in the Access Amendment BA (USFS 2010b).

Forest Plan goals, objectives, and standards, currently contained in the three Forest Plans (Appendix G) provide some benefits to grizzly bears and their habitat within these areas of mapped grizzly bear residency outside of the recovery zone. The goals and objectives of the Forest Plans set the framework for minimizing take. Specific management standards and guidelines are in place to achieve the forest goals.

Access Management: The Kootenai, Lolo and Idaho Panhandle National Forests (here after Forests) are the primary land managers in the CYE. Conservation of suitable grizzly bear habitat is therefore dependent upon the Forests. Access management has long been recognized as a tool to improve habitat conditions for grizzly bears. In the late 1970s, the Forests began restricting motorized vehicle use on some roads within the CYE recovery zone. Most road restrictions were accomplished with gates or permanent barriers. Gates have been used in cases where restrictions are seasonal to protect specific habitat at critical times of the year or in areas that are scheduled for additional timber management.

In 1987, the Forest Plan proposed that a minimum of 70 percent of each Bear Management Unit (BMU; an area approximating home range of a female grizzly bear that contains all of its seasonal habitats) would be "effective habitat" in the CYE (U.S. Forest Service 1987). Effective habitat is defined as an area greater than 0.25 miles away from open roads, active timber sales, or active mining operations (Christensen and Madel 1982). This standard was based on bear research from other recovery areas (Christensen and Madel 1982) and the habitat effectiveness metric was, in part, derived from extrapolating elk management guidelines (U.S. Fish and Wildlife Service, unpublished meeting notes, D. Harms, April 13, 1990).

Beginning in 1994, standards for access management evolved through direction from the IGBC. This direction called for establishing BMU-specific levels for secure habitat ("core areas", expressed as a percent of a BMU), Open motorized route density (OMRD expressed as a percent of a BMU), and Total motorized route density (TMRD, expressed as a percent of a BMU). A series of lawsuits ensued for various reasons. However, the Forests have used the "best science" indices of OMRD, TMRD and core area to describe and analyze the impacts of road densities on grizzly bears since 1995 on the KNF; and since 1998 on the IPNF and LNF despite no formal direction added to the Forest Plan. The progress that the Forests made prior to a "binding" access management strategy benefitted grizzly bears. In 2011 Forest Plans were amended with an access management strategy to conserve grizzly bear habitat in accordance with IGBC direction (USFS 2011c). With the direction in the amended Forest Plans, conditions for motorized access in grizzly bear habitat will improve even more, to levels that will sustain the recovery of the CYE population (USFWS 2011).

Habitat security on Forest land probably declined in the CYE recovery zone until the late 1980s when Forest Plans began to include access management with habitat security standards (Summerfield et al. 2004). The Forests developed criteria for road access within the CYE recovery zone's 22 BMUs. All the Forests' LRMPs have been amended to include new individual BMU standards for core, OMRD and TMRD (USFS 2010b, USFS 2011b, c, and d). Indices for these parameters have been improving steadily in the CYE since 1987, as documented by Summerfield et al. (2004), the Selkirk Cabinet-Yaak IGBC Subcommittee (1998), annual Forest Plan monitoring reports (U.S. Forest Service 1998, 1999, 2002, 2009a, 2010), and the annual monitoring reports sent to the Service since 2004 (U.S. Forest Service 2005, 2006, 2008, 2009b).

The CYE standards and current condition (2012) of grizzly bear habitat measures (OMRD, TMRD, and core area) are summarized in Table A7 (source: USFS 2010b, USFS 2012b, USFS 2013b). Historical conditions (2002-2011) of these measures are in Appendix F. Overall, motorized route densities have been reduced and secure habitat has increased in the CYE since the grizzly was listed.

Table A7. Standards and 2012 access parameters for the Cabinet-Yaak Recovery Zone

BMU	Access Standard Type	Standards	2012	BMU	Access Standard Type	Standards	2012
1 Cedar 56,818 acres	OMRD TMRD CORE	<15 <15 >80	15 8 83	12 Newton 51,562 ac.	OMRD TMRD CORE	<45 <31 >55	43 32 56
2 Snowshoe 65,241 ac.	OMRD TMRD CORE	<20 <18 >75	18 16 77	13 Keno 51,235 ac.	OMRD TMRD CORE	<33 <26 >59	33 24 60
3 Spar 75,701 ac.	OMRD TMRD CORE	<33 <26 >59	30 26 62	14 NW Peak 83,027 ac.	OMRD TMRD CORE	<31 <26 >55	35 26 56
4 Bull 81,750 ac.	OMRD TMRD CORE	<36 <26 >63	38 29 62	15 Garver 58,842 ac.	OMRD TMRD CORE	<33 <26 >55	30 25 55
5 St. Paul 70,210 ac.	OMRD TMRD CORE	<30 <23 >60	28 23 58	16 EF Yaak 97,586 ac.	OMRD TMRD CORE	<33 <26 >55	31 27 54
6 Wanless 64,148 ac.	OMRD TMRD CORE	<34 <32 >55	32 34 53	17 Big Creek 83,724 ac.	OMRD TMRD CORE	<33 <26 >55	31 16 56
7 Silver Butte- Fisher 63,151 ac.	OMRD TMRD CORE	<26 <23 >63	27 23 65	18 Boulder 62.379	OMRD TMRD CORE	<33 <29 >55	34 35 49
8 Vermillion 68,567 ac.	OMRD TMRD CORE	<32 <21 >55	32 25 55	19 Grouse 65,086 ac.	OMRD TMRD CORE	<59 <55 >37	60 59 32
9 Callahan 85,617 ac.	OMRD TMRD CORE	<33 <26 >55	29 27 57	20 N Lightning 68,724 ac.	OMRD TMRD CORE	<55 <20 >61	35 19 64
10 Pulpit 95,924 ac.	OMRD TMRD CORE	<44 <34 >52	45 27 54	21 Scotchman 62,288 ac.	OMRD TMRD CORE	<34 <26 >62	37 27 68
11 Roderick 77,746 ac.	OMRD TMRD CORE	<28 <26 >55	28 27 53	22 Mt Headley 162,917 ac.	OMRD TMRD CORE	<33 <35 >55	38 37 51

SHADED values meet Forest Plan standard. 2012 values reflect on the ground conditions for the active bear bear (CYE Recovery Zone 2012 annual compliance monitoring final summary report

Other Factors

Land acquisition. Land acquisition and exchange has placed additional areas within this recovery zone in the public domain and may benefit the long term conservation of the species. There have been two major land exchanges in particular that have been beneficial to grizzly bear habitat within the action area.

In 1997 the Kootenai National Forest completed a land exchange in which 33 square miles of land owned by Plum Creek Timber Company were placed in public ownership. Most of these lands fall within action area BMUs 7 and 8. Acquisition of these lands has provided the Forest with opportunities to improve grizzly bear habitat through changes in motorized access.

In 2005, the MFWP acquired almost 2 square miles in the Bull River Valley between the East and West Cabinet Mountains. A conservation easement on an adjacent one square mile was accepted from the Avista Company. The lands are in the BMU 4 portion of the action area, near BMU 2. The area, now known as the Bull River Wildlife Management Area, provides a wildlife habitat linkage of public land across the river valley and will have value for a number of species including grizzly bears, bull trout, westslope cutthroat trout, lynx, and bald eagles.

Augmentation. From 1990-94 four female grizzly bears were captured in the Flathead River Valley of British Columbia and released in the Cabinet Mountains to augment the existing population. Twenty-two different grizzly bears were captured during 840 trap-nights, to obtain the 4 sub-adult females transplanted. One of the transplanted bears and her cub died of unknown causes a year after release (Kasworm et al. 1998). The remaining three bears were monitored until their collars fell off. The program was designed to determine if transplanted bears would remain in the target area and ultimately contribute to the population through reproduction. Three of four transplanted bears remained within the target area for more than one year. Though one of the transplanted bears produced a cub, the animal had likely bred prior to translocation and did not satisfy the criteria for reproduction with native males.

In 2005 the augmentation program was reinitiated by MFWP personnel. During 2005-12, 7 female and 3 male grizzly bears were released in the Cabinet Mountains (Kasworm et al. 2013). Of 14 bears released through 2012, 4 are known to have left the target area (one was recaptured and returned), two were killed within 4 months of release, and one was killed 16 years after release. One animal is known to have produced at least 9 first generation offspring and 8 second generation offspring. A short history of these bears follows later in this report.

Linkage with Canada. The CYE relies on connectivity with Canada for its long-term conservation, thus the cumulative effects of timber harvest, mining, recreation, and road building in British Columbia (BC) have the potential to affect the CYE grizzly bear population. In 1995, the British Columbia provincial government developed a grizzly bear conservation strategy (British Columbia Ministry of Environment, Lands, and Parks 1995). A major goal of the British Columbia Grizzly Bear Conservation Strategy is to ensure effective, enhanced protection and management of habitat through land use planning processes, new protected areas, and the BC Forest Practices Code. Many of these processes are ongoing, and have not had the opportunity to achieve the stated goals of grizzly bear habitat protection. Currently there is little access management occurring on lands being used for timber production directly north of the International border in the Yaak and Moyie River drainages. However, Gilnockie Provincial Park was established in 1995 just north of the international border in the upper Yaak River drainage. The 11 square mile park is managed similarly to United States wilderness areas with little road access.

Linkage within the CYE and with other Recovery Zones. Linkage for the CYE population across U.S. Highway 2, which bisects the ecosystem between the Yaak and Cabinet Mountains portions is important for population recovery. Presently, there has been limited movement of native bears between the Cabinet Mountains and Yaak portions of the CYE. One sub-adult male has crossed the Kootenai River moving from the Yaak to the Cabinets and then returned to the Yaak (Wayne Kasworm pers. comm. 2013).

Recent DNA results show the first documented movement of a grizzly bear between the SE and the CYE (Wayne Wakkinen, 2013, pers. comm.). The DNA data indicate that a young male grizzly bear that was born in the SE successfully crossed into the Cabinet Mountains of the CYE. The parents and sibling of the young male remained in the SE. However there is currently no indication of successful movement and breeding activity by native bears resulting in gene flow. Grizzly bears augmented into the Cabinet Mountains have crossed Highway 2 during exploratory movements moving into the Yaak area and east back to the NCDE (Wayne Kasworm 2013 pers. comm.). Recent data on grizzly bear movements in the CYE is encouraging. In the past 5 years there have been more detections of Yaak grizzly bears (telemetry and hair snags) nearer the Kootenai River on the north side than in previous years (Wayne Kasworm 2013 pers. comm.).

Recreation. The Forest received 892,000 visits by people recreating in 2007 (USDA 2012). Approximately 60 percent of the total visits occurred within or adjacent to the CYE recovery zone. According to the Supplemental EIS for motorized access management in the CYE (USFS 2009d, USFS 2010b), high-use trails are counted against calculations of "percent core area." Because of this consideration of the effects of high use trails on grizzly security and the management of this security we do not consider the current levels of recreational use in the CYE a threat to grizzlies at this time.

Within the CYE recovery zone, there are 59 miles of groomed snowmobile trails and 281 miles of un-groomed routes (U.S. Forest Service 2009d). Off-route use occurs on approximately 70 square miles within the recovery zone. Both on and off-route snowmobile travel combined occurs on about only 6-9 percent of modeled den habitat within the CYE (U.S. Forest Service 2009d). Negative impacts on grizzly bears are primarily limited to the den emergence period (basically the month of April), particularly for female bears with cubs of that year. The potential of separating a mother and cub could result in cub mortality. However, such effects have never been documented and there are no known scientific papers supporting this potential impact. Given the small population size of grizzly bears, the overlap of less than 10 percent of modeled den habitat (U.S. Forest Service 2009d), and the seasonally-declining numbers of snowmobilers by April of each year, the probability of a snowmobile encountering a female with cubs using a particular patch of den habitat is low (USFWS 2011).

Livestock Grazing. Livestock grazing on the Kootenai National Forest has decreased since 1987 (U.S. Fish and Wildlife Service 2006). Within the CYE, but north of the action area BMUs, there are two cattle allotments on the Kootenai National Forest (Sullivan 2010). On the Lolo National Forest within the action area, there are currently 2 livestock grazing operations on the edge of BMU 22 in the CYE: (1) a special use permit for about 6 horses, and (2) an allotment for about 30 cow/calf pairs. To date, there have been no grizzly bear/livestock conflicts associated with livestock use of National Forests within the CYE, and we do not consider this type of land-use at its current levels a threat to grizzly bears in the CYE.

Timber Harvest. Timber harvest on National Forest lands within the CYE has decreased since 1987 (U.S. Forest Service 2009d). On the Kootenai National Forest the number of acres harvested has declined with the total volume of timber harvested declining at a faster rate (U.S. Forest Service 2009d). This trend is expected to remain stable or continue to decrease upon full implementation of the Amendments for access management standards because less suitable timber will be accessible for harvest (see U.S. Forest Service 2002, p. 3-104; U.S. Forest Service 2009d, pp. 156-157). Private timber company and state lands are present in the CYE and timber harvest could occur on these lands. Timber harvest may benefit bears when resulting early successional vegetation provides an increase in food plants (e.g. huckleberries).

Mining. There are no oil or gas leases within the CYE recovery zone (Bobbie Lacklen, Forest geologist, 2013, pers.comm.). There are a number of small scale mining operations within or adjacent to the CYE (ibid). Most of these mining activities occur on the Kootenai National Forest (ibid). Examples include gravel pits, suction dredging, and gold panning. There are multiple private in-holdings; many are historical patented mining claims, where future mining activity could occur (ibid).

In 2006 the Service issued a biological opinion for the re-start of the Troy Silver mine (U.S. Fish and Wildlife Service 2006). This facility was not operational between 1993 and 2004 due to low mineral prices. It is now operating and extracting over 100,000 pounds of silver and 15.5 million pounds of copper annually (Revett 2009). In 2012 Revett suspended operations due to seismic activity and some structural damage along the main access road. Revett is now considering alternative haul routes.

Revett Silver Company's Rock Creek Mine proposal was approved in 2003 and a biological opinion was issued in 2003 (U.S. Fish and Wildlife Service 2003a). Following lawsuits, it was reapproved and a new biological opinion was issued in 2006 (USFWS 2006). The Rock Creek mine would operate for about 30 years, extracting 10,000 tons of ore per day. The permit area for the mine would include a 1,560 acre staging area. The maximum number of people employed by the mine would be approximately 450 during various phases of construction, and about 340 during operation. The mitigation measures for the proposed mine would offset impacts of the project and are expected to improve habitat and population status for the CYE population (USFWS 2006). The 2006 biological opinion on the mine was challenged in court, was upheld in the Federal District Court, and the U.S. 9th Circuit Court of Appeals. The Missoula Federal District Court vacated the Forest's 2003 ROD on NEPA grounds, and the Forest is now preparing a supplemental EIS to address the Court's issues as well as updating important changed information.

G. Grizzly Bear Conservation Needs in the Cabinet Yak Ecosystem Recovery Zone

The Service's Grizzly Bear Recovery Coordinator identified the six priority needs to achieve grizzly bear recovery in the CYE grizzly bear recovery zones (Servheen pers comm. 2006 *in*: USFWS 2006):

1. Augment the Cabinet Mountains and Canadian Selkirks populations;
2. Limit human-caused mortality;
3. Enhance population linkage across Highways 2, 3, 200, 135, and 95;
4. Address the needs of bears outside the recovery zone line;
5. Inside the recovery zone, a) complete access management in most important areas and b) improve sanitation standards on public lands;
6. Increase outreach and public involvement.

Three of the six conservation needs (1, 2, and 3) are similar to those assessed in Proctor et al (2004b). Through population simulations, Proctor et al. (2004b) documented extinction risks for the CYE grizzly bear population, and the influence of three factors that could substantially reduce the likelihood of extinction of the grizzly bear population. Over the long-term (100-year period) mortality reduction had the largest effect, while augmentation had the largest positive effect on growth rate over the short-term (10 years). Population growth rates dramatically increased as a result of augmentation over 10 years; even low rates of augmentation (one female per year) reduced the probability of extinction by 33 percent over 25 years. Adding three females per year cut extinction rates in half. Increasing the age of those bears augmented and increasing a 10-year effort to 20-years both lowered the extinction risk slightly. However, mortality reduction had the greatest positive effect on growth rates over a 100-year period and equally strong reductions in extinction probabilities. Finally, linkage enhancement and mortality reduction combined had a larger effect on lowering the extinction probability than 10 years of augmentation.

The Access Amendment addresses need 5a, and contribute toward achieving needs 4 and 2. Each of the other needs are beyond the scope of the proposed Access Amendment, but are currently being worked on by federal, state, and private entities (e.g., see Selkirk-Cabinet Yaak Subcommittee notes: May 19, 2010).

The Forests have been addressing needs 5a and 2 through implementation of Forest Plan access standards as shown by the improvements in core, OMRD and TMRD since 2002 (Appendix E) and the reduction of grizzly bear mortalities on National Forest lands (see earlier discussion).

The mandatory food storage orders on National Forest lands address needs 5b and 2. Service efforts in partnership with county government and private entities have further addressed needs 5b and 2 by fencing garbage collection sites and/or placing bear resistant containers at those sites. The Forests have been placing bear resistant containers in Forest campgrounds.

The state, MFWP, has been addressing need 1 through its augmentation efforts since 1994. Specifically 14 grizzly bears (11 females and 3 males) have been placed into the CYE since the start of their program.

The state, MFWP, has been addressing need 3 through its land acquisition and conservation easement efforts. Specifically, MFWP has established a linkage area across state highway 56 just south of Bull Lake. They have also acquired a large scale conservation easement on lands along highway 2 south of Libby Montana.

The Service has worked with MFWP to establish a grizzly bear specialist position working in the CYE to address needs 6 and 2. One such position is now in place, stationed in Libby, Montana.

H. Climate Change

With respect to climate change, observations show that warming of the climate is occurring, and that human activities, i.e., both Federal and non-Federal, have led to large increases in heat-trapping gases over the past century (Karl et al. 2009). Human-induced emissions of heat-trapping gases come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities. The human-induced increases in heat-trapping gases from these activities have caused increases in global average temperatures, and changes in ocean heat content, precipitation, atmospheric moisture, and Arctic sea ice (Karl et al. 2009).

Climate changes have been characterized at the global, national, regional and local level and are expected to continue into the future (Karl et al. 2009; U.S. Fish and Wildlife Service and DNRC 2010). The best information indicates these changes are attributable to human activities, and the data suggests that some human activities are more likely than others to contribute heat-trapping gases. However, it is currently not possible to attribute proportions of the climate change trends to specific business or private action, or to specific categories of human activities, i.e., many human activities directly and indirectly contribute some proportion to heat-trapping gas emissions.

Future Conditions

Human activities in the future are expected to continue to contribute to climate change. There is high agreement and much evidence that with current climate change mitigation policies and related sustainable development practices, global greenhouse gas emissions will continue to grow over the next few decades (IPCC 2007). The rate will depend on the level of emissions of heat-trapping gases that continue to be created and the actions taken around the world to reduce emissions of heat-trapping gases. We assume, for purposes of this BO, the climate changes characterized above will continue through the foreseeable future. Thus, climate change will likely affect grizzly bear habitat throughout the duration of the current and amended Forest Plans.

Climate change trends in the Pacific Northwest region will be important to grizzly bears with respect to how these trends may affect den behavior, foraging habitat availability, and fire-regimes. Predicted decreases in snowpack levels may shorten the den season as foods are available later in the fall and earlier in the spring. Spring and fall encounters between grizzly bears and hunters and/or recreationists would therefore likely increase; escalating the mortality risk to bears during these times.

An additional effect of climate change could be changes in the availability of and distribution of foraging areas due to increasing temperatures and seasonal changes in precipitation. The extent and rate to which plant species and communities would be affected is difficult to predict. Changes in vegetative distributions may also influence other mammal distributions, including prey species like ungulates.

As described earlier, grizzly bears are opportunistic feeders and will consume almost any available food. Because grizzly bears are such successful omnivores, climate-induced vegetative changes may not have detectable, negative effects on grizzly bear populations in the lower 48 States.

An indirect effect of climate change may be an increase in wildfires that may result in reductions in forest cover and some types of foraging habitat, while potentially creating other types of foraging habitat, e.g. shrub, berry, and grassland forage areas. Increasing insect outbreaks may result in more decadence and die-outs of whitebark pine stands, thus, reducing a potential food source for grizzly bears. However, whitebark pine is not a key food source of grizzly bears in the CYE.

Summary of climate change effects to grizzly bears

Grizzly bears are habitat generalists and opportunistic omnivores, able to find resources in a wide variety of habitat conditions. It is difficult to predict how this large, wide-ranging species would respond to environmental changes associated with climate change. At this time, the scope and scale of such changes are unknown, and the effects (positive or negative) on grizzly bears would likely be variable across the landscape.

Through the Forests' significant participation in the IGBC, the Forests are made aware of new findings relative to grizzly bears in the action area. If a causal relationship can be established between climate change and changes in habitat relationships that may be affected by mining activity in a manner not considered here, it may be addressed by future federal action or reinitiating formal consultation in an effort to offset some of the effects of climate change.

IV. ENVIRONMENTAL BASELINE

The environmental baseline section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat, if applicable), and ecosystem, within the "action area" (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998).

The "environmental baseline" includes:

- the past and present impacts of all Federal, State, or private actions and other human activities in an "action area,"
- the anticipated impacts of all proposed Federal projects in an "action area" that have already undergone formal or early section 7 consultation,
- and the impact of State or private actions that are contemporaneous with the consultation in process.

The "action area" includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. The action area does not necessarily include all areas potentially frequented by far-ranging, or migrant, species (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998, pp 4-15 to 4-19).

This biological opinion addresses the effects on grizzly bears related to the Montanore project. Therefore, the action area is the affected (directly or indirectly) BMUs managed entirely or in part by the Forests, within the CYE recovery zone, and one "BORZ". The BORZ (Bear areas Outside the Recovery Zone) are adjacent areas on the Forests identified as having recurring use by grizzly bears outside of these recovery zones (USFS 2010b, and 2011b) (see USFS 2011 Appendix C).

The action area includes 7 BMUs on the Forest (1, 2, 4, 5, 6, 7, and 8) and 1 BMU (22) on the Lolo NF. All 8 BMUs are in the Cabinet Mountains portion of the CYE. It also includes one BORZ area, the Cabinet Face on the Kootenai NF as well as additional National Forest and private lands to the east near Highway 2 south of Libby, Montana.

Not included in the action area, because they are not affected by the proposed action, are:

- All BMUs in the Yaak portion of the CYE.
- CYE Forest BMUs in the West Cabinets bordering Idaho
- All BMUs on the IPNF portion of the CYE.
- Other BORZ areas

A. Status of Grizzly Bears in the Action Area

Because the action area does not encompass the entire range of the grizzly bear, this analysis is a subset of the preceding range-wide status discussion. The purpose of this part is to characterize: the current condition of the grizzly bear in the action area, in terms of its reproduction, numbers, and distribution (if known); the factors responsible for that condition; and, on the basis of those findings and the range-wide species' assessment, the grizzly bears' survival and recovery needs in the action area. Some discussions include data that pertains to the broader CYE to give context for our review of the environmental baseline in the action area.

The Cabinet-Yaak recovery zone was estimated to contain at least 42 grizzly bears during 2006-2012 (Kasworm et al. 2013) based on captures, genetic information, mortality, and sightings of unique individuals. Within the Cabinet Mountains portion of the CYE the minimum population estimate is 21 bears (ibid). Because most of the land in the Cabinet Mountains is National Forest, we assume most of the grizzly bears in the action area live on the Forest and LNF BMUs. Table A8 shows grizzly bear sightings in the action area in 2012 (Kasworm 2013).

Table A8: Credible 2012 grizzly bear sightings in the action area.

BMU or BORZ	Credible Grizzly Bear Sightings	Sightings of Females with Cubs (total)	Sightings of Females with Cubs (unduplicated)	Sightings with Females with Yearlings or 2-year olds (total)	Sightings of Females wth Yearlings or 2-year olds (unduplicated)
1	1	0	0	0	0
2	5	1	1	0	0
4	0	0	0	0	0
5	4	1	1	1	1
6	1	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
22	0	0	0	0	0
Cabinet Face	1	0	0	0	0
2012 TOTAL	12	2	2	1	1

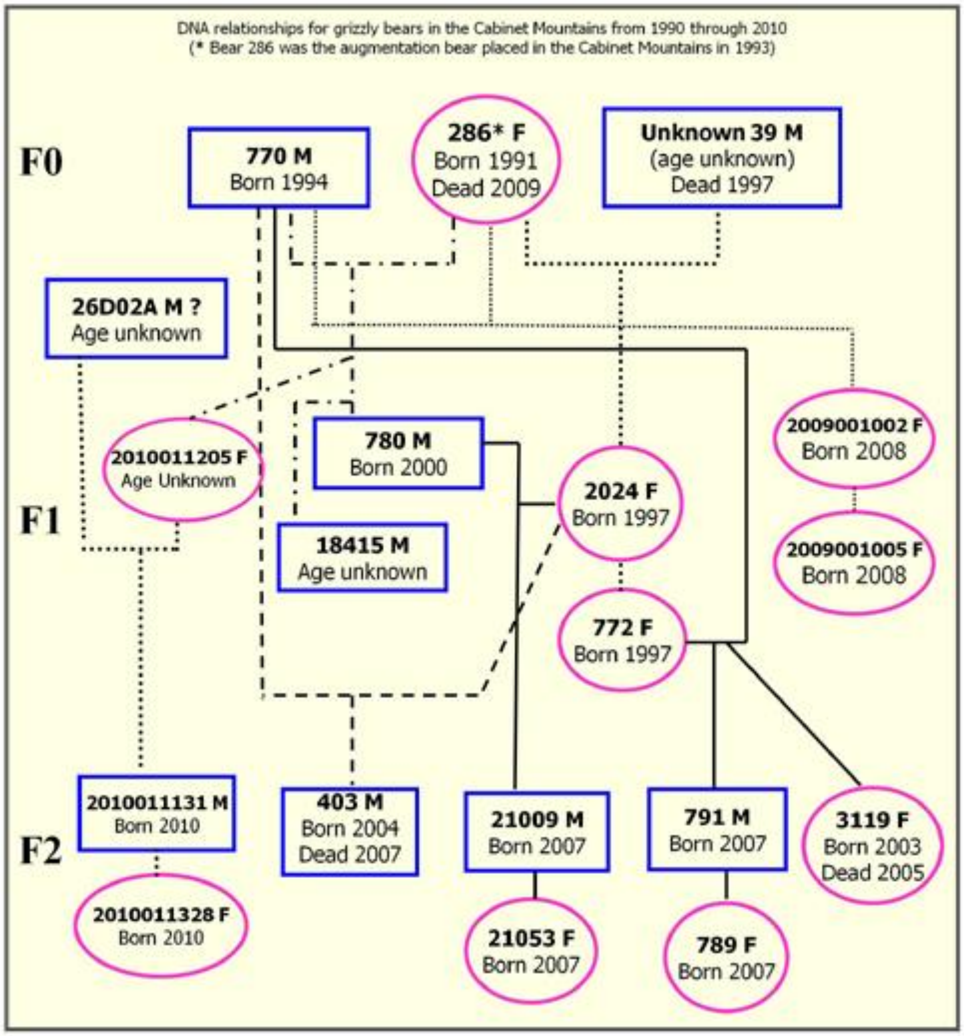
Credible sightings are those rated 4 or 5 on a 5 point scale
Sightings may duplicate the same animal in different locations. Only the first sighting of a duplicated female with cubs is counted toward total females. However, subsequent sighting contribute toward occupancy.

Based on data shown in Table A8, the portions of the action area with known grizzly bear presence in 2012 were BMUs 1, 2, 5, 6, and the Cabinet Face BORZ. The BMUs 2 and 5 were known to be occupied by female grizzly bears with young in 2012. There were at least three females with young observed in the action area in 2012 (based on Kasworm 2013). One of the recovery criteria considers a six year period for occupancy by females with young. Using that criteria action area BMUs 2, 4, 5, 6 and 7 were occupied by females with young for the 2007-2012 period (ibid, Figure 4). BMUs 8, and 22 have no known occupancy by females with young for that period. The Cabinet Face BORZ has had credible grizzly bear sightings in three of the last six years but no sightings of a female with young.

Mortality data for the CYE recovery zone shows a 57 percent probability that the population is declining at a *negative* 0.8 percent annual rate of change. However, the annual rate of change has been improving (ie. the rate of decline is lessening) since 2006 (see *Status of the Species* section for complete discussion). There were no known 2012 human or natural caused mortalities in the action area. Over the past six years (2007-2012) there have been three grizzly bear mortalities (one female, one male, and one unknown sex) in the action area. Two were human caused (self defense and mistaken identity) and one unknown cause. None were augmentation bears.

To date, the results of the MFWP augmentation efforts are encouraging. Evidence suggests that the Cabinet Mountains segment of this population has actually increased in size since the start of augmentation in 1990 (Kasworm et al 2012). The minimum number of grizzly bears in the Cabinet Mountains is estimated at 21, which is up from original estimates of 15 (Kasworm et al 2007). This increase is largely due to the reproductive output of a successful augmentation bear and her offspring which have also reproduced (see Figure A6). The MFWP intends to continue this effort into the future (Jim Williams, Montana Fish, Wildlife and Parks, pers. comm. 2013).

Figure A6: Most likely pedigree resulting from translocated female grizzly bear 286 into the Cabinet Mountains, USA 1993-2010 (Kasworm et al 2012). Rectangles = males, Ellipses = female. Lines indicate a parent-offspring relationship. F0 is the initial generation, F1 is the first generation of offspring for bear 286 and F2 is the second generation.



B. Factors Affecting Grizzly Bear Baseline Conditions in the Action Area

This analysis describes factors affecting grizzly bear, their habitat, including critical habitat if designated, in the action area. The baseline includes State, tribal, local, and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat (U.S. Fish and Wildlife Service and NMFS 1998).

C. Primary Factors Affecting Grizzly Bears in the Action Area

Human caused grizzly bear mortality risk. As detailed in the *Status of the Species* section, in the entire CYE since 1982, there have been a total of 65 known grizzly bear mortalities on all ownerships (including Canada) (U.S. Fish and Wildlife Service 2004; USFS 2010b; USFS 2011b). Action area human caused mortalities total 6 for the same period. The latest data (Kasworm et al 2012) indicates a decline of human-caused grizzly bear mortality on public lands and an increase of such cases on private lands (see Status section). Only two known human caused mortalities occurred in the action area in the past six years. This low level is likely due in part to reduced motorized access and increased levels of core habitat (see status section and Appendix E for CYE wide conditions and Table A9 for action area motorized access conditions).

Food Attractant and Storage. Attraction of grizzly bears to improperly stored food and garbage is identified as one of the principal causes of grizzly bear mortality, especially on private lands. The Forest and Lolo National Forests have signed food storage orders and are currently implementing sanitation programs in the action area. Implementation of the food storage order provides a crucial overall improvement to baseline conditions relative to mortality risk on National Forest lands. In the action area one garbage collection site along Highway 2, within the Cabinet Face BORZ, was relocated to another part of the BORZ, and fenced. Howard Lake campground, in BMU 5, now has bear resistant garbage receptacles. The Forest food storage order applies in the BORZ as well as the recovery zone. The MFWP grizzly bear specialist stationed in Libby, Montana works to inform and educate the public on proper food attractant storage and disposal. Those efforts have resulted in more members of the public seeking that information in a proactive way to avoid conflicts with bears (Annis 2013). Kim Annis, Montana Fish, Wildlife and Parks, (pers. comm. 2013) also states “Largest benefit comes from having a person knowledgeable about grizzly bears and how to deal with conflicts and with the resources available to quickly respond to conflict issues. They can not only work to solve the conflict immediately but can provide information and education to the public involved to help avoid future conflicts, all of which serves to avoid a bear mortality and to avoid human-bear conflicts.

Food attractant and storage is even more important in years when huckleberry production level is down. Increased bear mortality has been identified as a problem under those conditions (see Figure 4 and detailed mortality discussion in *Status of the Species* section). The bear specialist positions and the information and education program play a critical role during low huckleberry crop years. The bear specialist is able to notify the public through radio, TV and newspapers of the increased risk of bears on their property and provide protections through electric fence kits in a timely manner when needed.

Public Opinion: As shown in the *Status of the Species* section above, public opinion, knowledge, and attitude of those people living in and near the action area play a significant role in grizzly bear mortality risk.

Forest Plan Direction. Forest Plan direction in the form of goals, objectives and standards plays an important role in providing secure grizzly bear habitat and minimizing displacement of bears from suitable habitats. The majority (over 90 percent) of the action area is under Federal ownership, with only a small percent (less than 10 percent) comprised of State and private lands.

Forest Service Management: The Forests manage approximately 633,000 acres within the action area BMUs of the CYE (see Table A9). The Forest also manages about 27,000 acres of the Cabinet Face BORZ that is part of the action area.

Access Management: The action area standards, and current condition of grizzly bear habitat measures (OMRD, TMRD, and core area) in five year increments are summarized in Table A9 (source: USFS 2010b, USFS 2012b, USFS 2013). Historical annual data from 2002 thru 2011 are in Appendix E.

Indices for these parameters in the action area BMUs have been improving steadily in the action area since 1987, as documented by Summerfield et al. (2004), the Selkirk Cabinet-Yaak IGBC Subcommittee (1998), annual Forest Plan monitoring reports (U.S. Forest Service 1998, 1999, 2002, 2009a, 2010), and the annual monitoring reports sent to the Service since 2004 (U.S. Forest Service 2005, 2006, 2008, 2009b, 2013b). The annual monitoring reports also show any actions that occur during that year that result in changes from the previous year (i.e. USFWS 2013b).

Overall, motorized route densities have been reduced and secure habitat has increased in the action area since the grizzly was listed (Table A9 and Appendix E). The Service expects the projected access conditions to further improve in the action area once the access amendment is fully implemented as indicated by the BMU standards. The access amendment requires BMUs currently not meeting the core area, OMRD and/or TMRD standards to achieve all standards in the following manner: 33 percent of BMUs not meeting one or more standard will meet all standards within three years of the amendment decision date (11/09/2011); 66 percent within five years; and 100 percent within eight years. As of 2012, two of the action area BMUs (1 & 2) meets, or are better than, all three amendment standards, while four others (BMUs 5, 6, 7, and 8) meet, or are better than, one or two of the three standards (Table A9).

The access amendment also established a linear road mile standard for the BORZ areas. The standard is "no increases in permanent linear miles of open road on National Forest System lands in any individual BORZ, above baseline conditions, except in cases where the Forest Service lack discretion to prevent road building across national forest lands due to legal or other obligations (examples include, but are not limited to, ANILCA claims, identification of RS2477 thoroughfares). Potential increases in linear miles of open roads must be compensated for with in-kind reductions in linear miles of open road concurrently with, or prior to, project implementation with the same BORZ." The Cabinet Face BORZ baseline condition for total linear miles of open road on National Forest lands was set at 128.0 miles. Currently there are 130 miles of open linear miles. This differs from the access amendment due to an error in the data base that incorrectly listed road 4745 as closed when two miles of that road were actually open at the time of the access amendment (USFS 2011 Montanore BA).

Table A9. Access parameters for the Action Area BMUs, five year increments, compared to the standards.

BMUs	Access Standard Type	Standards	2002	2007	2012
1 - Cedar 56,818	OMRD	**15**	12	12	14
	TMRD	**15**	10	9	8
	CORE	**80**	83	83	83
2 - Snowshoe 65,241	OMRD	**20**	17	19	18
	TMRD	**18**	14	16	16
	CORE	**75**	77	76	77
4 - Bull 81,750	OMRD	**36**	36	37	38
	TMRD	**26**	26	26	29
	CORE	**63**	62	62	62
5 - St. Paul 70,210	OMRD	**30**	26	28	28
	TMRD	**23**	21	23	23
	CORE	**60**	63	58	58
6 - Wanless 64,148	OMRD	**34**	33	32	32
	TMRD	**32**	32	33	34
	CORE	**55**	55	53	53
7 Silver Butte-Fisher 63,151	OMRD	**26**	23	25	27
	TMRD	**23**	20	23	23
	CORE	**63**	66	62	65
8 - Vermillion 68,567	OMRD	**32**	32	33	32
	TMRD	**21**	23	22	25
	CORE	**55**	56	54	55
22 - Mt. Headley 162,917	OMRD	**33**	39	38	38
	TMRD	**35**	42.0	37	37
	CORE	**55**	46.8	51	51

* Standards as percent of BMU
OMRD = Open motorized route density; TMRD = Total motorized route density
Values for 2002, 2007, and 2012 reflect on the ground conditions for that active bear year (CYE Recovery Zone annual compliance monitoring final summary reports)
SHADED 2012 value meets or is better than Standard

Other Factors

Augmentation. Since 1990, 11 female and 4 male grizzly bears have been augmented into the Cabinet Mountains to enhance the existing population. Of the fifteen augmented bears, four left the target area (one recaptured and returned). Original estimates were that 75 percent of the augmented bears were likely to remain in the target area (Kasworm et al 2006). Through August 2013, seventy-three percent of the augmented bear stayed in the target area. Three of those bears that remained have been killed.

Kasworm et al. (2006) show that the numbers of augmented female grizzly bear needed to produce one reproducing female varied from three to six depending on the ages at the time of augmentation. One augmented female is known to have produced at least nine first generation offspring and eight second generation offspring (see Figure A6 above).

Another animal is known to have made large movements from the release site back to Glacier National Park where it denned, and then returned to the release area the next spring. The animal has now made this trek twice with the difference being it denned near the release site the second year and then traveled east to the park and back (Kasworm 2013b). This animal's movements indicate that there can be a link between the CYE and the NCDE, which is important for genetic interchange.

The MFWP currently plans to continue this effort (Jim Williams' pers. comm. 2013). Based on the genotype data, augmentation efforts are the reason grizzly bears still occupy the Cabinet Mountains portion of the CYE (Kasworm et al 2012).

Timber Harvest. Like the rest of the CYE, timber harvest on National Forest lands within the action area has decreased since 1987 (U.S. Forest Service 2009d). In the action area the number of acres harvested has declined with the total volume of timber harvested declining at a faster rate (U.S. Forest Service 2009d). This trend is expected to remain stable or continue to decrease upon full implementation of the Amendments for access management standards because less suitable timber will be accessible for harvest (see U.S. Forest Service 2002, p. 3-104; U.S. Forest Service 2009d, pp. 156-157). In the action area there are seven sections of land owned by timber companies and two state-owned sections where timber harvest could occur.

Mining. There are no oil or gas leases in the action area (Bobbie Lacklen pers.com.2013). There are a number of small scale mining operation within or adjacent to the action area (ibid). Most of these mining operations occur on the Kootenai National Forest lands (ibid). Examples include gravel pits, suction dredging, and gold panning. There are about 40 private in-holdings; many are historical patented mining claims in the action area BMUs where future mining activity could occur.

Revett Silver Company's Rock Creek Mine is in the action area (BMUs 4 and 5). The mitigation measures for the mine will offset impacts of the project and are expected to improve habitat and population status in the action area (USFWS 2006). One critical mitigation measure requires Revett to fund a Montana Fish, Wildlife and Parks grizzly bear management specialist position. Currently they are funding that position but should the project not move forward that position would be lost. The specialist in place together with the USFWS CYE grizzly bear researcher is working with the public in the Cabinets. The focus has been to "work closely with residents to identify and secure bear attractants, to foster public awareness of grizzly bear behavior and biological needs and to create a public understanding of bear-human conflicts causes in order to reduce social jeopardy." (Annis 2013). Annis (ibid) notes "The number of conflict calls is not necessarily an accurate representation of the level of black or grizzly bear conflicts for a given season. For example, the activity of a single bear may elicit several phone calls as the bear moves from place to place and not everyone having a bear conflict will contact MFWP for assistance. However, since this position was created in June of 2007 an increase each year in contacts has occurred as 1) people discover that there is someone that will assist them, 2) are more willing to report an incident, and 3) are looking to prevent a conflict before it begins."

The 2006 biological opinion on the Rock Creek mine was challenged in court, was upheld in the Federal District Court, and the U.S. 9th Circuit Court of Appeals. The Forest is completing a supplemental EIS for the Rock Creek mine project to show current or changed information and to address four points in the federal district courts opinion that vacated the 2003 ROD.

Livestock Grazing. There are no livestock grazing permits in the action area. To date, there have been no grizzly bear/livestock conflicts associated with livestock use of National Forests within the action area and we do not consider this type of land-use at its current levels a threat to grizzly bears in the action area.

Recreation. The number of recreational visits occurring in the action area is unknown at this time. However, it is clear that recreational use does occur there in the form of hiking, hunting, berry picking, scenic view driving and snowmobile use. A good portion of use is likely due to the presence of the Cabinet Mountain Wilderness and the trails that access it. According to the Supplemental EIS for motorized access management in the CYE (USFS 2009d, USFS 2010b), high-use trails are included in calculations of "percent core area." Because of this consideration of the effects of high use trails on grizzly security and the management of this security we do not consider the current levels of recreational use in the action area a threat to grizzlies at this time. Should the Rock Creek Mine project proceed there is the potential for the East Fork Rock Creek and Saint Paul Trails, in BMU 5, to reach high use levels. The Rock Creek Mine project includes mitigation to monitor trail use and make changes, like implementing a permit process, if necessary. Snowmobile use in the action area is limited due to terrain conditions and the presence of the Cabinet Mountain Wilderness. The Kootenai National Forest has not drafted a winter travel plan for snowmobile use which would cover the action area. There have been no reports of den abandonment in the CYE (Wayne Kasworm, pers. comm. 2013).

Land acquisition. Land acquisition and exchange has placed additional areas within this recovery zone in the public domain and may benefit the long term conservation of the species. There have been two major land exchanges in particular that have been beneficial to grizzly bear habitat within the action area.

In 1997 the Kootenai National Forest completed a land exchange in which 33 square miles of land owned by Plum Creek Timber Company were placed in public ownership. Most of these lands fall within action area BMUs 7 and 8. Acquisition of these lands has provided the Forest with opportunities to improve grizzly bear habitat through changes in motorized access.

In 2005, the MFWP acquired almost two square miles in the Bull River Valley between the East and West Cabinet Mountains. A conservation easement on an adjacent one square mile was accepted from the Avista Company. The lands are in the BMU 4 portion of the action area, near BMU 2. The area, now known as the Bull River Wildlife Management Area, provides a wildlife habitat linkage of public land across the river valley and will have value for a number of species including grizzly bears, bull trout, westslope cutthroat trout, lynx, and bald eagles.

D. Conservation Needs of the Species within the Action Area.

As mentioned earlier, the Service identified the six priority needs to achieve grizzly bear recovery in the CYE grizzly bear recovery zone (C.Servheen, pers comm. 2006 *in:* USFWS 2006), and they pertain to the action area as well:

1. Augment the Cabinet Mountains populations;
2. Limit human-caused mortality;
3. Enhance population linkage across Highways 2, 3, 56, and 200;
4. Address the needs of bears outside the recovery zone line;
5. Inside the recovery zone, a) complete access management in most important areas and b) improve sanitation standards on public lands;
6. Increase outreach and public involvement.

All these conservation needs have been fully or partially implemented as shown in the *Status of the Species* section above. Those efforts also apply to the action area and so are fully or partially addressed in this area as well.

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 (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). This section will describe and analyze the effects of the Montanore project on grizzly bears.

"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, and that will be added to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. [50 CFR §402.02]

This section analyzes the potential direct and indirect effects of the proposed action, including the measures in the 2013 mitigation plan. The effects of the proposed Montanore project will be discussed under the following often overlapping categories:

1. **Displacement of grizzly bears** resulting from disturbance associated with roads or activities. These impacts include: open motorized route density, increased total motorized route density, loss of core area, and impacts to seasonal habitats, displacement habitat, opening size, corridor width; and direct habitat loss.
2. **Mortality risk to grizzly bears** resulting from food conditioning and other human impacts, including recreation, access into grizzly bear habitat, and settlement.
3. **Fragmentation of grizzly bear habitat** resulting from impacts to a relatively narrow north-south corridor connecting the southern Cabinet Mountain BMUs (6, 7, 8 and 22) to those habitats to the north.

The analysis under each of these categories is organized into two major sections. Presented first is a synopsis of information and research regarding general, potential adverse effects on grizzly bears that are likely to be associated with mining operations. Presented second is an analysis of the effects of the specific proposed action, including the accompanying mitigation plan. The first section, general potential impacts of mining operations, may include discussion of actions or impacts that ***would not* necessarily** occur or apply within the action area and/or ***would not* necessarily** be related to the proposed action, but provide background information or context for the second section, analysis of specific effects of the proposed Montanore project.

The effects analysis ends with the following sections:

4. **Conservation Needs of the Species**
5. **Species Response to the Proposed Action**

A. Factors to Consider: General Potential Effects of Mining Operations on Grizzly Bears:

1. Displacement

Grizzly bears are known to avoid, or be displaced from, preferred habitat because of human caused disturbances. The term "displaced" does not necessarily mean that grizzly bears would totally avoid an area, or be excluded in some way from ever using an area. Displacement is used in general terms to describe "under-use" of habitat. In research, "significant under-use" of habitat means that bears use habitat "less than expected" compared to its availability. For instance, a given habitat may account for 30 percent of an analysis area, but may only receive 15 percent of bear use. Depending upon the confidence interval surrounding the 15 percent use, this may amount to statistically significant less-than-expected use of habitat, even though some use by bears is occurring. Displacement of grizzly bears from an area can range from short-term or diurnal avoidance to more significant long term under-use of habitat, depending upon the season, quality of habitat affected, and the age and sex of grizzly bears affected.

Displacement behavior in grizzly bears may be expressed through a change in diurnal habitat use or movement patterns, avoidance or under-use of otherwise preferred habitat, and/or other behaviors related to stress or fear. Displacement may be short term or long term, depending upon the nature of disturbance and consequences experienced by grizzly bears. Grizzly bears that avoid human activity may move into poorer quality habitat or habitat that is already occupied by other bears. These types of altered routine behaviors due to disturbances have been documented in grizzly bears. Clear cause-effect relationships have not often been statistically validated. However, numerous research efforts reported many grizzly bears under-use or avoid otherwise preferred habitats that are highly influenced by humans (Mace et al.1999; Wakkinen and Kasworm 1997; Mace et al. 1996; McLellan and Shackleton 1989; McLellan and Shackleton 1988).

If large amounts of preferred habitat within a female grizzly bear's home range are impacted by disturbances that cause displacement, the bear's reproductive capacity may be affected. Female grizzly bears that are deterred from adequate use of important resources in their home range may experience significant impairment of breeding, feeding and sheltering. Stress and increased caloric expenditure searching for food or protective cover in less desirable habitat may impact normal behavior patterns, possibly to the extent that reproduction is compromised. Female grizzly bears, in particular, have a strong home range affinity (IGBC 1987). They may avoid preferred habitats in response to disturbance, but have not been documented to move from established home ranges to a significant degree. Therefore, significant impacts to their home ranges can be deleterious. The reasons for this affinity are not completely understood, but may be related to how grizzly bears find and follow the phenological development of important food plants in their habitat, returning predictably to important habitats such as huckleberry fields in the fall or avalanche chutes in the spring. Bears appear to "learn" their home range, often expanding a home range as a bear matures while maintaining a central common core zone. Grizzly bears evidently learn to use their habitat from their mother. Home ranges of young, usually female young, often border or overlap that of the mother. Exploratory movements into unfamiliar territory can be expensive in terms of energy expenditure and the low potential of finding unoccupied habitat with adequate food resources to support the high caloric requirements of bears in the feeding season. An adult grizzly bear consumes up to 20,000 calories a day in preparation for denning. Lactating females may require an even greater caloric intake. Females with cubs are generally not as able to travel, limited by the need to feed and accompany the cubs.

Grizzly bear home ranges are large and overlap. Displacement from preferred habitat into areas also occupied by other grizzly bears increases the potential for adverse intra-specific interaction. Intra-specific interaction may include predation on cubs by male grizzly bears. Bears moving in to a less known territory or sub-optimal habitat give up known escape cover and increase their chances of encounters with dominant male bears. Intra-specific competition and/or under-use of otherwise preferred habitat in adult females may result in reduced foraging efficiency leading to adverse changes in breeding behavior, lowered reproductive success, or reduced cub and sub-adult survival.

Research demonstrates that management of human access into grizzly bear habitat can moderate the displacement of grizzly bears caused by human activity (Mace et al.1999; Wakkinen and Kasworm 1997; Mace et al. 1996; IGBC 1994, 1998). Roads into grizzly bear habitat have been widely recognized as having the potential to adversely affect grizzly bears (Nielson et al. 2004; Gibeau et al. 2002, 2005; Mace et al. 1999; Wakkinen and Kasworm 1997; Mace et al. 1996; McLellan 1989b; McLellan and Shackleton 1989; McLellan and Shackleton 1988).

Negative association with roads arises from vehicle noise and other human-related noise around roads, human scent along roads, and hunting and shooting along or from roads. Grizzly bears that experience such negative consequences learn to avoid the disturbance generated by roads. Such animals may not change this resultant avoidance behavior for long periods after road closures and lack of negative reinforcement. Displacement of bears away from preferred habitat is related to avoidance of people who shoot at bears (legal harvest, defense, mistaken identity or malicious shooting) and of the disturbance related to people, noise, activity, roads and traffic. In their Canadian study area, McLellan and Shackleton (1989b) found that bears near roads were more vulnerable to hunting, and found support for the hypothesis that non-secretive bears were eliminated from the population by hunters. Grizzly bears may avoid quality habitat near roads except in poor food years when they may be forced to seek those resources at higher risk to their safety.

All of the factors contributing to displacement of grizzly bears from habitat in roaded areas have not yet been quantified by research. However, grizzly bears were consistently displaced from roads and habitat surrounding roads (Mattson et al. 1987; McLellan and Shackleton 1988; Aune and Kasworm 1989; Kasworm and Manley 1990; Mace et al. 1996; Wakkinen and Kasworm 1997; Mace et al. 1999).

Along the Rocky Mountain Front in Montana, Aune and Stivers (1982) found that grizzly bears avoided roads and surrounding road corridors even when the area contained preferred habitat for breeding, feeding, shelter, and reproduction. McLellan and Shackleton (1988) found that grizzly bears used areas near roads less than expected in southeastern British Columbia and estimated that 8.7 percent of the total area was rendered incompatible for grizzly use because of roads. Mace and others (1996) found under-use of areas with high open and high total road densities on national forest lands in Montana, as measured by a spatial analysis method known as "moving windows". Using a GIS computer model, this analysis identifies areas of high open or total road densities and revealed female home range selection was high for unroaded and low for roaded areas. Areas with lower open and/or total densities were used as expected. Mace and others (1996) found that as road densities and human use of roads increased, female grizzly bear use of adjacent habitat decreased significantly. Waller and Servheen (2005) found that grizzly bears strongly avoided areas within 500 meters of U.S. Highway 2 in Montana, south of Glacier National Park. However, 52 percent of the bears sampled did cross the highway during the night when traffic volumes were lower (averaging 10 vehicles per hour).

Grizzly bears also avoid high-use trails and other disturbances, but existing literature provides little with which to estimate a threshold of tolerance by bears to people on trails, outside of national parks where recreationists do not carry firearms. Kasworm and Manley (1990) found that grizzly bears in the Cabinet Mountains used the 0-274 meter strip (approximately 899 feet) along trails 42 percent less than expected, based on availability. This pattern was consistent among the three grizzly bears analyzed. Distances greater than 3,322 meters (slightly over 2 miles) from the trails were used greater than their availability by one bear and two others used these as expected. Actual use of the trails by hikers was not monitored in the study.

Grizzly bear displacement from disturbances other than roads (e.g. such as mining, seismic activity and aircraft) is usually related to distance from the activity. Individual bear behavior, the season of use, sex, habitat conditions and a wide variety of other factors influence grizzly bear response to human presence and activities. McLellan and Shackleton (1988) did not find significant displacement in terms of moving away from disturbance when radio monitored bears were exposed to seismic activities, gas exploration and timber harvest, although individual bears responded differently. They did document avoidance of roads and industrial sites (McLellan and Shackleton 1988, McLellan and Shackleton 1989b). McLellan (1989b) found that industrial activities did not appear to have a significant detrimental effect on the grizzly bear population in the Flathead Valley, British Columbia during the period of study. However, this southeastern corner of British Columbia had few permanent human residents or settlements. Cronin et. Al (1999) found that some grizzly bears displayed fidelity to the Prudhoe Bay region in Alaska and produced offspring there over several years in the presence of an active oil field, which may indicate tolerance of human activity. However, the authors indicated that bears were not hunted in the oil fields and suggested that it was possible the oil fields attracted bears due in part to anthropogenic foods in garbage. Grizzly bears conditioned to anthropogenic foods may be killed by hunters or as nuisance bears when they move to other areas (Shidler and Hechtel, in press *in* Cronin et al. 1999) (see also discussions in *Mortality Risk* section below).

Bears responded differently to people on foot, to moving vehicles and to fixed wing aircraft in open habitat as opposed to closed, often timbered habitat (McLellan and Shackleton 1989b). Grizzly bears closer to areas of high human use were less likely to immediately flee humans on foot than those in areas of low human use. The most pronounced reactions were to humans on foot in remote, open habitat.

Grizzly bears can become conditioned to human activity and show a high level of tolerance especially if the location and nature of human use are predictable and do not result in overtly negative impacts for grizzly bears (Mattson 1993, Cronin et. al 1999). In Glacier National Park, Jope (1985) suggested grizzly bears in parks habituate to high human use and showed less displacement, even in open habitats. In Banff National Park, an area where people are prohibited from carrying firearms, grizzly bears used habitat close to low-volume roads more than expected, and were more likely to cross low-volume roads than high-volume roads (Chruszcz et al. 2003). High habitat quality influenced the use of habitat near roads and the likelihood that bears would cross roads. Habituated grizzly bears were closer to roads than wary bears.

Yonge (2001) found that grizzly bears near Cooke City, Montana, were willing to consistently forage in very close proximity to high levels of human use if cover was sufficient and energetically efficient feeding opportunities (high quality habitats) were present. Both Mattson (1993) and Yonge (2001) postulated that areas with higher levels of human activity might have a positive effect for bears by serving as a kind of refugia for weaker population cohorts, sub-adults and females with cubs, seeking to avoid intra-specific competition with adult males. However, Mattson qualified this observation by adding that the beneficial effects vary as to whether hunting is allowed, and how closely the human population is regulated. Further, food conditioned grizzly bears were much more likely to be killed by humans. Both Yonge (2001) and Mattson (1993) indicated that increases in human use levels can be deleterious if some human activities are unregulated, such as use of firearms, presence of attractants, nature and duration of human uses. Conversely, a level of coexistence between humans and grizzly bears can be achieved if such activities are controlled.

Near Cooke City, Montana, the New World Mine reclamation project had minimal effects on grizzly bears, in part because reclamation activities were temporally and spatially predictable and people associated with the work were carefully regulated against carrying firearms or having attractants available to grizzly bears (Tyers, unpublished 2006). In the SwanValley of Montana, raw location data from a small number of collared grizzly bears show nocturnal use of highly roaded, forested habitat (Chris Servheen, USFWS, pers. comm. 2005 *in*: USFWS 2006). The Swan Valley data have not been statistically analyzed and the study was not designed to determine the impact of roads on bears, sample size is very small, and perhaps most importantly, mortality rates for these grizzly bears are not yet known. However, these data indicate that some grizzly bears can apparently habituate or adapt to relatively high levels of human activity.

Anecdotal information regarding disturbance to bears around den sites has been reported but is inconclusive. Reynolds et al. (1984) reported elevated heart rates in one bear when a seismic shot detonated 1.4 km from its den and another responded to a shot 1.6 km from its den. Schoen et al. (1987) noted some grizzly bear movement within dens when fixed-wing aircraft flew within 150 meters above grizzly bear den sites. Reynolds et al.(1984) however, noted that heart rates of two monitored bears did not change during over flights. Harding and Nagy (1980) found that grizzly bears denned successfully 1.6 to 6.4 km from active mining camps but appeared to avoid drilling and staging camps by at least 1 km. In Sweden, Swenson et al. (1997) considered hunting early in the denning season a disturbance to brown bears. Swenson et al. (1997) suggested that denning bears may be more tolerant of industrial activity than humans or human activity such as hunting, survey work, shooting, fishing and dogs near the den site.

2. Human-caused grizzly bear mortality risk

Some human-grizzly bear interactions can result in negative outcomes that can lead to death or removal of the bear from the population:

1. Habituation, when a bear loses its natural caution around humans, often resulting from food conditioning, leaving the bear vulnerable to illegal shooting or management control actions in which a bear is killed or moved to avoid threats to humans or their property;
2. Encounters between grizzly bears and people during which people kill bears due to real or perceived threat to life or property damage; and
3. Increased exposure of grizzly bears to black bear or other big game hunters who may mistakenly kill a grizzly bear due to mistaken identification.

Many encounters between people and grizzly bear can be avoided, as can the serious outcomes when encounters do occur.

Food and attractant issues

At times, food sources are impacted to such an extent that grizzly bears have a difficult time finding available food. For example, fires, drought, and late season freezing temperatures can all affect available food, including berry crops, and cover over the short-term, particularly to individual grizzly bears with a significant portion of their home range affected. Typically, fires result in a mosaic of severely burned, moderately burned, and unburned areas on the landscape thereby maintaining some level of shelter, hiding cover, and unburned food resources for grizzly bears and other species. However, in the short-term, such crop failures often result in increased human-grizzly bear conflicts. This occurred in the NCDE during 1998 and again in 2004, significant huckleberry crop failures at mid to high elevations precipitated the increase in conflicts with grizzly bears (Manley 2005). The number of conflicts and grizzly bear management removals from private and public lands rose dramatically above average. About 80 percent were on private property in or adjacent to grizzly bear habitat with 20 percent from public lands. Consistently, mortalities from human-related causes occurred on private lands in the NCDE greater than any other land ownership (Mace and Waller 1998, U.S. Fish and Wildlife Service 2010a). A similar pattern has been observed in the CYE (Kasworm 2010, 2010b). Bears seeking food during these low huckleberry production years may become attracted or habituated to human-related food sources (e.g. garbage or pet foods), and come into conflict with people.

Human-caused grizzly bear mortality most typically involves habituation of grizzly bears to people and their food, garbage and other attractants, or either intentional or unintentional mortality as people gain more access to grizzly bear habitat. Attractants include nearly all human and domestic animal and livestock foods, fruiting trees and shrubs near homes, and garbage. Management removal of habituated grizzly bears is a leading cause of known human caused grizzly bear mortality in both the YGBE and the NCDE (from Montana Fish, Wildlife and Parks 2005, Gunther et al. 2005, Schwartz and Haroldson 2002, Servheen in litt. 2005a).

Conflict situations caused by non-secured human attractants continue to be the major cause of bear-human conflict (Gunther et al. 2005, Schwartz and Haroldson 2001, Montana Fish, Wildlife and Parks 2001, Montana Fish, Wildlife and Parks 2005). In the past decade, the number of grizzly bear-human conflicts has increased in the YGBE (Schwartz and Haroldson 2001) and NCDE (Servheen in litt. 2005a). In the CYE, very few conflicts have been reported thus far. However, the potential for conflict is high, considering the number of unsecured attractants in grizzly bear habitat. In the CYE during the past decade, 2002 through 2012, a total of 31 known human-caused mortalities were attributed to the following causes: five to poaching; six mistaken ID; one unknown; four management removals; nine under investigation; one to research; three defense of life; two were killed by trains, and one legal kill in Canada. Further, in the past five years (2008-2012), three separate incidences involved moving and relocating young male grizzly bears in the CYE because they killed livestock (pigs or chickens) or were frequenting areas near residences or garbage, and were at high risk of becoming habituated (Wayne Kasworm pers. comm. 2013).

Continued exposure to non-secured attractants or human presence and activity without negative consequences can result in habituation. Grizzly bears are highly individualistic. Some bears can become conditioned to human presence and disturbance with little to no significant adverse effect. However others are eventually lured to human foods and attractants and become a threat to human safety. Habituation increases the potential for conflicts between people and bears. Human attractants such as food, garbage, livestock feed, and pet food pose powerful incentives for grizzly bears to use areas near people and residences. Habituated bears that obtain human food rewards often become involved in incidents where they threaten human life or property. Food conditioned bears generally experience high mortality rates; they are killed illegally or are eventually destroyed or removed from the population through management actions. Some bears, particularly sub-adults, more readily become habituated to humans and consequently suffer increased mortality risk. Habituated bears are more vulnerable to illegal killing because of their increased exposure to people. In the Yellowstone region, people killed habituated bears over three times more often than non-habituated bears (Mattson et al.1992).

An informed public and appropriate food and attractant storage are key factors in reducing habituation, and the resulting conflicts and grizzly bear mortality. Montana Fish, Wildlife and Parks' grizzly bear specialist program is recognized as being successful in fostering public awareness and support of grizzly bear conservation. The program is aimed at resolving conflicts between bears and people, but also reducing the potential for conflicts to arise though education and information regarding attractant storage. This program has evolved and grown over two decades, based in part on the experience of bear specialists afield. The programs now recognize and address two essential components of an effective program to reduce human-grizzly bear conflict: food and attractant storage, and the importance of social values and attitudes and public support for recovery efforts (see also *Social aspect*s section below). Since many of the efforts are preventative, precisely quantifying the total effects of such programs is difficult. However, ample evidence demonstrates that securing human food and garbage from grizzly bears can dramatically reduce the number of grizzly bears removed through management actions, as evidenced in Yellowstone (Gunther 1994) and Glacier National Parks. The results of bear specialist programs are summarized biannually at IGBC Subcommittee meetings and in annual reports, such as the annual "Yellowstone Grizzly Bear Investigations", and annual reports from the Montana Fish, Wildlife and Parks grizzly bear specialists in the NCDE (Madel 1996; Wenum 2002; Wenum 2004; Montana Fish, Wildlife and Parks 2005. In their annual reports, Montana's bear specialists report annually on progress that can be measured. For example, conflict reports detail the number of grizzly bear conflicts before and after construction of electric fencing around attractant sites (see Agency Summaries *in* Schwartz and Haroldson 2001). The grizzly bear management program on the NCDE Rocky Mountain Front began in 1988. Since that time, records indicate that the presence of grizzly bears in the region, including females with cubs, has remained stable to slightly increasing, but the level of known human-caused grizzly bear mortality has declined (Mike Madel, Montana Fish, Wildlife and Parks, pers. comm. 2002 *in:* USFWS 2006). Dan Carney, Blackfoot Tribe bear specialist in the NCDE, (pers. comm. 2013) stated "I firmly believe that the work of the Blackfeet Fish & Wildlife Department as well as state bear management specialists results in an overall reduction in bear mortalities." Kim Annis, MFWP bear specialist in the CYE, (2013) notes that since she began her work in the CYE, she has experienced an increase in the number of people seeking information and assistance to prevent conflicts with bears before they begin.

Human access into grizzly bear habitat

Roads in grizzly bear habitat also can create a serious risk of mortality to grizzly bears. Grizzly bear mortality can result directly from collisions with vehicles, but more commonly, indirectly through increased exposure to and interaction with humans. The specific relationship between roads and the mortality risk to bears is difficult to quantify however the level of human use of roads is one of several factors influencing the mortality risk associated with any road. Forest roads facilitate human access into grizzly bear habitat, which directly or indirectly increases the mortality risk to grizzly bears. Grizzly bears are increasingly vulnerable to illegal and legal harvest as a consequence of increased road access by humans in Montana (Mace et al. 1996) and in the Yellowstone region (Mattson et al. 1992). In southeastern British Columbia, roads increased access for settlers, legal hunters and poachers, the major source of adult grizzly mortality in that area (McLellan and Shackleton 1988; McLellan 1989a.) McLellan (1989b) reported that 7 of 13 successful legal hunters interviewed had been on a road when they harvested a grizzly bear.

McLellan (1989a) reported 11 human-caused grizzly bear mortalities during a 9-year period of research in southeastern British Columbia, whereas the study in the South Fork of the Flathead River, Montana, reported 13 mortalities during 6 years of research in the South Fork Study area, excluding legal mortalities. Although the British Columbia study area was roaded for gas exploration, timber harvest, and other uses, the area had very few permanent human residents and generally received lower use by humans than did the South Fork Study area, and had a very high density of grizzly bears for an interior population (McLellan 1989b). In 1994, grizzly bear population trajectories for the two study areas were computed (Servheen et al. in litt.1994). In the British Columbia study area, high survivorship rates of adult and sub-adult females resulted in an upward trend in the grizzly population. In the South Fork Study area, a peninsular area largely bordered by settlement, dispersed rural residences, highways and a reservoir, relatively low adult and sub-adult female survivorship rates resulted in an annual decline in the grizzly bear population. Adult female grizzly bear mortality was the most important factor in determining trend. Most of the known grizzly bear mortalities were attributable to humans and occurred on private lands near or adjacent to national forest lands.

This comparison illustrates that the proximity of grizzly bear populations to human population centers and resulting availability of attractants on private lands, high numbers of people using forest roads, dispersed recreation or other activity in roaded habitat, and other factors leading to increased interaction between bears and humans pose considerable risks to grizzly bears.

In the North Fork of the Flathead River Valley in British Columbia, McLellan and Mace (1985) found that a disproportionate number of mortalities occurred near roads. In the Yellowstone ecosystem, Mattson and Knight (1991) reported that areas influenced by secondary roads and major developments were most lethal to bears. Aune and Kasworm (1989) reported 63 percent of known, human-caused grizzly bear deaths on the east front of the Rocky Mountains occurred within 1 kilometer (0.6 miles) of roads, including 10 of 11 known female grizzly bear deaths. In Montana, Dood et al. (1986) reported that 48 percent of all known, non-hunting mortalities during the period of 1967 through 1986 occurred within 1 mile of roads. Kasworm et.al 2013 reports that 63 percent (12 of 19) of known human caused grizzly bear mortalities (1982-2012) occurring on National Forest lands in the CYE were less than 500 meters from an open road and 37 percent were greater than 500 meters from an open road (7 of 19).

Recent models indicate that the relative risk of grizzly bear mortality was positively associated with human access, roads and trails or the area's human population size (Nielsen et al. 2005; Mattson and Merrill 2004). Bears were also killed by vehicle collision (Greer 1985, Knight et al.1981, Palmisciano 1986, Servheen in litt. 2005a). The Grizzly Bear Compendium (IGBC 1987) and Mattson (1993) summarized impacts reported in current literature including direct mortality from legal and illegal harvest and other factors resulting from increased human-bear encounters.

We conclude that excessive road densities in grizzly bear habitat are responsible for serious adverse impacts to grizzly bears, especially when located near towns or cities. Where people are abundant and Forest access is provided nearby, roads receive more routine use and higher use levels. Negative impacts associated with roads and excessive road densities influence grizzly bear population dynamics and habitat use patterns in numerous ways. As evidenced in the NCDE, the YGBE and the CYE, appropriate access management on federal lands can sustain and conserve effective grizzly bear habitat in the face of an increasing human population in western Montana.

Social aspects related to effects on grizzly bear mortality

Social values and attitudes also contribute to the level of mortality risk to grizzly bears. This topic is complex and will remain a continuing challenge to grizzly bear conservation efforts, prior to and after recovery. Incidental or accidental human-caused grizzly bear mortality, combined with a few people intent on illegally shooting bears, can collectively result in serious, detrimental effects to grizzly bear populations. The Service has long recognized this important factor and the 1993 grizzly bear recovery plan discussed the role of human social factors in grizzly bear recovery (see the Plan's section "*Human Social Factors in Grizzly Bear Recovery"*). In particular the Service notes that the future of the grizzly bear *will depend* on integrating the socioeconomic and utilitarian values of the general (local) population into the establishment and management of preservation programs. This implies that local communities must be owners of the concept of grizzly bear conservation. Value systems that are imposed on local communities will not foster support for the conservation of the grizzly. Local values and traditions must be integrated into grizzly bear preservation to enhance local support. According to Brechin et al. (2002) a conservation program ties up natural areas that are highly sought after by resource dependent communities. This highly political nature results in a corresponding high incidence of conflict and resistance (ibid). The process by which nature protection is carried out must be ecologically sound, socially and politically feasible and morally just. If not, conservation efforts will most likely generate increasing levels of resistance and conflict, thus derailing attempts at protection. Brechin et al. (2002) suggests that conservation effort needs to be community based, which means people oriented. Dood et al. (2006) supports this by saying "It is through awareness of the risk, and by responding accordingly, that support for grizzlies in Montana can increase while minimizing the risk. If officials fail to respond adequately to concerns for human safety, <u>local</u> support for maintaining this species will erode." The NCDE draft conservation strategy (IGBC 2013) further backs this concept with "Local support for grizzlies on the landscape decreases if conflicts are not handled in an effective and timely manner." The conservation strategy for the GYA (ICST 2007) also recognizes the importance of management efforts to minimize grizzly bear-human conflicts. In the greater Yellowstone area, nuisance bear management is essential to successful grizzly bear conservation." A major responsibility of the grizzly bear specialist in each recovery zone is working closely with the local residents and implementing a strong public outreach program to gain public support for grizzly bear recovery and reduce human-caused bear mortalities.

Summary

When combined, public information programs, on-the-ground efforts to foster local public support for grizzly bear recovery such as those of bear specialists and access management that provides adequate amounts of habitat secure from the influence of roads and high use trails, can be instrumental in reducing mortality risks to grizzly bears Social tolerance [for grizzly bear recovery] can increase effective habitat in areas where bears and humans must coexist, whether it be in backcountry wilderness or in areas of human settlement on the edges of wild lands (USFWS 1993).

3. Habitat fragmentation

Habitat connectivity is essential in maintaining the ecological functions of grizzly habitat. Connectivity is generally thought as vegetation or cover that allows normal use of home range. Connectivity for grizzly bears entails cover and space providing security from human-caused mortality risks or from other grizzly bears, optimal opportunities for sub-adult grizzly bears to establish home ranges and the resulting distribution of bears across the landscape, and allows males unimpaired access to breeding partners, which promotes optimal conditions for successful reproduction. Habitat fragmentation generally refers to total or partial impediments to wildlife movement between blocks of preferred habitat. Fragmentation of grizzly bear habitat can significantly reduce or preclude successful dispersal; movements associated with breeding behavior or occasional migration, as well as increase the risks to bears moving through insecure habitat patches.

Within home ranges and during dispersal and home range selection movements, grizzly bears that are deterred from traveling to preferred feeding areas may experience reduced weight gain and increased risk of impaired fitness or reduced reproductive success. High road densities, human development and activity with grizzly bear habitat can impact connectivity and bear movement.

Fragmentation or degraded connectivity can alter preferred travel patterns and results in bears using less optimal habitat, or using more resources and traveling farther to find suitable habitat. Sub-adult males were disproportionately killed by humans in many study areas, partly attributable to wider-ranging movements (Mattson 1993). If young bears are deterred from dispersing through secure habitat, they are more likely to range closer to people. In doing so they suffer increased risks of food habituation, mortality from hunters through mistaken identity, death due to real or perceived defense of life or property, collisions with vehicles, or control actions. Displacement into habitat already occupied by grizzly bears or unfamiliar habitat that fails to offer good bear security increases the chance of encounters with adult bears, which can lead to direct intra-specific mortality or indirect effects such as reduced fitness or survival due to stress or injuries.

B. Specific Effects of the Proposed Action on Grizzly Bear

1. Grizzly Bear Displacement

The proposed Montanore project would result in direct loss of 1,556 acres (see USFS 2013 BA Table 22) of grizzly bear habitat from the CYE recovery zone (on federal lands) as a result of development of mine facilities and roads (Table A10). Habitat loss is mitigated by securing 3,112 acres of grizzly bear habitat that is at risk from potential human activities.

Grizzly bears may already be displaced from the influence zone around existing roads and point source disturbances (see Appendix D). This influence zone is about 6,276 acres. Increased use on existing roads and increased activity levels at mine project sites, adds an additional 1,560 acres to the size of the influence zone for a total of 7,836 acres. Effects of mine activities would result in long-term under-use of these acres within the CYE and Cabinet Face BORZ. The mitigation for long-term grizzly bear displacement impacts is to secure (purchase or conservation easement) 3,073 acres of grizzly bear habitat.

As we discussed above in the *General Potential Effects of Mining: Displacement* section, displacement can, but does not always mean that grizzly bears totally avoid an area. Displacement of grizzly bears from an area can range from short-term or diurnal avoidance to more significant long-term under-use of habitat, depending upon season, quality of habitat affected, and the age and sex of grizzly bears affected.

The Service expects that displacement from areas by grizzly bears would occur within the Libby Creek drainage due to heavy road use and the continual noise and activity generated by the construction and operation of the mine. Displacement effects would be most pronounced near the roads and facilities at lower elevations in the drainage, which encompass areas of spring habitat. Habitat near the mine site, facilities and roads may be under-used by grizzly bears for the life of the mine. As detailed in Appendix D, grizzly bears are already displaced from 6,276 acres (3,688 acres in Recovery Zone and 2,588 acress in the BORZ) of this area by existing human activity in northwest portion of the Libby Creek drainage, including parts of its twelve sub-drainages in the action area, and along Forest roads, including the Bear Creek road, in the displacement areas.

Replacement acre mitigation, including timing, for physical habitat loss and displacement effects are shown in table A10. Appendix D describes in detail how the numbers of mitigation acres were derived, in relation to displacement of grizzly.

Table A10. Approximate acres of surface feature disturbances, influence zones, Cumulative Effects Model compensation levels and required replacement habitat associated with the proposed Montanore Mine (data from BA 2013).

<table>
<tr><th>Impact Areas</th><th>Acres disturbed by site development or influence zone***</th><th>Compensation factor (level)</th><th>Total Replacement Habitat Required (rounded acres)</th><th>Replacement Timing</th></tr>
<tr><td>Physical Habitat Loss in RZ
Includes:
*
Upper Libby vent Adit (1ac.)
Plant Site (76ac.)
Tailings Impoundment
(1,272ac.)
Roads (197ac.)
Rock Lake Vent Adit (1ac.)
*Transmission line roads (9ac.)</td><td>1,556</td><td>x 1 (100%) x 2</td><td>3,112 acres

(2 acres)
(152 acres)

(2,544 acres)
(394 acres)
(2 acres)
(18 acres)</td><td>

Pre-construction
“
“

“
“</td></tr>
<tr><td>Influence Zones in RZ
Includes:
Physically disturbed IZ
New roads IZ
Existing roads IZ
Ventilation Adit IZ
*Plant site IZ</td><td>7,836</td><td>Variable **
x .2 (20%)
x .4 (40%)
x 1.0 (100%)</td><td>3,073 acres</td><td>

500 ac. Pre-eval
2,573 ac.
Pre-const</td></tr>
<tr><td>Transmission Line clearing</td><td>331 Acres **</td><td>n/a*</td><td>0 acres *</td><td>Timing constraint</td></tr>
<tr><td>Transmission Line Influence zone (all lands)</td><td>17,043 Acres *</td><td>n/a*</td><td>0 acres *</td><td>Timing constraint</td></tr>
<tr><td>Total New and Existing Features</td><td></td><td></td><td>6,185 acres</td><td></td></tr>
</table>

*** Displacement** effects of transmission line are mitigated by implementing a timing restriction. All construction and reclamation activities associated with the transmission line would take place outside the grizzly bear spring and den seasons.
**Transmission line clearing creates potential spring forage areas that would all be within 600 feet or less from cover and thus are not considered lost habitat. Of the 17,043 acres disturbed, 10,810 acres have existing disturbances.
*** Influence zones had various compensation levels depending on existing disturbance level. Compensation levels ranged from 0.2 to 1.0.

The project use of the Bear Creek road (#278) extends 18.3 miles between the mine site and highway 2. About 14.2 miles cross through or are adjacent to two BMUs and in Management Situation MS 1 habitat. Traffic levels are expected to increase by 255 percent from current use. Long-term displacement from, or under-use of MS 1 habitat within portions of the affected drainages by some grizzly bears could occur as an indirect effect from increased high-intensity motorized traffic. Females may teach avoidance of disturbed area to cubs, extending the displacement for an unknown period of time after the mine is reclaimed. In addition, road 278 which lies in a north to south alignment cuts across most of the Libby Creek sub-drainages that flow west to east. The increased traffic levels contribute to fracturing habitat connectivity between summer, fall, and den habitats west of the road from spring habitats to the east. Use on road 278 may also affect grizzly bear movements toward the east where linkage areas across highway 2 connect to the NCDE.

The main Bear Creek Forest Road #278 is currently not maintained for winter travel beyond the three mile mark (from US Highway 2) near the private residences. During the construction and operation phases of the mine, road 278 would be easily drivable during the first two weeks of the spring bear hunting season (April 15 to May 1) and during the last two weeks (November 15 to November 30) of the general big game fall hunting season. Currently, the road is closed to conventional vehicles due to snow pack in April, and becomes a challenge to drive toward the end of the fall big game rifle season in November. Increased road access during these time periods would allow increased hunter access, which would then increase the potential for human/bear encounters that could result in bear mortality.

The grizzly bear habitat Cumulative Effect Model (CEM) adjusts the level of displacement effects from habitat near existing and new roads according to the level or intensity of the disturbance (see Appendix D). The construction and operation of the mine would result in increased traffic levels on the existing access and service roads, as well as main highways in and around the CYE. The primary impact of increased traffic would be an increase in existing levels of long-term displacement of bears from 6,276 acres of habitat near the main roads (see Table A10). Although bussing of mine employees would be required and would lessen mine-related traffic on Forest roads, traffic levels are still anticipated to increase 255 percent over pre-Montanore Mine levels during the lengthy construction phase (USFS 2011e). Traffic would remain 255 percent above existing traffic levels during the 25-year operation phase of the Montanore Mine. Traffic along Montana Highway 2 also would increase by about four percent. Existing roads and activities associated with the Montanore mine would serve to inhibit bear activity within this area. Further, displacement of bears is likely on an additional 1,560 acres (approximately) due to new mine-related roads, increased road use levels, and structures and the influence zones around them.

Noise levels would be a factor contributing to the displacement of grizzly bears. Construction, operation and reclamation of the Montanore Mine would raise background noise levels substantially during the life of the operation. Blasting during adit construction would generate sounds up to 125 dBA within 900 feet of the blast and 60-80 dBA within the Libby Creek drainage and the Cabinet Mountains Wilderness. Blasting could be heard up to a mile or more away from the construction site (USFS 2011e). Construction equipment would generate sounds up to 100 dBA within 50 feet. Mine operations noise levels of 52 to 62 dBA would exceed baseline conditions. The conveyor, crushing plant and ball mill are the loudest continual disturbances, and would be heard up to a mile or more away (MDEQ and USDA 1998). Traffic noise on Libby Creek road would increase from 30 to 70 dBA.

As recognized in the mitigation plan, we do not anticipate that the construction and operation of the evaluation adit would result in similar levels of displacement. Disturbance effects of the evaluation adit would not approach levels associated with the construction and operation of the mine, considering the habitat condition (moderate motorized route densities and abundant core), number of employees, level of road use along an existing open road, and disturbances generated by construction and operation of the adit (see project description). Given the existing road management in the action area, effects would be moderate. The number of employees working on the evaluation adit would be 30 to 35, as compared to over 300 during construction and up to 450 during the operation phase. Crews would assemble at an area designated by MMC and from there would be bused to the adit site. Bussing of employees would minimize traffic on forest road 278, which is already an existing, open road. Eighty percent of the employees would be sourced from the local area and 20 percent would come from outside the area

(Lynn Hagarty, Forest minerals specialist, pers. comm. 2013). They would likely live in the Libby or Troy area.

Noise generated by construction and blasting for an adit would occur sporadically for about two weeks. Blasting would then mostly occur underground. The noise generated would be short and sporadic and likely not audible to degrees that would significantly impact grizzly bear behavior. Based on experience at the Troy Mine, blasting noise would be eliminated at the surface after the adit has advanced approximately 500 feet underground. Electrical power at the adit would be sourced via an above ground power line thereby greatly reducing noise by eliminating the need for generators.

Finally, transmission line construction would affect about 17,043 acres, the majority being spring habitat. About 8,997 of these acres are in the CYE recovery zone, 1,404 are in the Cabinet Face BORZ to the southeast, and the remainder (6,644 acres) occurring mostly on private lands east of the BORZ (USFS 2013 – BA Figure 4). Of the 17,043 acres affected, approximately 10,810 are currently affected by human use on existing open roads. Thus of the total, 6,234 acres would be affected by new short-term disturbance due to aircraft use. Grizzly bears in that area could be disturbed by aircraft. Construction of the transmission line is limited to only two active bear seasons. Further, construction activity is limited to the period outside the grizzly bear spring (April 1 - June 15) and den (December 1 – March 31) seasons, making the likelihood of actual displacement or grizzly bears very low. Displacement effects are so highly unlikely to occur that they are discountable or if the effect would occur it would not be measurable or detectable and so would be insignificant due to: 1) the transmission line is primarily in spring habitat; 2) grizzly bears are highly unlikely to use the area outside the spring period; 3) no activities are allowed during the spring period; and, 4) other undisturbed areas of quality spring habitat would be available should a bear be disturbed. Thus, no habitat replacement acres are needed as potential effects are mitigated through timing of activities.

Mitigation plan measures to reduce or avoid displacement

The Service has concluded the conservation measures in the mitigation plan (see Appendix C) would adequately offset impacts to grizzly bears from both direct habitat loss and displacement from habitat due to disturbances generated by the mine. Several factors, including those outlined in the following paragraphs, lessen displacement and/or moderate the impact of displacement on grizzly bears in the action area.

1. **We anticipate that displacement of grizzly bears would occur within the Libby Creek drainage, but these bears would likely have sufficient alternative habitat available elsewhere within their home ranges:**

- **Substantial core areas and moderate road densities would provide secure alternative habitat for grizzly bears displaced from near the mine facilities (adits, mill, tailings, access roads, transmission line)**. The proposed action would not result in less core habitat in any BMUs within the action area (USFS 2013). The BMUs 2(102 square miles), 5 (109 square miles) and 6 (100 square miles) encompass approximately 65,241, 70,000, and 64,000 acres respectively. These BMUs provide substantial existing core areas of approximately 49,720, 42,000, and 34,560 acres respectively. The existing and resulting (net increase of 6,764 acres) (Figure A7) levels of secure core, and the seasonal habitats within them, would provide essential and available habitat for grizzly bears in BMUs 2, 5, and

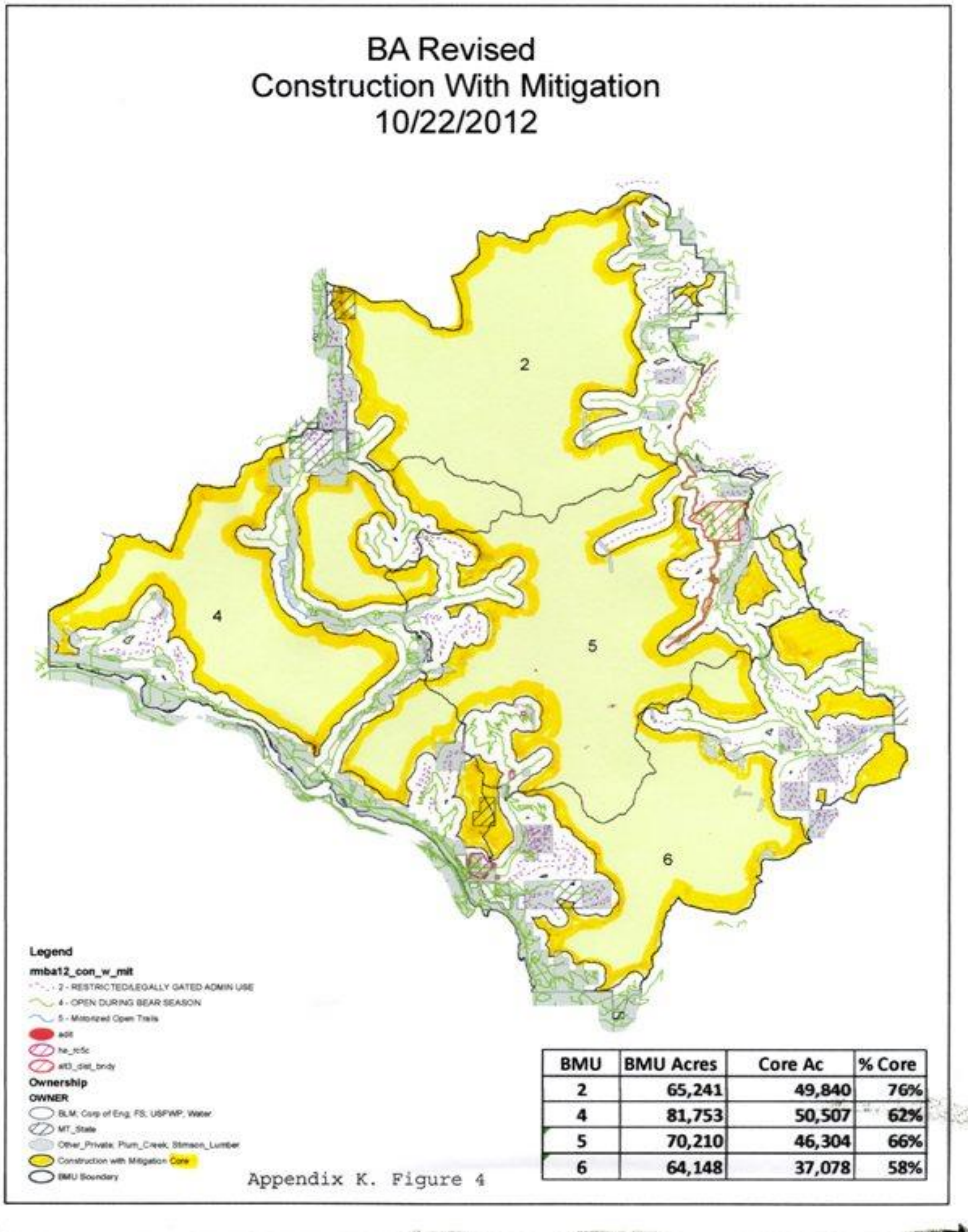
6. Large core areas are also provided in the surrounding BMUs (4, 7, 8, and 22) (see Table A12 and Appendix E). Core areas are well connected through the action area (USFS 2013 Appendix G) and surrounding BMUs and encompass portions of the Cabinet Mountains Wilderness.

The Service considers core areas extremely important in partially mitigating the displacement impacts of the proposed action. Core areas in each of the three BMUs 2, 5, and 6 (77, 58, 53 percent) are comparable to or larger than the core area within the average female home range reported in research (55 percent) (Wakkinen and Kasworm 1997). Similarly the three adjacent BMUs (1, 4, and 7) provide more core area than the average amount reported in research. Core areas in those adjacent BMUs are: 1 (83 percent), 4 (62 percent), and 7 (65 percent).

Outside core areas, the proposed action would decrease (improve) both open and total motorized route densities (USFS 2013 BA Tables 24 and 25). About 1.6 miles of new road would be required and 13 miles of existing road would be reconstructed, but these roads would not substantially expand the existing spatial distribution of roads in the BMUs (e.g. the existing percent of area impacted by human activity) and so would not increase total or open road densities and would not decrease core area. Open motorized route densities (OMRD) within BMUs 2, 5 and 6 are near or lower (better) than levels reported in average female home range (Wakkinen and Kasworm 1997). Of the remaining BMUs in the action area (4, 7, 8 and 22) two have lower OMRDs than that reported used by grizzly bears in the CYE.. Open motorized route densities in BMU 4 (38 percent) are higher than the average reported being used by grizzlies in the CYE (33 percent), in part due to the presence of Highway 200 along the unit's southern boundary and highway 56 which bisects the unit. Total motorized route densities (TMRD) in the action area are likewise near or lower than the average reported being used by grizzlies in the CYE (26 percent) (ibid). BMUs 4(29 percent), 6 (34 percent) and 22 (37 percent) have higher TMRDs than that reported as used by grizzly bear in the CYE. BMUs 4 and 6 TMRDs are higher than the CYE research average (26 percent). The density in BMU 4 is due in part to Highway 200 running along its southern boundary and Highway 56 bisects the BMU. The density in BMU 6 is due in part to Highway 200 which runs along its southwestern boundary and to private roads that access six sections of private corporate timber lands.

- **A total of 6,185 acres of mitigation properties would be acquired (purchased or permanent easement); a portion (500) prior to the start of the evaluation phase, and the remainder (5,685 acres) prior to the start of the construction phase of the mine (see Table A10).** The acres required are related to habitat loss and the intensity and duration of the disturbance associated with each phase of the mine. The required acres would offset the physical loss of habitat and displacement of grizzly bears prior to the onset of the particular phase of the mine. As properties are acquired, access management within BMUs 2, 5, and 6 would improve (as required by the mitigation plan). Disturbance impacts within spring habitat within the Libby Creek drainage and in other portions of BMUs 2, 5, and 6 would be alleviated by varying degrees, depending upon existing access, development on the properties acquired and proximity to spring habitat. Spring habitat may be conserved if acquired parcels contained spring habitat, or had existing access via roads though spring habitat, or could require roads through spring habitat for access in the future and motorized access on those parcels was reduced.

Figure A7: Resulting core habitat blocks



* Source: USFS 2013 Montanore Biological Assessment

- **The best available information suggests grizzly bear density in the Cabinet Mountains is currently relatively low.** Grizzly bear home ranges are large and overlap. With low numbers of grizzly bears in the Cabinet Mountains at this time (about 21), it is unlikely that density induced stresses currently affect adult female grizzly bears within their home ranges there and that there are adequate amounts of space and habitat. We estimate that of the 21 grizzly bears, currently 4 adult females occupy the Cabinet Mountains (Wayne Kasworm, pers. comm. 2013). Based on habitat and area in each BMU, the Cabinet Mountains could likely support at least 14 female grizzly bears (USFWS 2006). Credible sightings of individual bears have occurred in 13 of 14 BMUs in the Cabinet Mountains since 1990 and sightings of females with young occurred in 8 of 14 BMUs since 2002. During the period from 2007 to 2012, at least one female grizzly bear with young was reported in each of BMUS 2, 4, 5, 6, and 7 (Kasworm et al 2013). The proximity of the BMUs, the number of young present, and whether these young were cubs or yearlings/two-year olds in the data suggests that currently at least three reproductive-age females were present in BMUs 2 thru 6. No females with young were reported in BMUs 8 or 22 to the south of the action area during that same period.

- **The area affected by disturbance generated by the mine and roads is relatively small compared to the size of an average grizzly bear home range, and represents about five percent of the size of the home range of a female grizzly bear native to the Cabinet Mountains, so alternative habitat would be available to bears if displaced from areas near the mine sites.** Grizzly bear home ranges are variable and range from approximately 17,000 acres (68 square kilometers) to 640,000 acres (2,600 square km) in the CYE (Kasworm et al. 2002). Male grizzly bears typically have larger home ranges than females. However, female grizzly bear home ranges are also large; native adult female life ranges in the CYE averaged approximately 165,000 acres (668 square km; 258 square miles) (Kasworm et al 2002). One of these native females lived in the Cabinet Mountains and had a life range of 143,000 acres (579 sq km; 224 sq miles). The 7,836 acres area from which grizzly bears would be displaced over the long-term is relatively small compared to the size of an average grizzly bear home range. Further, of the 7,836 acres, 6,276 acres are already impacted by disturbance from existing roads. Finally, the affected BMUs all moderate the effects by maintaining limited road densities and abundant core.

- **Spring habitat remains available in the action area**. The area from which grizzly bears would be displaced is primarily spring habitat. A net loss of freely available spring habitat for grizzly bears would result during the construction and operation phases of the Montanore Mine. The proposed project is likely to displace grizzly bears from the active mine, mill and tailings sites, the access roads and utility corridors, highly used trails and other recreational areas, and possibly the surface conveyor line area. Most of the 7,836 acres impacted by the long-term disturbances of construction and operation of the mine occurs in low-elevation spring habitat, which is thought to be less abundant than other seasonal habitats in this ecosystem. Up to 952 acres of spring habitat would be less available to grizzly bears and so likely under used by bears. Much of this 952 acres of spring habitat is already influenced by existing disturbance within the 6,276 acres zone along existing roads in the area, but displacement effects would likely increase due to the substantial increase in levels of human activity and traffic volumes on roads due to the mine and at mine sites.

Core areas in the action area are generally large. In many ecosystems, core area occurs at higher elevations and lacks quality spring habitat. Higher elevation habitat in the Cabinet Mountains tends to provide abundant summer habitat. However, the best information indicates that core areas in the affected BMUs do contain spring habitat, defined by aspect and elevation. Potential future improvements or additions to core area are possible due to acquisition or easement of mitigation land parcels. Some of those parcels would provide spring habitat. As required in the mitigation plan, once the Forest acquired or obtained easements on parcels, elimination or reduction of access routes or elimination of the potential for future routes leading to or crossing through the parcels would create or preserve core habitat and on some parcels spring habitat for grizzly bear.

2. **The mitigation plan measures include 4,912 acres of replacement habitat to reduce or mitigate for grizzly bear displacement from and physical loss of habitat, and an additional 1,273 acres to offset potential fragmentation from displacement in the north-south movement corridor for a total of 6,185 acres (see Table A10).**

The CEM, as detailed in Appendix D, represents the best available method to assess the impacts of displacement. This model was used to calculate the appropriate amount of replacement habitat to offset the impacts of the mine. As such, the mitigation plan stipulates that up to 4,912 acres of private lands in the Cabinet mountains portion of the CYE or the linkage area to the east across highway 2 toward the NCDE be acquired by MMC through fee title transfer or perpetual conservation easements to compensate for both direct habitat loss and an additional loss of habitat use by grizzly bears due to disturbance. An additional 1,273 acres (500 acres pre-evaluation and 773 acres pre-construction) is required to contribute to offsetting potential fragmentation of grizzly bear habitat from displacement effects in a north-south movement corridor along the Cabinet Mountains divide, west of the mine. Conservation easements would be held by the Forest. The mitigation plan requires perpetual conservation easements to ensure long-term conservation of the habitat parcels for grizzly bear whose home ranges include these areas. The appropriate acquisitions or easements would be in place prior to the phase of the mine that would cause the disturbance, thus assuring an offset prior to displacement.

3. **Some grizzly bears may adapt to the consistent, repetitive noise provided that natural food availability and quantity are not reduced and they suffer no adverse consequences associated with the mine activity.**

In the South Fork of the Flathead River in Montana, which encompassed multiple use national forest lands, adult female bears were likely to avoid highly roaded habitat and roads with high levels of use (Mace et al. 1996, Mace et.al. 1999). Additional research confirms that female home ranges are likely to have lower road densities and large areas of secure habitat (Wakkinen and Kasworm 1997). Other research indicates that resident grizzly bears are more likely to habituate to human activity if the use is spatially and temporarily predictable, and the bear population is not hunted (Cronin et al. 1999, Mattson 1993, McLellan and Shackleton 1989a). Such conditions can exist along major roads and highways. Waller and Servheen (1999) reported five of nine grizzly bears radio-collared in the U.S. Highway 2 corridor in Montana, south of Glacier National Park, maintained home ranges that were centered over the highway corridor, and remained in the highway corridor during their active season. However, they found that grizzly bears strongly avoided areas within 500 meters of the highway itself (Waller and Servheen 2005). In Yellowstone National Park, Mattson et al. (1987) found displacement effects surrounding developments and reported that habituated adult females that used areas near developments suffered higher mortality rates than more wary bears. They suggested that sanitation of developments (securing attractants from bears) would allow adult females to occupy habitat near development and yet not incur the increased mortality risks typically associated with habituation. These results are consistent with those reported in Yonge (2001) and Tyers (unpublished 2006) in the Cooke City basin, in Montana, outside of Yellowstone National Park. There, grizzly bears near Cooke City consistently foraged in very close proximity to high levels of human use if cover was sufficient and energetically efficient feeding opportunities were present (Yonge 2001). Also near Cook City, the New World Mine reclamation project had minimal effects on grizzly bears, in part because reclamation activities were temporally and spatially predictable and people associated with the work were carefully regulated against carrying firearms or having attractants available to grizzly bears (Tyers, unpublished 2006).

Grizzly bears would initially be displaced from about 7,836 acres in the drainage due to high levels of human activity. Grizzly bears are already displaced from about 6,276 acres of this area, due to existing activities as described earlier. However, the activities associated with Montanore Mine would become predictable, routine and concentrated along forest road 278 (Bear Creek road), especially as the operation phase is implemented. Habituation of grizzly bears to these activities would allow bears more use of surrounding habitat, but would be detrimental if human food or attractants were available. Food-conditioned bears typically become threats to people and so are often euthanized through management actions. Attractant storage measures would be implemented at the mine site, and routinely inspected by the State grizzly bear specialist, funded by Montanore. Employees would be informed of the importance of attractant-storage issues through programs developed by the State grizzly bear specialist. Mine employees would be prohibited from carrying firearms when on duty. Public use of roads would occur, but illegal shooting would be discouraged by the presence of mine employees and associated traffic on the road. With full implementation of these measures, grizzly bears could potentially habituate to the activity and disturbance along forest road 278 and use habitat nearer the mine site without negative consequences from mine activities.

We anticipate that the displacement impacts related to mine-generated disturbance within the Libby Creek drainage on resident female grizzly bears would decline as time goes on, although not entirely. Over time, we expect the potential for adverse consequences to grizzly bears frequenting areas near the mine site would be lowered because of effective food and attractant storage , and information and education mitigation efforts (see lists under 1, 2, and 3 of section: *Mitigation plan measures to reduce risk of grizzly bear mortality*, found later in this document). However, use of this habitat by grizzly bears may result in habituation to human presence. This habituation in turn may make less wary bears more vulnerable to human-caused mortality if they attempt to use other developed areas within their home ranges or, especially in the case of sub-adults, other areas to which they may wander or be displaced, such as residential sites. The two State grizzly bear specialists (both required regardless of one or two mines operating) and the law enforcement officer (one if one mine or two if two mines operating) would improve the level of information on co-existing with grizzly bears that is provided to area residents. The bear specialists would work within the communities to reduce the risk of attractant-related conflicts. Reducing the potential for such conflicts in communities within and outside the immediate action area is intended to contribute to offsetting the risks associated with grizzly bears habituated to people and human activity at the mine.

The specific effects of such habituation on specific grizzly bears in the area is difficult to predict, as is whether bears that become accustomed to mining activity and use the habitat in the Libby Creek drainage would retain some wariness of people. Although grizzly bears are not hunted in the contiguous United States, people in the area use trails and areas of the drainage further from the mine and associated activity for dispersed recreation, while carrying firearms and use the area for hunting. The sporadic disturbance generated by dispersed recreation and hunting would likely serve to keep some grizzly bears wary of people; grizzly bears more often flee from encounters with people when on foot or where human access and use is not spatially or temporally predictable (Jope 1985, Gunther 1990, and Albert and Bowyer 1991 *in* Mattson 1993; McLellan and Shackleton 1989b). Such activities present a greater direct mortality risk (for instance, malicious or accidental shooting) for habituated bears that do not retain some wariness of people. The programs conducted by bear specialists would increase public awareness of the presence of grizzly bears and bear behavior.

Thus, we expect female grizzly bears, especially females with cubs, would underuse or avoid habitat near the mine sites and roads. Such displacement is probably already occurring to some extent, as Forest road 278 (Bear Creek road) is an open road, but displacement potential would increase with mine activity. As time goes on, however, these females or others are likely to regain the use of some areas in the Libby Creek drainage at higher elevations further from the roads and disturbance, especially to take advantage of quality summer or fall habitat. As grizzly bear numbers increase in the Cabinets, intra-specific population pressure may increase the likelihood of some bears, especially subadults, using preferred habitat in the Libby Creek drainage. Grizzly bears may habituate to the noise and activity of the mine without suffering the negative consequences of habituation by retaining wariness of less predictable or routine human activity, such as dispersed recreation.

We expect that displacement would be most significant during the construction phase, as adult female bears using the Libby Creek drainage would have to adjust to the newly increased human activity. As time goes by, we expect that the potential for significant adverse effects would decline as bears adjust by habituating to the disturbance or by using alternative habitats within their home ranges. Over the short- and long-term, the severity of the effects of displacement of grizzly bears in the project area would be alleviated by substantial amounts of core habitat and moderate motorized access levels in the action area (see discussion 4 below) and acquisition of replacement habitat (see discussion 3 below). Also, the following sections and discussions describe how the effects of displacement on the CYE grizzly bear population would also be moderated by continued augmentation, and improved connectivity within the Cabinet Mountains and between the Cabinets and the NCDE to the east.

4. **Displacement within the BMUs would be moderated by Forest Plan standards that address habitat condition and displacement.** The 2011 Forest Plan amendment provides sub-unit specific access standards, in accordance with IGBC recommendations (IGBC 1994 and 1998). Project compliance with the 2011 amendment requirements is discussed below.

Open and total motorized route density *The 2011 Forest Plan amendment limited open motorized route densities exceeding 1 mile per square mile to no more than 20 percent, 30 percent and 34 percent of BMUs 2, 5, and 6 respectively. The amendment limited total motorized route densities exceeding 2 miles per square mile to no more than 18 percent, 23 percent and 32 percent of BMUs 2, 5, and 6 respectively.*

Summary: The proposed action would not change motorized route densities in BMUs 4, 7, 8, or 22. Current route densities in the action area are moderate and provide conditions suited for use by grizzly bears. All but BMU 22 meet or are within three percent of meeting Forest Plan standards for open or total motorized route density. Further, in BMUs 2, 5, and 6, open and total route densities would remain the same or decrease (improve), and meet or provide better access management conditions than required by Forest Plan standards (Table A11). The exception is BMU 4, which is within two percent of open motorized route density standards, and would not change. The Forest Plan includes a time frame/schedule within which all BMUs will eventually reach standards. The proposed action would meet the access requirements of the amended Forest Plan. Open and total motorized route densities would not change, or would decrease (improve) with implementation of the proposed action (Table A11).

Discussion: The IGBC (1994, 1998) recommended managing both open and total motorized route densities and providing adequate core areas for grizzly bears, based on research conducted within specific ecosystems. The Service endorsed this strategy to limit the effects of road densities on grizzly bears. Because of scale and the effects of motorized administrative use of closed roads on grizzly bears, management of core area and open and total route densities outside of core at the BMU scale are the best indicator of habitat security for grizzly bears. Wakkinen and Kasworm (1997) provided research benchmarks for appropriate OMRD, TMRD and core area, based on the average motorized access conditions found in female home ranges in the CYE. The 2011 Forest Plan standards for each BMU were identified in consideration of these research benchmarks.

The proposed action would not increase open or total motorized route densities, or decrease core area, in any BMU (Tables A11 and A12). Open and/or total motorized route densities would decrease (i.e. improve) in BMUs 5, and 6.

OMRD currently meet the Forest Plan standard. Total motorized route densities in BMU 6 are elevated by roads on private corporate timber lands (6 sections) in the BMU and by Highway 200. The project would slightly decrease (i.e. improve) open and total motorized route densities in BMU 6 (see Table A11). If route densities on private lands remain similar to existing conditions, access conditions would meet or be better than Forest Plan standards for BMU 6, during and after the proposed action.

In BMU 5, open motorized route density is 27 percent and total motorized density is 23 percent. The project would improve both densities further. The Montanore Mine road closures identified in the BA and revised mitigation plan (USFS 2013 BA) would result in limiting high total motorized route densities to less than 23 percent and open road densities to less than 27 percent of BMU 5. If route densities on private lands remain similar to existing conditions, access conditions would meet or be better than Forest Plan standards for BMU 5, during and after the proposed action.

Table A11. Percent of BMUs with open motorized route density exceeding 1 mile per square mile (OMRD) and total motorized route density exceeding 2 miles per square mile (TMRD) (data from U.S. Forest Service 2013 BA)

	Percent of BMU **					
	BMU 2		BMU 5		BMU 6	
	OMRD ***	TMRD ***	OMRD ***	TMRD ***	OMRD ***	TMRD ***
Forest Plan Standard	20	18	30	23	34	32
Baseline	20	16	27	23	29	33
During Project	No change	No change	-1%	-4%****	-1%	-1%
Post Net Percent change due to Montanore Mine *	0 percent	0 percent	- 1 percent	- 5 percent	- 1 percent	- 1 percent
* Net change in road densities as a result of the Montanore Mine construction and operation, including full implementation of the proposed road closures in the BA, but **not** including mitigation lands. ** For comparison, research benchmarks are no more than 33 percent of an average female home range exceeded 1 mile per square mile OMRD and no more than 26 percent exceeded 2 miles per square mile TMRD (Wakkinen and Kasworm 1997).						

*** A negative value reflects an improvement in the habitat parameter.
****Numbers may not add up due to rounding

In BMU 2 there would be no change in percent OMRD or TMRD due to the proposed project.

Five of the seven BMUs within the larger action area have open motorized route densities (exceeding one mile per square mile) that are equal to or less than that required by the Forest Plan amendment (see Table A9). The proposed action would result in slight improvements (decreases) in open motorized route densities in BMUs 5 and 6. With implementation of the proposed action, four of seven BMUs would then have open motorized route densities similar to or slightly less than (better) the research benchmark as reported by Wakkinen and Kasworm (1997).

Three of the seven BMUs within the action area currently have total motorized route densities (exceeding two miles per square mile) meeting the level required by the Forest Plan amendment (see Table A8). The proposed action would result in slight improvements (decreases) in BMUs 5 and 6 (see Table A11). With implementation of the proposed action, four of seven BMUs would then have total motorized route densities similar to or slightly less than (better) that in the average female home range as reported in research (Wakkinen and Kasworm (1997) and that meet the Forest Plan Amendment standard.

The acquisition or easement of mitigation lands would also either further reduce existing motorized route densities or prevent future increases in motorized route densities by removing the need for access to privately-owned in-holdings.

Core area *The 2011 Forest Plan amendment required core areas of 75 percent, 60 percent, and 55 percent in BMUs 2, 5, and 6 respectively. The incidental take statement in the 2011 biological opinion on the Forest Plan amendment requires no permanent loss of core area.*

Summary. The proposed action would meet the requirements of the 2011 Forest Plan amendment and the 2011 incidental take statement in the biological opinion on the amendment (USFWS 2011). The proposed action would not result in a reduction of baseline core area (USFS 2011a) in any BMUs. The biological opinion on the 2011 Forest Plan amendment concluded the proposed access management was not likely to jeopardize grizzly bears. Across the action area, core area exists in substantial amounts for use by grizzly bears and the proposed action would not decrease core area.

Discussion. Core area currently comprises 76, 60 and 54 percent of BMUs 2, 5 and 6 respectively (USFS BA 2013and Table A12). The amount of baseline core habitat would not decrease in any BMU and could improve further as a result of the acquisition or easement of mitigation properties associated with the proposed Montanore Mine project. The Service considers core areas extremely important in partially offsetting the cumulative impacts of the proposed action. The existing and resulting levels of secure core, and the seasonal habitats within them, would provide essential habitat for grizzly bears in BMUs 2, 5, and 6. Further, the core area in adjacent BMU 7 is substantial at 63 percent. BMU 8 provides 55 percent core and BMU 22 provides 51 percent.

Table A12. Percent Core area in BMUs (data from USFS 2013)

	Percent BMU 2	Percent BMU 5	Percent BMU 6
Forest Plan Standard **	75	60	55
Baseline	76	60	54
Net Percent Change Due to Montanore Mine *	0 percent (76)	+5 percent (65)	+4 percent (58)
*Net change in core area as a result of the Montanore Mine construction and operation, including full implementation of the proposed motorized route closures in the BA, but **not** including mitigation lands. **For comparison, the research benchmark is 55 percent of an average female home range was core area (Wakkinen and Kasworm 1997).			

A total of 7,030 acres of new core habitat (net increase of 6,764 acres) would be created through changes in access management in the action area (see USFS 2013: Montanore BA Figure 7).

Mortality management through access controls on public lands is highly unlikely to eliminate all human-caused mortality. However, implementation of the road density standards recommended by Wakkinen and Kasworm (1997) and established as management direction in the Access Amendment (US Forest Service 2011c) through timber sale or other project planning is expected to limit human-caused mortality on public lands. These effects will require time to become more evident because of the low reproductive rate. Long term monitoring of the population is needed for verification of trends and adaptive management if required. Some level of human-caused mortality is likely to persist on public lands. This is demonstrated by the 2009 mortality of an adult female in a core area. The bear was killed approximately 0.6 miles from the nearest closed road and 1.2 miles from the nearest open road. Seven (37 percent) of the grizzly bear human-caused mortalities since 1982 occurred in what was or would have been “core habitat” under the current access management standards. Creation of core habitat does not eliminate the opportunity for human caused mortality. Therefore, to accomplish recovery of the population in the CYE, greater efforts to reduce the high levels of human-caused mortality on private lands are necessary.

The proposed action may result in heavier use of popular hiking trails in the action area, due to increased people living in the immediate area. A reduction in effective core area habitat would occur if human use of the Rock Creek or St. Paul Trails in BMU 5 reaches levels that would result in the displacement of grizzly bears. This trail is located in a narrow north-south movement corridor between BMUs 6, 7, 8 and 22 and the rest of the Cabinet Mountains to the north and northwest. In addition the Rock Creek Trail provides motorized access to private lands in the East Fork of Rock Creek.

The mitigation plan includes funding for the Forest to change the motorized access on the Rock Creek Trail to non-motorized. This action would create 1,065 acres of core habitat. The Rock Creek Mine Mitigation plan requires monitoring of recreational use on this trail (#935). As required under the Rock Creek Mine mitigation, “high use” levels during one year would result in limits on trail use imposed during the following year. This may result in short-term adverse impacts to grizzly bears in the area during the first year of high use. The Service agrees that trail management restrictions would be best implemented on a recreational season basis to foster public understanding and acceptance. The short-term impacts during the high use year that triggers restrictions would likely be tolerated by grizzly bears in the area provided remedies are immediately implemented prior to the following recreational season, and food and attractant storage is adequately monitored and enforced. The Montanore mitigation plan contains several other measures that further address potential impacts to grizzly bear (see Appendix C).

Core area in BMU 5 could potentially be impacted by a possible ventilation adit however no core habitat would be lost as there are no motorized access routes planned. The location would be on private land east of and higher than Rock Lake. It would be accessed from underground, and some rock might be expelled to the surface. The portal opening would be about 15 feet wide and 15 feet high and gated. There would be no fans or facilities on the surface. Fan noise levels would be less than 83 dBA measured at 50 feet down wind. If the ventilation fans were needed and turned on (most likely during the construction phase), there would be a constant, low-level hum audible in the vicinity that could reduce effective habitat around the adit portal by 0.25 miles (non-motorized point, 24 hour disturbance). This would equate to potential displacement effects on 150 acres. However this disturbance would be minimized by specially-designed low-noise fan blades or active noise suppression equipment that was estimated to reduce fan noise to about 16 dBA, which would not be audible over ambient noise levels (Big Sky Acoustics 2006) (Mitigation Plan B.2.a). With this mitigation, no habitat compensation or replacement is required for ventilation fans.

The ventilation audit may not be needed, pending information gained during the evaluation adit and construction phases of the mine. The ventilation adit would be evaluated at the time it is needed (and if it is needed) to determine alternatives and to ensure latest technology is incorporated. If the ventilation adit is needed, the Forest and the Service would assess the situation prior to construction to further reduce potential impacts as appropriate.

Movement corridors. *The Forest Plan standard is to maintain forested corridors at least 600 feet wide between management induced and natural forest openings. Functional hiding cover has a minimum of three sight distances following timber harvest, where a sight distance is the mean distance at which 90 percent of an animal is hidden from view.*

Summary. The proposed Montanore Mine would meet the Forest Plan standard or assessment criteria of maintaining a minimum of 600 feet between openings (BA 2013). The BA noted that this standard was primarily intended for vegetation management created openings (e.g. openings between harvest units).

Discussion. The displacement of grizzly bears is affected by the availability and functionality of cover within which to move about home ranges. Although the standards would be met, the effectiveness of movement corridors and cover adjacent to the Libby Creek Mine area would be significantly impacted. The presence of new facilities (onsite) increases the motorized traffic levels on forest road 278. Anticipated increases in motorized and non-motorized recreation due to improved access would increase disturbance to grizzly bears attempting to use these corridors near the mine site.

Conservation measures proposed for the Montanore Mine project includes a transportation plan to reduce traffic levels, including busing employees to the mine facilities. Even with the transportation plan in effect the Forest (USFS 2013 BA p.67) anticipates a 255 percent increase in road use during construction and operation phases of the proposed Montanore Mine. The increase in traffic volume on forest road 278 would not approach levels that are likely to constitute a complete barrier to movement of grizzly bears, based on existing research (Waller and Servheen 2005, Chruszcz et al. 2003, Ruediger et al. 1999). However, effective cover along forest road 278, the principal access road, would be compromised by the increased traffic (+255%). The ability of the influence zone around the road to support grizzly bears would be reduced from existing levels, as discussed earlier under 3) above. Existing cover areas also may be impacted by the increased recreational use anticipated with the influx of people into the area.

Seasonal habitat protection *The Forest Plan standard is:*
1. Spring habitat protection objective: schedule activities within spring habitat (southerly aspects less than 5,000 feet elevation) outside spring season from April 1 to June 15.
2. Den site protection objective: allow activities within one-half mile of known den sites only outside the den season, from December 1 through March 31.

Summary. The project would not meet the Forest Plan standard for spring habitat. No seasonal avoidance of important spring habitats can be incorporated into the mine facility activities since the mine is planned to run year round, 7 days a week, and several shifts a day. A total of about 45,000 acres of spring habitat components are present in the three BMUs directly affected by the Montanore Mine (USFS 2013). At least 591acres of this spring habitat will be impacted by the proposed mine sites and associated roads. However, about 3,843 of the 45,000 acres are already affected by use on existing roads, especially forest roads 278 and 231. Due to the increased traffic volumes and significant human activity along these forest roads and at the mine site, this spring habitat would be under-used by grizzly bears. Den habitat in the three affected BMUs totals just over 44,000 acres, with 1,694 acres already affected by use on existing roads Den habitat is not expected to be directly impacted by this action, but an estimated 342 acres are within the influence zone of mine sites and roads (USFS 2013)**.** With planned road access changes 2,291 acres of spring habitat would be made secure by creating core habitat. BMUs 2, 5 and 6 provide den habitat in designated roadless areas in high elevation grizzly bear habitats within the Cabinet Mountain Wilderness Area.

Displacement effects of the transmission line are mitigated by implementing a timing restriction. All construction and reclamation activities associated with the transmission line would occur outside the grizzly bear spring and den seasons as discussed previously.

Discussion. Spring habitat on 591 acres would be made less effective for bears due to displacement effects on areas of spring habitat adjacent to mine activities. At least 591 acres of spring habitat would be directly impacted by the proposed action and major activities, through site development, roads, or increased disturbance in adjacent influence zones. To compensate, 2,291 acres of spring habitat (USFS 2013, BA Table 29) are protected from major activities through access management changes that are proposed as part of the mine project. Displacement areas would not result in a net increase in acres of spring habitat, but would ensure that more acres of spring habitat were protected from major disturbances, throughout the life of the mine, than the amount of spring habitat lost to the mine. This measure provides for over 45,500 acres of spring habitat to be available for use by grizzly bears throughout the life of the mine. Displacement areas also secure more potential den habitat than that currently occurring in the active BMUs (ibid).

Further, based on the best information available, information in the BA indicates that core areas in BMUs 2, 5 and 6 contain substantive amounts of spring habitat (defined as <5000 feet elevation on south, east or west aspects) (see Table 9 in BA). The core areas within the BMUs provide proportionately more spring habitat than that available in the BMUs (see BA Table 21).

5. **The mitigation plan requires that the Forest form and lead an Oversight Committee that would develop an MOU to define the roles and responsibilities of each member and the committee itself. Participation by DEQ and Montana Fish, Wildlife and Parks on the**

oversight committee would be strongly encouraged. The Service would participate in an advisory capacity.

The mitigation plan includes several measures and requirements such as acquisition of fee title or conservation easements on property, and extends over a 30-year time period. The plan is complex and would require detailed oversight to achieve objectives. Accurately predicting or anticipating conditions related to the CYE grizzly bear population over such a long time frame is difficult. The mitigation plan states that the Oversight Committee has the responsibility to oversee the implementation of all mitigation requirements, and to collect and review new information on grizzly bears and other information relevant to CYE grizzly bears over the life of the mine. If such information or relevant data indicate the need, the provisions of adaptive management would allow modifications of the mitigation plan. The Service would be an ex-officio, nonvoting member of the Committee, with advisory responsibilities. We would review proposed revisions to the management plan or mitigation plan under the appropriate section 7 provisions, if required. The Forest would also organize and lead regularly scheduled meetings, attended by agency, county commissioner, mining company, local citizen and other nongovernmental group representatives, and the interested public in general. This group would meet regularly to review management objectives, implementation of mitigation measures and review monitoring and research results.

6. **The mitigation plan requires funding to conduct a long-term monitoring study of grizzly bears throughout the life of the mine within the action area, in coordination with the current grizzly bear research conducted in the CYE.**

The Service's current monitoring effort in the CYE was expanded to include monitoring all grizzly bears augmented into the Cabinet Mountains as a result of the Montana Fish, Wildlife and Park's effort. However, annual federal funding for such monitoring is not assured and dependent upon annual federal budgets. MMC has agreed to provide funding to ensure that the Service is able to adequately monitor the augmented bears, as well as native bears (see mitigation plan). Monitoring information would provide essential survival and reproductive information on females and cubs, both native and augmented bears. Augmentation of the grizzly bear population in the Cabinets Mountains, along with the maintenance of adequate and improved levels of effective habitat and reduced grizzly bear mortality through mitigation plan measures, will over time provide an improved and improving baseline for the CYE grizzly bear population (see discussions under *Grizzly Bear Mortality Risks* section below). Over time, this improved population status is expected to more than offset any loss of reproductive potential in the female grizzly bears displaced from areas surrounding the mine.

Monitoring results would be used to assess whether mitigation measures, including road closures, habitat acquisition and easements, were in fact working to maintain grizzly bear use of habitat within the action area. If information suggested otherwise, the Oversight Committee would develop and recommend measures the Forest could implement to remedy the situation, and allow agencies to employ adaptive management if needed to accommodate the conservation needs of grizzly bears in the area. The Service, in its advisory capacity on the Committee, would advise the Forest as to whether additional consultation may be required to assess new information or changes in the mitigation plan resulting from adaptive management.

Displacement summary As detailed above, the Service has determined that it is not possible to precisely quantify the effects of displacement of grizzly bears, especially when related to whether such displacement actually kills or injures bears by significantly impairing breeding, feeding or sheltering. The severity of displacement effects are likely the result of the intensity of disturbance, the duration of the activity, the relative habitat quality and population density. Displacement may not occur where the level of disturbance is low, or in very high value habitats even where disturbance levels are high, or may not occur if there is a lack of adequate quality habitat elsewhere and the individual tolerates the disturbance result. Displacement may not occur if bears have no options to move elsewhere due to the presence of other bears. Finally, the effects of displacement on grizzly bears may be insignificant if adequate seasonal habitat were available to the individual elsewhere within its home range.

Precisely quantifying or predicting such effects on grizzly bears is difficult for several reasons. While displacement of grizzly bears, or under-use of habitat by bears, has been well-documented, research has yet to quantify the effects of disturbance or displacement on fitness or reproduction in grizzly bears. At this time we *estimate* that three adult females could potentially be using the Libby Creek drainage and other portions of the action area. As time goes on and grizzly bear numbers increase, more adult females, perhaps offspring of existing bears or augmented bears, may use the area as well. It is difficult to predict how many females would attempt to use the Libby Creek drainage over the course of 30 years. However, we know that road densities and core areas in the action area are mostly similar to or better than levels in the average female home range (Wakkinen and Kasworm 1997), so we do not expect that road density itself would substantially negatively impact use of the action area by females. However, we expect that the intensity and duration of disturbances on and near roads would result in some additional and significant under-use of habitat near roads. Based on existing research, we expect that some individual female grizzly bears may be displaced by the high, constant levels of disturbance generated by the mine (Mace et al. 1996, Waller and Servheen 2005) and others may become accustomed to the continuous, routine disturbance (Mattson 1993, Yonge 2001, Tyers 2006). Of those bears displaced, some may find adequate habitat away from the mine and suffer no significant impacts. Some may be stressed to levels that impair their reproductive potential. Finally, factors such as availability of seasonal foods are dependent upon annual climate and precipitation, and have a strong influence on reproductive success (see Kasworm et al. 2005). All of these factors play a role in the reproductive success of females using the Libby Creek drainage. Most are not easily predicted or well understood given current information. Therefore, how the disturbance caused by the mine would affect female grizzly bears over a 30-year period is difficult to predict with certainty due to the influence of factors (e.g. individual nature of bears, habitat quality, and climate) that are inherently variable.

Despite the uncertainty, the best information suggests that there would *initially* be displacement effects on female grizzly bears now using the Libby Creek drainage. At the current time, we estimate that about three adult female bears may be using the action area (as discussed earlier). These female bears would be impacted initially because they are unaccustomed to the level of disturbance created by the mine. We expect this initial displacement would begin when construction of the mine begins and human activity levels substantively increase along forest road 278, the route leading to the mine. Displacement of bears would be most pronounced at lower elevations in the drainage near the road, particularly spring habitat, but would extend throughout larger portions of the drainage for some time, affecting a total of about 7,836 acres, including 6,276 acres of habitat already disturbed by motorized vehicle use on existing roads. It is not likely that the displacement effects of the mine would drive grizzly bears from established home ranges within the action area, especially female bears, even though displacement effects in the Libby Creek drainage during the construction phase initially may be significant. We anticipate that at some time during the 30-year life of the mine, most likely during the 5-year construction phase, one to three adult female grizzly bears may be displaced to the point where their reproduction is impaired. In other words, females may not breed or complete a pregnancy during a breeding cycle due to lack of adequate nutrition or stresses associated with displacement. We do not anticipate that this impairment would be permanent. We do not anticipate that this level of disturbance would result in the death of cubs, sub-adult or adult bears.

Over time, we expect that the severity of this effect would diminish to lower levels. Female grizzly bears initially displaced from Libby Creek drainage when construction begins would eventually regain their reproductive potential by using other portions of their home range or by habituating to the disturbance over time to regain use of preferred habitat. The area from which bears would be displaced, about 80 percent of which is already impacted by disturbance from roads, represents only a small proportion of an average female grizzly bear home range. Based on the size of grizzly bear home range, the direct displacement impacts of construction and operation of the mine and the existing habitat condition (including roads and core area) now and during the life of the mine, it is reasonable to expect that those grizzly bears that use the Libby Creek drainage would have alternative areas to use if displaced from areas near the mine. Existing and future levels of motorized route densities and core area, with implementation of the mine, meet or are within one percent of Forest Plan standards and are similar to or provide better conditions than those in an average female home range.

Further, 3,073 acres of habitat (500 acres pre-evaluation and 2,573 acres pre-construction phase) would be acquired by MMC (fee title transferred to the Forest) or conserved under conservation easement to compensate for the long-term displacement impact. Some of the identified habitat parcels have existing development or have road or trail access to them, and some as of yet undeveloped parcels would likely be developed within the next 30 years. Acquisition of these properties would reduce and in some cases remove this existing (and potential) development and access. As explained earlier in this biological opinion, the benefits of conserving this acreage would add to security on additional acres as well. Conservation of this habitat for grizzly bears over the long term would contribute to suitable habitat for female grizzly bears during the life of the mine. The replacement habitat acquisition would contribute further to offsetting the long-term disturbance effects of the mine.

Finally, some grizzly bears, either those living there now, their offspring, or bears immigrating to or augmented into the area, are likely to adapt to the consistent, repetitive noise provided that natural food availability and quantity are not reduced and they suffer no adverse consequences associated with the mine activity. The effects of attractant storage, lack of firearms at work sites, and intensive education program for mine employees would improve the likelihood that bears could successfully regain some use of habitat from which they were initially displaced. Thus, habitat conditions in BMUs 2, 5, and 6 should continue to allow female grizzly bears to successfully produce offspring over the long-term. The remaining BMUs in the Cabinet Mountains, along with BMUs 2, 5, and 6, provide or will provide conditions suitable for a total of 14 female grizzly bears (by 2019), primarily as a result of the access amendment (see Table A9 above and Appendix E) and the Forest's food storage order. Thus there is habitat available for offspring, immigrants or augmented females to find and establish home ranges.

Therefore, the direct loss of habitat plus under-use of influence zones around the sites and roads may initially have adverse effects on grizzly bears. We expect that during the construction phase of the mine, displacement effects on one to three adult female grizzly bears using the area would result in some level of impairment of reproduction, but would not impair females' reproduction over the long term. The lasting effect of the mine would be long-term under-use of habitat in, but likely not total avoidance of, the 7,836-acre influence zone within the Libby Creek drainage. While this under-use of habitat by grizzly bears is of concern in an ecosystem the size of the CYE, these adverse effects would be offset by the conservation measures detailed above. Considering the large home range sizes of grizzly bears, and the area of displacement, the information on grizzly bear home range use in the Cabinets (Kasworm et al. 2002, and 2005), the year-long and seasonal road closures on the east side, the existing habitat condition, existing and future management of road access in action area BMUs, and habitat acquisition, it is reasonable to expect that grizzly bears with home ranges encompassing the Libby Creek drainage would have relatively secure alternatives to habitats from which they are displaced due to mine-related disturbances over the life of the mine. Finally, the grizzly bear monitoring required as part of the proposed action would enable the Service to evaluate the impacts of displacement on bears over time.

2. Human-caused grizzly bear mortality risk

Since 1988, credible sightings of individual grizzly bears in all 14 BMUs in the Cabinet Mountains were reported, including BMUs in the action area (Kasworm et al. 2005). Based on large grizzly bear home ranges, grizzly bears that live in the southern Cabinet Mountains have a high probability of being somehow affected by the mine itself or by increased numbers of people working and living in the area. Bears using the N-S corridor would be affected by Montanore, Rock Creek or both mines depending on the bears home range location.

The most prominent direct and indirect effects on grizzly bears from the implementation of the proposed Montanore Mine project would stem from the influx of mine employees into this relatively remote area. This local workforce would live within commuting distance of the proposed Montanore Mine. Recent experience for large projects indicates this commuting distance to be driven by commuting time – historically about one hour. Beyond that distance, workers may be more likely to relocate closer to the project site (USFS 2009e). For the Montanore Project, this implies a local employment area that could include all of Lincoln County including the towns of Libby, Troy, and Eureka, all of which are within about an hour's commute or less.

The SFEIS (USFS 2011e) suggested the number of people associated with the mine (mine employees and families, and people associated with related employment) could range from 447 to a high of about 802 during peak construction periods; numbers would vary over a period of about 5 years during the evaluation and construction periods.

The initial influx of workers into grizzly bear habitat would be associated with the evaluation adit phase of the project. The first influx of people would range from 107 to 288 employees and their families (USFS 2011e). Lynn Hagarty (pers. comm. 2013) indicated the likely source of about 80 percent of these employees would be from the local area, and about 20 percent would come from outside Lincoln County. Unmitigated, this number of people could pose some risk to bears in this ecosystem. This phase would bring people into an area that is relatively undeveloped at the current time, which could be associated with higher mortality risk to grizzly bears. However, these potential risks would be immediately addressed, reduced, and more than offset by the mitigation plan measures to address mortality risk, specifically those to be in place *prior to construction of the evaluation adit.* The bear management specialist and law enforcement officer would be on duty to advance bear awareness and education among the employees and in the community. Each employee would meet and receive information from the grizzly bear management specialist and law enforcement officer, receive a personal-use grizzly bear resistant garbage container for use at home, and be encouraged by MMC to respect the importance of grizzly bear conservation efforts needed to live compatibly with bears, in or near grizzly bear habitat. Other measures are listed in discussions below. Further, because the term of employment is limited (up to 36 months), most of these employees from outside Lincoln County would seek rentals, motel units, or mobile home recreational vehicle sites, rather than build new homes (in or near grizzly bear habitat) and remain in the area.

Most of the human impact would be associated with the subsequent five-year mine construction phase. Peak levels of immigrant workers, families and people associated with related employment would be about 425 people during the construction phase. Of the total mine employees during construction periods, 246 to 350 would be local hires and 43 to 100 would be immigrants (ibid).

Following the five-year construction period, the full operation (production) stage could last about 20 years during which time the mine would employ about 450 full time workers. During operation of the mine (post construction to full production), full time employees (including immigrants and original residents) and their families would live in the area for up to 30 years (USFS 2011e). Of these 450 employees, about 350 would be local hires and 100 would be new immigrants to the area. Approximately 350 additional immigrants and their families would live in the Cabinet Mountains area to work at associated businesses that would develop from the increased population. About the same total immigrant numbers (workers, families and people associated through related employment) are associated with the production phase, about 429 compared to peak levels of about 425 during construction. Measures addressing the impacts of the number of people moving into the area during construction and operation are discussed in detail in the following sections.

Most immigrating employees and their families would settle in the local area. Of these total immigrants, most would live in the Libby area, with stable employment during full production. A few immigrants would settle in Troy and Eureka. This immigration would result in a 1.8 to 2.3 percent increase in the current local population (Libby/Troy/Eureka areas) over a period of years (USFS 2009e). Some immigrants could live further from the mine resulting in less of a proportional increase in population of these areas.

The construction and full operations period would require new housing units. The local area of Libby would see the largest number of new households, and the rest would be distributed in the Troy, and Eureka areas (USFS 2011e). Some new residents would build on undeveloped private land in or near the CYE, perhaps resulting in a permanent loss of habitat otherwise available to grizzly bears. Others would occupy existing housing within commuting distance. Probably more important than actual acres of habitat developed, the associated increased number of people living on private lands in or near bear habitat would increase the potential for conflicts with grizzly bears related to sanitation, habituation or displacement, thus increasing grizzly bear mortality risks due to management actions or illegal actions. Large numbers of dispersed home sites in rural areas or new subdivisions in previously rural areas would impose adverse impacts on grizzly bears. If new home sites were developed in or adjacent to existing communities, less impacts on grizzly bears would occur than if homes were built further from existing towns or settlements and still in the CYE. Grizzly bears tend to avoid areas of high human activity such as towns and communities. This tendency would generally keep many grizzly bears from wandering near new home sites that were located within or near existing communities, thus reducing the potential for habituation and food conditioning. We have no information predicting how many of the new homes would be built in or near existing communities.

The following sections analyze the effects of the action related to increased mortality risk to bears, including mitigation measures to reduce adverse effects and an analysis of the effects of the mitigation measures aimed at reducing human-caused mortality risk. Potential sources of human-caused grizzly bear mortality as a result of direct or indirect impacts of the proposed mine can be attributed to two primary and somewhat overlapping categories, attractant-related and recreation-related mortality. Traffic-related mortality may also increase somewhat due to increased traffic along major roads such as Highway 2. Traffic levels along Highway 2 in and near the action area already exceed those levels that usually result in some mortality risk to wildlife (Ruediger et al. 1999). The effects of the action are discussed next under these categories.

Attractants. The area proposed for Montanore Mine is currently relatively remote, and most people live along the main roads and in small towns. The proposed Montanore Mine would substantially increase the number of people working, recreating or maintaining homes in the area. The influx would occur over a very short time frame once hiring for the mine begins. Local residents already living in the area generally have had repeated exposure to grizzly bear issues through the media, workshops, school presentations and personal experience. Newly arrived people coming from areas where grizzly bears do not occur, or emigrating from areas where living with wildlife is not emphasized, would increase the risks of conflicts between people and grizzly bears because of their lack of experience and knowledge. Some people may be prone to poor compliance with sanitation recommendations. Voluntary education and information programs typically result in success over a period of time. Without proactive attractant storage measures, grizzly bears in the area could be exposed to a rapid increase in available garbage, pet foods and other household attractants with little opportunity to adapt. Thus, the risk of the indirect effects of food conditioning or other types of habituation resulting from additional human residences on private lands would increase.

Unmitigated ingress of people could result in increased *potential* for attractant-related conflicts with grizzly bears on public lands as well. Attractant-related incidents would likely be infrequent at first; such incidents have not yet been reported in the Cabinet portion of the CYE, probably due to the existing small number of grizzly bears and sparse human population in the region. However, as the grizzly bear and human populations expand, the potential for conflict would increase.

We anticipate that food storage and attractant issues would be less problematic on Forest lands than on private lands. The Forest currently has a mandatory forest-wide food storage order that requires forest users to keep their food unavailable to grizzly bears. These orders are mandatory, and are enforced by the Forest and depend upon long-term education and information efforts. The order mandates that all human foods and attractants be made unavailable to grizzly bears. Additionally, grizzly bear resistant garbage receptacles would be required at the mine site as well as in campgrounds or other Forest facilities within all BMUs in the CYE where garbage containers are normally provided. These efforts to curb attractant-related conflicts on public land would become increasingly effective over time, with the increased levels of information programs in the CYE. These measures would substantively reduce the risk of grizzly bear mortality as a result of habituation and food conditioning on national forest lands.

Such risks to grizzly bears resulting from the mine-related increase in number of people using the Forest would be lowered. Further, such risks outside the action area and not associated with the mine would be lowered from the existing condition.

Many of the human impacts associated with the Montanore Mine that may affect grizzly bears would occur on private lands, which are beyond the direct jurisdiction of the Forest or MMC. Attractant storage conflicts between bears and people would likely arise on private lands over the 30-year life of the mine. Private land attractant storage issues are typically more difficult to resolve than those occurring on national forest.

Unmitigated, the mortality risk to grizzly bears associated with attractant storage would grow with increased numbers of residents in the vicinity of the mine. In both the YGBE and the NCDE, attractant storage issues became one of the primary causes of conflict between bears and people, and of human-caused grizzly bear mortality as the number of bears and people in and around the ecosystem increased. As discussed earlier, while attractant storage has not yet been a primary cause of human-caused grizzly bear mortality in the CYE, we expect its significance to increase as the bear population grows. In the past six years in the CYE, one grizzly bear was killed through management action and six others relocated because of habituation or the risk of habituation to human foods and garbage. However, the proposed action including mitigation addresses these potential impacts and would significantly reduce the risks both from the proposed mine and the current condition. Benefits would accrue over time, especially as the grizzly bear population increases over time. Without funding for the conservation measures outlined in the mitigation plan, the current condition for grizzly bears is not expected to improve in the forseeable future. Adequate funding through government sources is not likely within the near future to address the current condition outside of this action. Details of the proposed conservation measures and mitigation are described in Appendix C.

Over a 30-year period, the Montanore Mine would likely result in the risk of grizzly bear mortality because of attractant storage conflicts. The expected increase in numbers of people in the area and the 30-year life of the mine would increase the potential for bear-human confrontation. The mitigation plan therefore includes a number of measures to significantly reduce this potential for mortality associated with the mine. Further, the measures in the mitigation plan would substantially improve conditions for grizzly bears over current and future conditions not attributable to the mine (such as human population growth not attributable to the mine). A full listing of measures to address attractant-related risks occurs below in *mitigation plan measures to reduce risk of grizzly bear mortality*.

Recreation. Roads and trails facilitate encounters between grizzly bears and humans, and roads markedly increase the risks of grizzly bear mortality, especially at higher open road densities. Seventy-five percent of the human-caused grizzly bear mortalities from 1982 through 1999 in the CYE were within 500 meters of an open road (Wayne Kasworm, pers. comm. 2012). Incidences related to hunting and poaching contribute to human-caused grizzly bear mortalities. Increased trail use leads to increased chances of bear-human interactions with bears that are not displaced from trails and the habitat around it.

As discussed earlier, open road and trail densities would not increase over existing levels due to the proposed action, and currently are moderate within the action area. The proposed levels of access management would be significant in reducing human access in the action area (see Tables A11 and

A12). However, an influx of workers, supporting businesses, and families would likely increase recreational use of the existing roads and trails in the action area. Improved access and a substantial increase in the human local population are expected to increase recreational and hunting use within grizzly bear habitat. As we indicated in our opinion on the Rock Creek Mine (USFWS 2006), use of the Rock Creek Trail along the East Fork of Rock Creek is expected to increase substantially with the improvement of access, greater publicity and increased people moving to the area. This trail would be accessed by the improved road to the Rock Creek mine and would be expected to attract greater use following improvement of the road. The Rock Creek Trail is currently considered a low use trail; however it is a gated motorized route that accesses private land in the upper reach of the East Fork of Rock Creek. It is a significant detrimental impact to core area and a potential fracture zone on the western portion of the north-south movement corridor in the Cabinet Mountains. Mitigation for the Montanore mine is planned to remove or reduce this impact by replacing the gate with an earth barrier thus removing motorized access and creating core habitat. In addition, the private lands, owned by MMC, would have the fee title transferred to the Forest thus removing any future possibility of needing motorized access. These two measures increase grizzly bear core acres in the Cabinet Mountains.

A reduction in security for grizzly bears could occur if human use on the Rock Creek or St. Paul Trails increased to levels that displace grizzly bears and contribute to fragmentation of the north-south corridor, or result in a corresponding increase in human food and attractants made available to bears. The potential for confrontations between bears and people would be expected to increase if high use of the Rock Creek Trail should occur. Increased hiking and camping in the area could lead to increased food and attractant storage problems, resulting in conflicts between grizzly and recreationists. The Rock Creek Mine project includes mitigation to monitor trail use and adjust allowable levels should monitoring show reaching high use level, thus avoiding adverse effects to grizzly bears.

From 1982 through 2012, only six grizzly bears were known to be incorrectly identified and killed during big game or black bear hunting seasons in the CYE. Increased hunting pressure in the area would elevate the potential for grizzly bears to be misidentified as game species and inadvertently killed. Montana Fish, Wildlife and Parks manages and regulates all hunting in the action area and currently implements a proactive hunter education program aimed at reducing the potential for mistaken identification of game animals (Montana Fish, Wildlife and Parks 2001).

The potential for poaching could increase with the influx of workers with diverse social, cultural and economic backgrounds, many of whom may be unfamiliar with or lack interest in wildlife conservation. For example, following the initial phase at the Montanore Mine project, some workers associated with the mine were convicted of poaching deer (USDI 1993b). From past experience, Montana Fish, Wildlife and Parks have found that poaching incidents tended to increase during construction activities. The spike in illegal activities seems to correlate with transient work forces that work “around-the-clock” schedules, but tends to decline once construction is complete and the stable work force is in place (Mark SoderlindMontana Fish, Wildlife and Parks, pers. comm. 2000).

Unmitigated, over a 30-year period, the Montanore Mine would likely result in the risk of legal and illegal mortality of grizzly bears. The expected increase in numbers of people using the Forest to recreate over the 30-year life of the mine would increase the potential for conflicts between grizzly bears and people. The agencies recognized this risk, and therefore the mitigation plan includes a number of measures to reduce the potential for mortality. See below for a summary and analysis of the measures in *mitigation plan measures to reduce risk of grizzly bear mortality*.

Vehicle collision. The Montanore Mine would result in increased traffic levels on the access and service roads in the action area, as well as main highways in and around the CYE. Traffic levels on Forest Road R 278 are anticipated to increase significantly over pre-Montanore Mine levels during the construction phase. Traffic would eventually increase about 255 percent above existing traffic levels during the 30-year operation period of the Montanore Mine. Traffic along Montana Highway 2 also would increase by about 132 vehicles per day (USFS 2009e) for about a four percent increase in use. Grizzly bear mortality resulting from motorized vehicles collision has been documented (Servheen in litt. 2005a; IGBC 1987). Typically, these collisions have occurred on major highways or roads that receive higher traffic volume and have higher speed limits than these roads, such as U.S. Highway 2 south of Glacier National Park, and Montana Highways 83 and 93.

The Montanore Mine would result in an increase in the average vehicle speed on Forest Road 278 due to the proposed paving of the main access road and several spur roads within the Montanore Mine area. As vehicle numbers and/or speed increase on Forest Road 278 and Highway 2, the mortality risk to bears attempting to cross these principal access routes would also increase. The small number of grizzly bears living in the action area and surrounding areas has and would probably continue to contribute to the lack of grizzly bear mortalities along roads in the area. Five grizzly bears are known to have crossed Highway 2 along the boundary of the action area (Wayne Kasworm, pers. comm. 2013). The Service lacks data and information with which to accurately estimate the level of risk associated with higher traffic volumes. If vehicle collision is a risk, it is more likely to occur along Highway 2 than along Forest Road 278, due to higher traffic volumes and speeds along that route. Traffic on Highway 2 already poses a risk to grizzly bears, although no vehicle related mortality has been recorded. Traffic levels from 2000 to 3000 vehicles per day usually have adverse impacts on wildlife due to habitat fragmentation and mortality (Dr. Tony Clevenger and Dr. Paul Paquet, pers. comm. *in* Ruediger et al. 1999). Traffic levels on Highway 2 are already near this range (McLeod pers.com. 2012). The lack of bear mortality reported is probably a result of few grizzly bears within the CYE, and/or their ability at this point to navigate the highway successfully. Traffic levels are expected to increase, with or without the mine. The level of mortality risk to grizzly bears on Highway 2 that could be attributable to the mine would not likely be determinable, given the already high levels of traffic and anticipated increases not associated with the mine. See below for a summary and analysis of the measures in *mitigation plan measures to reduce risk of grizzly bear mortality*.

Public Opinion and Knowledge. As explained earlier, social values and attitudes also contribute to the level of mortality risk to grizzly bears. This social political nature, especially in resource dependent communities like Libby, and Troy, lead to conflict and resistance to recovery of the grizzly bear population in the CYE. The conflict can result in grizzly bear mortalities. There have been eight known poaching grizzly bear deaths in the CYE between 1982 and 2012, with most (5) occurring after 2001 (Kasworm et al. 2012). In addition, there are ten grizzly bear mortalities still under investigation (ibid) of which a portion may be poaching caused. The level of mortality risk to grizzly bears due to attitudes from people associated with the Montanore project would not likely be determinable due to the already existing poaching level. Substantial effort to reduce this mortality risk factor is included in the mitigation plan for the Montanore project, including measures to involve, inform, and consider inputs from the public to design strategies to achieve mortality risk reduction.

Mitigation plan measures to reduce risk of human-caused grizzly bear mortality

The following measures are included in the mitigation plan and would reduce or minimize the mortality risks associated with the proposed action as identified above. The 2013 mitigation plan was fashioned in recognition that current levels of human-caused grizzly bear mortality in the CYE were too high, and that measures to reduce mortality were needed with or without the proposed action. Collectively, the measures represent a substantial effort to reduce and minimize human-caused grizzly bear mortality risk not only that associated with the mine but also risks that arise from current conditions in the CYE and surrounding area:

1. Management of road and trail access into grizzly bear habitat.

- The Forest would ensure no increases in open or total motorized route densities or decreases in core area within BMUs 2, 5, and 6 for the life of the mine. Open and total road densities are near or lower than research averages and core areas are substantial, equal to or greater than 55 percent of the area in each of BMUs 2, 4, 5, 6 (53 percent), 7, and 8 (see *Analysis of Displacement Effects on Grizzly Bears* section for greater detail on access management).

- The Forest would close portions of roads on the east front of the Cabinet Mountains, contributing to a more secure habitat corridor from north-south along the face and increase core habitat in the affected BMUs (see USFS 2013 BA Table A18, discussion, and mitigation plan).

- As the total 6,185acres of mitigation habitat is acquired through purchase or easement, management actions would decrease motorized route densities and/or increase core areas, acquisition of fee title or conservation easement would eliminate existing access and/or preclude new development or improved access and/or reduce attractant sources. Thus future mortality risks to bears would be reduced; and

- Recreational use of trails and open roads in the action area are expected to generally increase over time, with or without the mine. Should high use occur on trails in the area, they would be mitigated as needed to maintain low use levels to protect habitat conditions for grizzly bears.

The impacts of increased numbers of people accessing the Forest would be adequately moderated by full implementation of the measures above. Although use of roads and trails would increase, the existing access baseline meets or is very near meeting Forest Plan standards for grizzly bears, and would remain so and gradually improve due to the measures above. As a result, we do not expect that access management related to the mine would result in increased mortality risk to grizzly bears.

2. Management of attractants.

- Prior to construction of the evaluation adit, MMC would fund Lincoln County and Montana Fish, Wildlife, and Parks to upgrade the county garbage transfer station near the mine entrance to make it grizzly bear-resistant prior to construction of the evaluation adit. Mine employees living in the local area would use this facility to dispose of their trash.

- MMC, and if applicable, in collaboration with the proponents of Rock Creek Mine, would fund the eventual upgrade of up to 13 county garbage transfer stations in the CYE to bear-resistant during construction and operation of the mine. Preventing food conditioning of both black bears and grizzly bears at the garbage transfer stations, as well as at residences, has proven very important in both the YGBE and NCDE (Tim Manley, Montana Fish, Wildlife and Parks, pers. comm. 2012).

- MMC would require employees to attend annual educational workshops on living with grizzly bears, attractant storage at home and in the back-country, and would prohibit employees from feeding bears.

- MMC would fund purchase and maintenance of grizzly bear-resistant garbage containers for all employees living in or near grizzly bear habitat, for their personal use at home.

- MMC would provide 20 additional personal use containers per year for distribution to the public by the grizzly bear specialists.

- MMC would, in collaboration with the Rock Creek mine proponents if applicable, and in coordination with the Forest, fund acquisition and maintenance of grizzly bear resistant garbage containers for Forest campgrounds that provide garbage receptacles in BMUs throughout the CYE.

- MMC would fund acquisition and maintenance of grizzly bear resistant containers that would be used at mine facilities, and ensure they are in place in advance of any work being initiated on any phase of the mine, and that they would be emptied at least weekly unless problems arise, whereupon, removal would be daily.

- MMC would initially fund ten electric fencing kits and then two additional annually as needed (need determined by grizzly bear specialist).

- MMC would have a company-sponsored education program to advance knowledge of how people can coexist with grizzly bears in and near grizzly bear habitat.

- MMC would fund up to two grizzly bear specialist positions dedicated to work in the CYE (see #3 below), one of which would be funded prior to starting the evaluation adit. While Rock Creek mine project is active MMC will fund one position. Should Rock Creek mine become non-active MMC will fund two bear specialists

- MMC would fund prior to start of the evaluation phase a grizzly bear habitat conservation specialist (see A.1.i of mitigation plan in Appendix C) if both Montanore and Rock Creek mine projects are active. Combined with the grizzly bear information and education program, two bear specialists and two wildlife law enforcement officers, the measures listed above would significantly improve existing and future sanitation conditions within the action area and the CYE.

Unmitigated, a mine development at the scale such as the one proposed would likely increase conflicts between people and grizzly bears due to increased attractants made available to grizzly bears. If the project moves forward with the mitigation plan, the current conditions for grizzly bears related to attractant storage would be substantially improved over its current condition. Of the measures listed immediately above, only one (grizzly bear specialist position) exists within the ecosystem today, the additional measures would be contingent upon securing government funding, which has not been available in the past. The mine would result in an increased number of people living in the area, but the measures listed above would reduce the potential for conflicts, not only those associated with the mine but also those not attributable to the mine. Further, the mitigation plan now includes measures that address attractant issues across the ecosystem, including outside the immediate action area. Mine-related attractant risks to grizzly bears would be reduced and while not entirely eliminated, their adverse impact would be more than offset by the above measures in combination with #3 immediately below. These measures would benefit the action area as well as the entire CYE.

The mitigation measures outlined above and in #3 below represent the full complement of the types of actions that are recognized by grizzly bear experts as being effective in reducing conflict between bears and people and they would affect the entire CYE. With reasonable certainty, we expect that implementation of such measures would result in a *net decrease* in the potential for conflict and in the actual number of conflicts between grizzly bears and people that would arise in the CYE, with or without the Montanore mine project. We expect that the mitigation measures would prevent conflict and /or resolve conflicts in ways that prevent the removal or human-caused death of more than one grizzly bear over the 30-year life of the project, thus more than offsetting the loss we anticipate from the project (one grizzly bear). In other words, we believe that the measures to be implemented by MMC and the Forest would result in a net reduction in future human-caused grizzly bear mortality rates that would have occurred without the project.

3. **Enhancement of law enforcement and comprehensive, proactive information and education programs and Outreach that build public support of grizzly bear recovery**.

- Prior to the construction of the evaluation adit, MMC would provide funding for a MFWP wildlife law enforcement position to reduce the potential for illegal activities (e.g. poaching) and readily handle any illegal activity that may arise due to the increased number of people living in the area.

- As stated under #2 above, prior to the construction of the evaluation adit, MMC would fund a bear specialist position to help inform and prepare mine personnel, their families and other residents in the area about how to live and recreate safely in grizzly bear habitat, to implement proactive sanitation efforts in the communities, and to respond to black or grizzly bear conflict situations.

- Starting prior to the construction of the evaluation adit, the Forest Service would lead a stakeholder's information annual meeting. Stakeholders may include, but would not be limited to state and federal agencies, county commissioners, mining company, local citizen and non-governmental organization representatives. The objectives of the meeting would be to review a) management objectives; b) implementation of mitigation measures, c) monitoring and research result, and d) hear public concerns.

- Prior to the beginning of construction of the mine, MMC would fund a second grizzly bear specialist to live in the Libby area and work in the northern reaches of the CYE.
    - These bear specialists and the law enforcement position would receive funding from MMC throughout the life of the project.
    - Funding for two bear specialists and a law enforcement position would be adequate for highly skilled, full-time, professional staff (including benefits);
    - Funding for these positions would ensure that Montana Fish Wildlife and Parks creates new positions in addition to the Montana Fish Wildlife and Parks staff already in the area; duties of the positions would be clearly defined to deal with the grizzly bear issues related to the Montanore Mine.
    - The duties of these personnel would include monitoring and documenting black and grizzly bear-human encounters and how these situations were handled as well as conflict resolution.
    - These personnel would remain in place during temporary shutdowns and for a reasonable (minimum 5 years) amount of time following mine reclamation to maintain continuity in community relationships, grizzly bear incident response and monitoring.

- MMC would develop a public outreach program that conveys its support of grizzly bear conservation in the CYE, working with county and local governments, the MFWP and the Forest. See appendix I for outreach plan outline.

- Mine employees would be prohibited from carrying firearms while on duty.

Prior to construction of the evaluation adit, the mitigation plan requires funding for one grizzly bear specialist and one law enforcement position to be located in the vicinity of the mine, to primarily deal with the Montanore Mine mitigation issues, and initiate preventative management and education programs to avoid impacts to threatened and endangered species. The presence of the grizzly bear specialist and wildlife law enforcement officer in the community would be consistent and long term (retained for the life of the mine), including periods of shutdown. These personnel would be on the job prior to the time construction began on the evaluation adit. The positions would be based in the Libby area where the majority of immigrating people would settle.

Prior to the start of the construction phase, MMC will, in coordination with the Forest, MFWP, county and local governments and FWS, fund, develop, and implement an enhanced public outreach program to build support and understanding for the conservation of the CYE grizzly population (see Appendix C: mitigation plan A.1.c). Implementation of this plan would work together with the grizzly bear specialist efforts to achieve more support, more tolerance, and a develop a more educated public which would contribute to reducing grizzly bear-human conflicts and ultimately fewer human-caused grizzly bear mortalities. This will be a comprehensive effort as outlined in Appendix I. This will address the grizzly bear mortality risk directly but more importantly tackle the social economic issues by studying values and attitudes and providing information and assistance (ie bear specialist) that directly addresses public needs.

The enhanced outreach plan would integrate and complement the local State wildlife law enforcement agent and bear specialist programs. The law enforcement officer and bear specialist would make personal contacts with mine employees and with other area residents as well. This effort would begin to address the current mortality risks in the action area. The bear specialist's duties would be similar to those described in Montana Fish, Wildlife and Parks Bear Management reports (Montana Fish, Wildlife and Parks 2005). The bear specialist would work with and provide information to all mine employees and other area residents on managing garbage, foodstuffs and livestock at their homes or camping and hunting sites to avoid attracting bears. They would also provide temporary electric fencing kits and bear resistant garbage containers. Information on game carcass management and other issues related to hunting in grizzly bear habitat would be provided, enhancing Montana Fish, Wildlife and Parks' hunter education programs already in place. The law enforcement officer would provide additional wildlife and conservation information, and work as a deterrent to reduce the risk of illegal human-caused grizzly bear mortality. These personnel would precede the influx of mine construction workers so that pre-emptive planning could occur and education programs would be in place when employees arrive. The bear specialist would respond in a timely manner to resolve conflicts between people and both black and grizzly bears, if they arise.

Every mine employee would be required to attend annual grizzly bear update workshops/presentations provided by the bear specialist and law enforcement officer and understand the support provided by these personnel. MMC would ensure that employees understand the importance of conservation of grizzly bears and other natural resources in general. This level of personal contact with mine employees and area residents would improve awareness of grizzly bear conservation issues, and improve local support for grizzly bear recovery.

Further, grizzly bear resistant garbage facilities would be in place at the mine site and on Forest locations in BMUs 2, 5, and 6, a Forest-wide mandatory food storage order is in place. The county garbage transfer station at the mine entrance would be made grizzly bear-resistant, all prior to activities beginning on the evaluation adit and prior to any grizzly bear conflicts arising. Should sanitation related incidents occur; the bear specialist would be available to respond to the situation quickly to avoid escalation of the problem. As mine employees are hired, each employee would be provided with a personal use grizzly bear resistant garbage container, as well as workshops and other forms of information related to grizzly bear conservation from programs developed by the bear specialist and law enforcement officer. This is a significant level of effort aimed at the 35 or so employees hired to construct and work at the evaluation adit. Thus, we do not expect construction and operation of the evaluation adit to result in grizzly bear mortality.

Prior to construction of the mine itself, a second MFWP bear specialist would be funded to work in the Libby area, and implement a similar program for residents of the northern part of the CYE, including the Yaak. This effort would further address human-caused mortality risk associated with the existing conditions throughout rest of the CYE outside the action area. The bear specialist positions would include duties comparable to the existing grizzly bear management specialist positions within the Montana Fish, Wildlife, and Parks, and would be provided adequate funding for public education programs and workshops, aversive conditioning equipment, dogs, electric fencing and other prevention work.

Should both the Montanore and Rock Creek projects move forward, MMC would fund an additional grizzly bear <u>habitat</u> specialist (a third position). That position would work closely with the Forest and local governments to assure appropriate mitigation acres are acquired and management actions taken to improve grizzly bear habitat conditions on those lands where possible.

Prior to construction of the evaluation adit, MMC would provide funding for the ongoing grizzly bear monitoring study, as well as looking at linkage across highway 2 south of Libby.

Combined, the local presence of these personnel in addition to the enhanced public outreach plan, the grizzly bear monitoring/research effort, food storage orders, measures to secure attractants, and other mitigation recovery efforts, are expected to contribute significantly to increased public awareness, cooperation and support of grizzly bear conservation needs, not only in the action area but across the CYE.

The importance of these new positions cannot be overstated. Bear specialists are influential in numerous ways that promote recovery of grizzly bears. Montana Fish, Wildlife and Parks stated that perhaps the greatest advancement in the management of problem bears has been the development of bear management specialist positions (Montana Fish, Wildlife and Parks 2001). The combination of shortened response time to grizzly bear conflict reports, preventative actions to remove attractants, the deterrent effects of local law enforcement, and perhaps most important, building community involvement in the management and conservation of grizzly bears, has been invaluable in dealing with nuisance bears, preventing habituation of bears, and fostering local public support of grizzly bear conservation (see Montana Fish, Wildlife and Parks 2005a; Wenum 2002; Wenum 2004). Grizzly bear management specialists have been able to keep grizzly bears alive through an array of preventative measures. For example, in 1998 grizzly bear specialists trapped and radio-collared six nuisance grizzly bears in the North Fork of the Flathead River Valley (Tim Manley, pers. comm. 2006 *in:* USFWS 2006). The bear specialists initiated an intense, proactive information and education effort with people living in the area. In the past three years, there have been no reports of nuisance grizzly bear activity in the North Fork, despite a substantial number of people living in grizzly bear habitat. In other areas, a Montana Fish, Wildlife and Parks bear specialist was instrumental in developing the trust and confidence of local residents participating in a study that ultimately resulted in reducing conflicts between ranchers, bee-keepers and grizzly bears along the Rocky Mountain Front region in Montana (Primm and Wilson 2004). State bear specialists also participated in the highly successful Blackfoot Challenge project (Primm and Wilson 2004). The groups involved created a wildlife committee to improve human-wildlife management in the Blackfoot River Valley, Montana. This committee worked on human-grizzly bear conflict abatement through many means: workshops, outreach, and sanitation projects. These efforts now enhance existing state grizzly bear management programs. Specific to the CYE, the required mitigation to fund a bear management specialist position is especially important as these positions are widely recognized as being successful in fostering public awareness and support of grizzly bear recovery (Annis 2013). They also provide a proactive approach to human-bear conflict prevention and are able to provide quick and appropriate responses to human-bear conflict resolution (ibid). "Since the MFWP grizzly bear management specialist position in the CYE began in 2007, the numbers of human-bear interactions being reported by residents has decreased and residents have increasingly become more interested in preventing interactions with bears before they begin" (NFWF 2013, 2013b). "The electric fence and bear-resistant garbage container loan programs have been extremely popular with residents, and have been effective at preventing, eliminating or reducing bear interactions" (ibid). "The residents and local government within the Cabinet-Yaak grizzly bear recovery zone value and depend upon the assistance and information provided by the grizzly bear management specialist" (ibid).

If the proposed project moves forward, law enforcement, conservation education, proactive prevention of conflicts between bears and people as well as responsive conflict resolution, would significantly reduce mortality risk to grizzly bears in the CYE. None of the measures listed immediately above exist within the ecosystem today. All are needed within the CYE in the short and long term to reduce levels of human-caused grizzly bear mortality. Currently, the nearest grizzly bear specialist is based in Libby, and covers the entire CYE. The long-term intent of this position is to cover the Sanders County portion of the CYE to work with the public on grizzly bear issues arising from development of the Rock Creek mine. Funding for this position is currently partially provided by the Rock Creek mine proponent and is contingent upon that project going forward. The local grizzly bear specialists and law enforcement officer would provide enhanced levels of security and protection for grizzly bears that currently does not exist, thus improving current conditions for grizzly bears in the CYE. The positive effects of related programs would not only impact those people living in the action area and/or working at the mine, but would reach people living throughout the CYE ecosystem. The current conditions for grizzly bears in the CYE would also improve with the measures addressing access management, attractant storage, and research and monitoring (see discussion below). As new or existing residents to the area, mine employees would be among the most informed members of the public in the CYE about grizzly bear conservation, assisted by the support for conservation of grizzly bears from the company.

Overall, if the project proceeds and the mitigation plan is implemented, we expect a reduction in future rates of human-caused mortality of grizzly bears, even when we take into account the mortality risk posed by the mine. The human-caused grizzly mortality expected to result from the mine would be more than offset by reductions in the present level of human-caused mortality risks within the CYE, due to the benefits of the mortality risk management measures in the mitigation plan. The net human-caused grizzly bear mortality rate is expected to decline within the CYE with full implementation of the mitigation plan associated with the proposed action.

The Service has determined that the full-time law enforcement and bear specialist positions to be funded by MMC are essential to offsetting the potential mortality risks associated with the Montanore Mine and those in the existing baseline. We expect that the law enforcement and bear specialist positions would significantly reduce and minimize the potential for human-caused grizzly bear mortality associated with the mine, although the risk cannot be entirely eliminated. However, the lowered mortality risk of the mine itself would be more than offset by the decrease in mortality risk conditions for grizzly bears in the action area and other areas of the CYE. As a result of the agency bear specialist and law enforcement positions, we expect:

- a significant reduction in the potential for increased conflicts between grizzly bears and people due to the increased number of people in the area as a result of the mine, and
- a net reduction in the overall existing mortality risks to grizzly bears on both national forest and private lands within the action area and across the CYE.

4. Support monitoring and research.

The mitigation plan requires funding for the ongoing grizzly bear monitoring and research effort in the action area for the life of the mine in conjunction with the ongoing grizzly bear research in the CYE, conducted by the Service. These funds are in addition to those required in the Rock Creek mine mitigation plan, which focus on monitoring in the Rock Creek mine action area. The study would monitor grizzly bears in the Montanore project action area and gain information related to the effectiveness of the conservation measures by monitoring grizzly bear use of the N-S corridor, mortality and bear use of the impacted BMUs. Funds would also be used to examine linkage across highway 2 south of Libby that provides connectivity to the NCDE. The Service would also use the funding to monitor the grizzly bears augmented into the CYE as part of Montana Fish, Wildlife and Parks' program. This information is essential to gauge the success of the effort and make improvements or modifications if needed. The ongoing monitoring and research would also act to increase public awareness and interest in grizzly bears. Because of the increased potential for detecting bear mortality, monitoring would likely act as a deterrent to illegal killing of grizzly bears. Data collected from radio-collared grizzly bears would enhance our understanding of survival and mortality, which is crucial to determining population trend. Furthermore, the monitoring would provide essential information as to whether or not the mitigation plan is working to allow grizzly bears to safely use habitat and move through the action area and north-south corridor. Because this information is important to judging the effectiveness of the mitigation, MMC has agreed to ensure adequate funds as part of the mitigation plan for this ongoing work during the life of the mine.

5. Reduction of risks posed by increased traffic on Forest Road 278.

- MMC Company would implement a transportation plan requiring employees be bused from parking lots near the highway up through the drainage to work. Bussing employees would substantially reduce the expected elevated levels of traffic but overall traffic levels would remain high. Controlling employees on their way to work sites would significantly reduce the potential for illegal harassment or shooting of grizzly bears and reduce litter and other attractants along the route;

- The use of salt would be avoided when sanding during winter plowing operations on road FR 278 to reduce attracting bears to roadways,

- Palatable vegetative forage like clover (*Trifolium spp*.) would not be used to reclaim disturbed sites from construction facilities and roads; and

- The remains of road-killed carcasses along roads would be removed daily.

Summary of human-caused mortality risks. The Service concludes that the mitigation plan measures aimed at decreasing the risk of human-caused mortality of grizzly bears would significantly reduce those risks associated with the proposed action. We expect that these measures would more than reduce and offset the risk of human-caused grizzly bear mortality attributable to the mine, but also would reduce the current and future risks not attributable to the mine. In this way, the project would improve the baseline for grizzly bears over existing conditions. Further, habitat conditions such as habitat effectiveness and access management can affect mortality risk. Both have generally remained stable or improved over the past decades, and are expected to improve in the action area as a result of the mitigation plan.

Table A13 displays the past causes of mortality in the CYE and the proportion of the mitigation funding directed at each cause. Seventy-five percent of the total mitigation plan funding would be directed at reducing human-caused mortalities of grizzly bears. The main factors of human caused mortality between 1983 and 2011 were illegal/malicious killings, self defense, and mistaken identification by big game hunters. Much of the funding would be directed at these three categories. Combined these categories account for about 37 percent of all mortalities. As has occurred in the NCDE and YGBE, attractant related human-site conflicts are expected to become more of a problem in the CYE as the grizzly bear population increases. Table A13 indicates that mitigation funding is appropriately directed at main sources of human-caused mortality that may be associated with the mining project.

The enhanced public outreach program which involves collaboration of MMC with the county and local governments, the public at large, the grizzly bear specialists, MFWP law enforcement, and the Forest together would be powerful in elevating awareness and fostering positive attitudes and tolerance toward grizzly bears and their recovery in the CYE. See Appendix I for outreach plan outline.

The proposed action cannot eliminate entirely the risk of human-caused mortality, simply due to the increased number of people that would live in the area over 30 years, but it also includes significant, essential short- and long-term recovery actions that minimize the risk and would benefit grizzly bears in the action area and throughout the CYE. These beneficial actions would not likely occur otherwise in the near or long-term. The mitigation plan includes a full complement of the types of measures, actions and strategies known to reduce conflicts between grizzly bears and people. Within the first five years of work beginning with the evaluation adit, we expect that the mitigation measures aimed at reducing mortality would be effective at reducing the *existing* risks of human-caused mortality because of implementation of many grizzly bear conservation measures, described earlier, that currently do not exist. The measures in the mitigation plan would also significantly reduce the potential for human-caused mortality of grizzly bears that *is attributable* to the mine. This comprehensive approach to reducing potential mortality (e.g. bear specialists in the action area and in Libby, increased law enforcement presence, sanitation efforts throughout the ecosystem, etc.) is also expected to significantly reduce the potential for grizzly bear mortality *not attributable* to the mine, within and outside the action area.

No empirical data is available with which to accurately predict the number of grizzly bear mortalities as a result of the proposed mine over 30 years. The proposed mine would result in a two percent increase in the number of people living and working in and near the Cabinet Mountains. The expected increase would occur in the Libby, Troy and Eureka area (Lincoln County) (USFS 2009).

The best information upon which to base estimates of future human-caused grizzly bear mortality includes the existing rates and causes of human-caused mortality information in the CYE and in the action area, baseline habitat and access conditions leading to existing mortality levels, and the adequacy of the conservation measures in the proposed action and requirements in the mitigation plan.

Table A13. Categories, numbers and percent of grizzly bear mortalities in the U.S. portion of the CYE between 1982 and 2012 compared to approximate Montanore mine project mitigation funding allocated to efforts to reduce mortality (budgets and allocations may change).

<table>
<tr><th>Category</th><th>Number of Mortalities</th><th colspan="2">Percent of Total</th><th>Percent of Mitigation Plan Funding</th></tr>
<tr><td>Human site conflicts</td><td>1</td><td>2 percent</td><td></td><td>59 percent</td></tr>
<tr><td>Mistaken ID</td><td>6</td><td>12 percent</td><td rowspan="3">37 percent</td><td rowspan="3">16 percent</td></tr>
<tr><td>Self defense</td><td>5</td><td>10 percent</td></tr>
<tr><td>Illegal/Malicious</td><td>8</td><td>15 percent</td></tr>
</table>

Train	3	6 percent		0 percent
Car	0	0 percent		9 percent
Capture mortality	1	2 percent		Not applicable *
Natural	11	21 percent	55 percent	16 percent
Unknown	10	19 percent		
Under Investigation	7	13 percent		
Total	**52**			
Deaths/Year	**1.79**			

* not directly applicable, but the additional wildlife law enforcement officer would help alleviate problems associated with these categories, as would having grizzly bear researchers monitoring the bear population.

Although the conservation measures in the mitigation plan would significantly lower risks, we expect that the mitigation plan measures cannot entirely eliminate the risk of human-caused grizzly bear mortality associated with the project over 30 years, primarily due to the increased number of people living in the area. Legal grizzly bear mortality is possible through management action or defense of life, or illegally through malicious or accidental events. We expect that attractant-related conflicts between grizzly bears and people would most likely be the cause of grizzly bear mortality that would be attributable to the mine during the 30-year period. The potential for such conflict is substantially reduced by conservation measures in the mitigation plan. While malicious killing remains a possibility, its likelihood is also significantly reduced by the presence of bear specialists and law enforcement, and the information provided through their programs. The company's support of grizzly bear conservation would act as a deterrent for any mine employee to illegally kill a grizzly bear or be negligent regarding attractant storage. Conflicts between grizzly bears and people recreating on the Forest are possible, but are less likely to be related to the mine. Based on the number of grizzly bears in the action area, existing mortality records and expected displacement effects near the mine, we consider this risk discountable.

During the 30- year period from 1982 through 2012, eight known human-caused grizzly bear mortalities occurred within or near the Cabinet Mountains portion of the CYE, six of which occurred in the action area. Information from Kasworm et al 2013 indicates approximately two known human-caused mortalities of grizzly bears occurred per decade in the Cabinet Mountains, since 1982.

Six of the eight known, human-caused mortalities in the Cabinet Mountains were a result of people using national forest lands and were due to poaching and self-defense. None were caused by attractant-related problems on private lands. These mortalities, especially those occurring in the 1980s, took place during a time when grizzly bear conservation programs and recovery efforts were not as developed and obvious as they are today. Further, there were no grizzly bear specialists or law enforcement officers working in the Cabinet Mountains focusing primarily on grizzly bear issues. The mitigation plan addresses this mortality through the bear specialists and law enforcement personnel, education and information provided to the mine personnel and community, access management on the Forest that provides substantial core areas and moderate road access, and a grizzly bear research and monitoring effort. Montana Fish, Wildlife and Parks has increased its efforts to inform and educate hunters about hunting in grizzly bear habitat (Montana Fish, Wildlife and Parks 2001). We expect that this suite of measures will significantly minimize the potential for grizzly bears to be killed by mine employees or their families by poaching, mistaken identity or self-defense. The mitigation plan also includes a substantial level of attractant management efforts at the mine, on the Forest and on county and private lands in the Cabinet Mountains. The Forest implemented an ecosystem-wide mandatory food storage order that became effective June 3, 2011.

Based on existing levels and causes of grizzly bear mortality in the Cabinet Mountains and CYE, the proposed action, expected improvements in the environmental baseline due to implementation of the full complement of conservation measures in the mitigation plan, we estimate that impacts of the proposed action would result in no more than one grizzly bear mortality over the 30-year life of the mine. The Service believes that if grizzly bear mortality occurs attributable to the mine, it would most likely be due to food and attractant issues on private land or perhaps self-defense in a surprise encounter situation.

The number of CYE grizzly bears killed by people since 1982 is split about evenly between known sex bears: females (19) and males (20). In the Cabinet Mountains, of nine known human-caused mortalities, five were known to be males and three were female. In general males and sub-adult male grizzly bears have larger home ranges and conduct wider exploratory and home range movements, making them more vulnerable to confrontations with people (McLellan et al. 1999). However, due to existing information on this ecosystem, we analyzed the worst case scenario where the one human-caused mortality associated with the mine would be a female bear. We do not expect mortality associated with the evaluation adit phase, but it is more likely during the construction phase of the mine itself, when the number of employees is highest, or at sometime during the operation phase.

As described above, analysis of all factors leads us to conclude that the proposed action would fully offset the expected grizzly bear mortality due to the mine and result in a net reduction in human-caused mortality of grizzly bears within the CYE. The implementation of these measures would improve conditions for grizzly bears by reducing the current and future risk of human-caused mortality not attributable to the mine. We expect that the mitigation plan conservation measures would prevent the human-caused mortality of more than one female grizzly bear over a 30-year period. Without the proposed action, we reasonably expect that few if any of the proposed conservation measures outlined above would occur in the near future.

3. Fragmentation

The CYE is a long, narrow ecosystem, approximately 100 miles long north-south and ranging from 15 to 35 miles east to west. The Cabinet Mountains Wilderness is a small, unroaded area in the higher elevations of the ecosystem, approximately 34 miles long and varying in width from 0.5 to 7 miles. The Cabinet Mountains Wilderness consists of approximately 94,272 of the 1,664,000 acres of the CYE (5.7 percent) (MDEQ and USDA 1995) and contains all or part of BMUs 1, 2, 4, 5 and 6. BMU 8 contains the Cataract Roadless Area. These unroaded or wilderness areas provide a relatively high quantity of summer habitat, abundant throughout the CYE, but relatively limited important spring habitat. The Cabinet Mountains Wilderness forms the central section of a north-south movement corridor, linking the Cabinet Mountains to the Yaak River basin to the north. The wilderness area is unroaded, however it is impacted in places by open roads leading near or adjacent to its borders. The influence of nearby roads is especially detrimental where the wilderness narrows or where habitat in the wilderness is not conducive to grizzly bear movement, such as open areas devoid of cover.

The proposed action would not increase, and would decrease slightly, open and total motorized route densities (USFS 2013). Core area would increase and potentially could increase further with acquisition of mitigation habitat parcels. Open and total motorized route density and core areas in BMUs 2, 5, and 6 are near or better than those reported for the average of female home ranges documented by Wakkinen and Kasworm (1997) (see discussion in previous section

Analysis of Displacement Effects on Grizzly Bears).

Roads in the action area tend to be concentrated in the lower elevations where the spring habitat is concentrated and where human development and activities are situated. Approximately nine roads, including the roads accessing Way-Up and Fourth of July parcels, partially bisect the southern Cabinet Mountains from east to west in BMUs 5 and 6. Portions of some of the roads enter the north-south corridor. Of these, seven are open to the public and two allow access to only landowners with in-holdings. On the west side, two roads are open to the public and are within the north south corridor. Open roads occurring within this corridor pose displacement and mortality risks to bears attempting to move north or south through the ecosystem. The displacement resulting from these roads is particularly disruptive to grizzly bears because they cross important spring habitat, which is limited in the ecosystem, and early-season huckleberries, also not abundant within the southern portion of the ecosystem. A few of these roads run from the highways bordering the CYE up to the edges of the wilderness area bringing people near secure bear habitat. Additionally, roads just outside the corridor boundaries on the east side occur in or traverse through important spring habitat. The Vermilion River road (Forest Road 154) bisects BMU 8.

The mitigation plan (Appendix C) requires yearlong closures that would improve grizzly bear habitat by reducing fragmentation in the the north to south movement corridor. This includes Bear Creek road (Forest Road 4784) which would be closed with an earth barrier for the life of the mine (see mitigation plan), and would significantly improve grizzly bear habitat in BMU 5.

Near the proposed Montanore Mine project action area, the ecosystem narrows to approximately 15 miles, its narrowest portion. Human development on the east and west slopes, impacts the north-south movement corridor for grizzly bears in BMUs 2, 5, and 6. The BA delineates this north-south movement corridor and existing and potential sites that, if developed, may constrict the corridor and impair movement of bears through the area (see Forest BA: Figures 9-12). Distances between existing or potential sites of high human use could be less than 2 miles in some cases and when displacement distances are considered it could be less than one mile. This corridor is critical as it links grizzly bear habitat in the southern Cabinet Mountains, specifically BMUs 7, 8, and 22 with habitat in the Cabinet Mountains BMUs to the north.

Unmitigated, the proposed Montanore Mine has the *potential* to further constrict the north - south corridor in the southern Cabinet Mountains, contributing to fragmentation of the block of habitat in BMUs 6, 7, 8, and 22 from areas to the north. Improvements and increased use of Forest Road 150, and the predicted increased access to and use of Rock Creek Trail could displace grizzly bears using the north-south corridor, or those attempting to navigate the action area west of the divide.

The major roads and activities associated with the Montanore mine could also inhibit grizzly bear movement *east* of the divide in the Libby Creek drainage itself, along Forest Road 278 and use of habitat near the mine site. When added to the existing patented private lands, other private inholdings, and roads occurring on the west side of the Cabinet Mountains, the proposed Montanore Mine would contribute to fragmentation across BMU 5 within the north-south corridor.

Unmitigated, the disturbance and displacement of grizzly bears from the proposed mine activities and existing roads on the east side could reduce the safe movement and/or inhibit movement of bears traveling north and south along the Cabinet Mountains. Further the 2013 BA identified a band of fragmented habitat that could potentially reduce the connectivity between the lower third of the Cabinet Mountains section of the CYE from the rest of the CYE (USFS 2013). The BA's analysis considered the Rock Creek Mine, with all of its associated activities on the west side, to be part of the environmental baseline. The effects of the Rock Creek Mine, when added to existing roads occurring on the east side of the divide, would contribute to high levels of human disturbance within the action area. Although it would not constitute a complete barrier to movement, the disturbance could evoke avoidance behavior by some bears and reduce use of the north-south movement corridor, by inhibiting movement west of the divide. Unmitigated, the disturbances, from two mines, occurring on both sides of the divide, could impede grizzly bear movement to and from the south, impacting BMUs 6, 7, 8 and 22. And some grizzly bears could move into areas of human activity and face increased mortality risk. Grizzly bears using BMUs 2, 5, and 6 may be compelled to change traditional movement patterns and behaviors. However the effects of the Rock Creek project are mitigated as are the effects of the Montanore project (see Mitigation measures for fragmentation below).

Human use of the Rock Creek Trail along the East Fork of Rock Creek is expected to increase substantially with the improvement of access (under the Rock Creek Mine project), greater publicity and increased people moving to the area. This trail would be accessed by the improved road to the mine and would be expected to attract greater use following improvement of the road. The Rock Creek trail is currently considered a low use trail; however it is a gated motorized route that accesses private land in the upper reach of the East Fork of Rock Creek. It is a significant detrimental impact to core area and a potential fracture zone on the west side of the north-south movement corridor in the Cabinet Mountains. Mitigation for the Montanore project is planned to remove or reduce this impact by replacing the gate with an earth barrier thus removing motorized access and creating core habitat.

If not addressed, a reduction in effective core habitat may occur if human use on the Rock Creek or St. Paul Trails increased to levels that displace grizzly bears and contribute to fragmentation of the north-south corridor. The potential for confrontations between bears and people would be expected to increase if high use of the Rock Creek Trail should occur. According to the Rock Creek Mine BA (USDA 1998a), the Forest predicted the Rock Creek Mine would result in a 31 percent increase over the current (actual) use levels on this trail, ranging from 14 to 35 parties per week. This predicted increase was based solely upon a portion of the anticipated influx of Rock Creek Mine employees and their family members recreating during the life of the mine, and did not include a general increased public interest (that would include Montanore Mine employees and families) in the area. The Service has determined that the average 18 percent annual increase in reported general recreation use of the trail from 1990 to 1996 would likely continue for at least part of the next 30 years. If the existing use exceeded 20 parties per week, trail use would be considered high and significant displacement of bears away from the area would be expected, but also expected is an increased chance of adverse human-grizzly bear interactions within the north south corridor. The Rock Creek project includes mitigation to assure use levels remain low and thus assures retention of existing grizzly habitat conditions.

The Montanore Mine directly affects BMUs 2, 5 and 6 just south of the Libby valley. Further human development in the valley and along Libby Creek would displace bears sensitive to human activities and could lead to further constriction of the ecosystem to the north of the action area. People coming to the area because of opportunities associated with the proposed Montanore Mine could contribute to the fragmentation as they build homes in grizzly bear habitat. However, of the new housing units that would result due to the mine, the Libby area would see the largest number of new housing units where impacts on grizzly bear habitat would be minimal. The remaining units are likely to be distributed in or near Troy, and Eureka.

Mitigation plan measures to reduce and avoid fragmentation

1. The Forest would restrict Bear Creek Road (Forest Road 4784).

The Forest closed this eastside route to the public for safety reasons and to mitigate the impacts of the proposed action (USDA 2002c). It is now reopened, but would be closed by MMC if the proposed action proceeds and it has not been previously closed under the Rock Creek mine mitigation plan. This restriction was an important benefit to grizzly bears using the action area east of the Cabinet Divide. Bear Creek Road accesses some of the best spring, summer and fall grizzly bear habitat in the Cabinet Mountains (Kasworm and Manley 1988). Securing spring habitat in the drainage is of particular importance. East of the divide, all or portions of 19 routes would be closed year long with barriers (see BA Table 13) and two with gates, all funded by MMC.

The restrictions on motorized public use of Bear Creek Road would significantly improve secure habitat for grizzly bears on the east side, creating a block of habitat to the north with no roads open to the public covering Bear, Cable, Poorman and Ramsey Creek drainages. These drainages contain some of the highest quality grizzly bear habitat in the Cabinet Mountains and form the core area for homes ranges of eleven known grizzly bear (USFS 3013 BA Figure 5) of the minimum estimated 21 bear from the Cabinet Mountains. The closure does not entirely eliminate impacts to important habitat on the east side, but results in a significant improvement for bears in the action area. Similarly, the restrictions on Forest Road 150A in BMU 4 and other routes under the Rock Creek mitigation plan would not compensate entirely for the increased activity and disturbance in adjacent BMU 6 and along the Rock Creek trail, but would significantly improve habitat conditions for bears west of the divide in the action area.

2. The mitigation plan requires acquisition of or easement on 6,185 acres of mitigation habitat, 1,273 of which must be in the north-south corridor (see Table A10).

As mentioned previously, a minimum of 1,273 acres of this mitigation habitat is required in BMUs 5 and 6 to *specifically* reduce or mitigate for the potential fragmentation of the north-south movement corridor that results from impacts of the proposed mine. The mitigation plan requires that 500 acres be acquired *before* the evaluation adit phase of the mine could begin and 773 acres prior to the start of mine construction phase. The 1,273 acres of mitigation habitat within the north-south corridor would improve connectivity, increase core area, and maintain benefits for grizzly bears throughout a larger area depending upon the current and potential access to the lands that could be eliminated and the parcels' development potential.

The most critical objective of the required mitigation habitat is to maintain and improve grizzly bear habitat connectivity within the north-south movement corridor, to ensure grizzly bears in the southern

Cabinet Mountains portion of the CYE can adequately maintain and use home ranges, and can move between BMUs 7, 8 and 22 and BMUs to the north and north west, including BMUs 6, 5, 4, 2 and beyond (e.g toward the SCYE to the northwest and toward the Bitterroot ecosystem to the south). The key element in assuring connectivity in the north-south movement corridor is the juxtaposition of properties acquired through fee title or easement to the proposed mine site, the mine's zone of influence, and the east-side roads. With the number of private land parcels available in BMUs 2, 5 and 6, there are a number of combinations of mitigation properties that would meet this objective. However, other combinations of mitigation properties may not adequately offset the significant potential for fragmentation of the north-south movement corridor. The Oversight Committee has a role to oversee the replacement habitat requirement, providing input to the Forest, to ensure the adequacy of parcels selected. Further, the Service would review the combination of properties and advise the Forest as to whether it ensures an adequate movement corridor and home range use for grizzly bears within BMUs 2, 5, and 6.

The mitigation plan relies on the *Montanore Mine Potential Habitat Replacement Lands Assessment (*final Novembert 2013 (Kasworm et al 2013*)* and the north south corridor *Mitigation Credit Assessment*, final December 2013 (Kasworm et al 2013)). These assessements would ensure that the 1,273 acres acquired adequately reduces the potential for fragmentation of the north-south corridor. The Service, including the grizzly research group, and Forest were involved in the development of the Habitat Replacement Assessment and the Mitigation Credit Assessment, which identifies potential mitigation habitat parcels and prioritizes them according to location, development potential, and potential contribution to maintaining and improving connectivity in the north-south corridor. The Mitigation Credit Assessment further prioritizes those lands within the north south corridor based on biological importance and potential to improve grizzly bear habitat conditions. The plan also states that the Forest Service would have final approval of mitigation acres and associated covenants prior to recording At the request of the Forest, the Service would review the identified properties to further ensure they contribute to an adequate movement corridor. Portions of the additional 4,912 acres of mitigation habitat could also serve to further improve connectivity north-south, if those acquisitions were determined to be most beneficial to grizzly bears.

The mitigation plan stipulates that private lands be acquired by MMC through acquisition of fee-title or *perpetual* conservation easements and transferred to the Forest Service through donation or land exchange. Perpetual conservation easements would ensure long-term protection of security habitat for bears that have incorporated these secure areas into their home ranges. Mitigation habitat would preclude development of existing private habitat that might occur without such protection. Acquiring mitigation habitat that is currently developed or at risk of development would benefit bears by eliminating or precluding development or other management adverse to bears over the long-term; mitigation properties would be managed in a way supportive of bear survival and recovery, a factor especially important in the north-south movement corridor. The mitigation plan requires these acres be managed for grizzly bear security pursuant to protective conservation easement terms or pursuant to Forest management strategies supportive of grizzly bear recovery and survival. Acquisition of fee title or permanent easement would ensure that these private lands remain secure for bear habitat in the future. The 6,185acres of mitigation habitat would also contribute to improving connectivity of habitat in the general action area (see discussion above under *Mitigation plan effects on grizzly bear displacement and habitat loss*).

In addition the mitigation plan (Appendix C, Item C.2) allows up to 1,286 acres of the total 6,185 acres required to come from the Cabinet Face BORZ and linkage area identified east of the CYE. Acres acquired in this area would contribute to providing a secure movement area (linkage zone) between the CYE and NCDE.

3. **The mitigation plan requires funding to conduct a long-term monitoring study of grizzly bears throughout the life of the mine within the action area, in coordination with the current grizzly bear research conducted in the Cabinet Yaak ecosystem.**

As discussed in more detail above under "*Support monitoring and research"* section, the information gathered from the monitoring study would be used to ensure the mitigation measures, including road closures, habitat acquisition, and easements, were in fact working to alleviate fragmentation of habitat within the action area. If monitoring information suggested otherwise, the Service would consider that as new information requiring initiation of additional consultation. Information gained through monitoring could be used to inform the adaptive management process.

4. **The proposed action and mitigation plan ensure no degradation of access management conditions for grizzly bears in BMUs 4, 5 and 6 for the life of the mine.**

As discussed in detail in the previous section *Analysis of Displacement Effects on Grizzly Bears,* levels of open and total motorized route densities are near or below the average reported in CYE grizzly bear research. Core areas in BMUs 2, 4, 5, 6, 7, and 8 are equal to, or in most cases substantially above the average reported in research. The mitigation plan requires the Forest to manage at a level better than these baseline conditions once mitigation properties are acquired and access management opportunities arise on National Forest lands. This level of access management would contribute to reducing or mitigating for displacement and fragmentation effects of the mine on grizzly bears.

5. **The mitigation plan would require an Oversight Committee to establish an MOU that would define roles and responsibilities of members and the committee, whose primary function would be to oversee the 30-year grizzly bear management plan.**

The Oversight Committee and defined management plan required in the mitigation plan is needed to coordinate and monitor the complex set of mitigations, the acquisition of lands and conservation easements, the monitoring and reporting, use of new information, and other requirements of the mitigation plan to ensure that the conservation needs of grizzly bears are met. This coordinated, calculated approach to full implementation of the mitigation plan, with adaptive management where needed, would alleviate the potential for fragmentation of the southern Cabinets as a result of the proposed Montanore Mine.

Summary of fragmentation risks. Considering the current conditions in the action area, the proposed action would reduce north-south connectivity across the Libby Creek drainage itself, due to effects of the mine and increased traffic along FR 278. The increased traffic on Forest Road 278 is not expected to create a barrier to grizzly bear crossing the drainage, but would probably affect general movement patterns and would affect grizzly bear use of habitat near the road. The potential for fragmentation due to roads and development would be reduced throughout the rest of the action area, especially within the north-south movement corridor. The effects of full implementation of all conservation measures in the proposed action and mitigation plan, is expected to result in an improvement in the connectivity of habitat within the corridor through proposed access management of road closures east of the divide (see USFS 2013 BA Table 13), and acquisition of fee title or conservation easement on mitigation lands that are currently developed or at risk of development. Overall, the measures taken to improve connectivity throughout the north south corridor would provide habitat for unimpeded grizzly bear movement along the Cabinet Divide, supporting the effectiveness of the southern BMUs for grizzly bear recovery in the Cabinet Mountains. This would partially compensate for the impacts of reduced connectivity across the Libby Creek drainage.

Conservation Needs of the Species

The Service has identified six priority needs to improve the present status of grizzly bears in the CYE and achieve grizzly bear recovery (Servheen pers comm. 2006 *in*: USFWS 2006)These are listed below, along with a summary of the proposed mitigation plan measures that specifically address each need. The Service's Grizzly Bear Recovery Coordinator identified the six priority needs to achieve grizzly bear recovery in the CYE grizzly bear recovery zones (ibid):

1. Augment the Cabinet Mountains and Canadian Selkirks populations;
2. Limit human-caused mortality;
3. Enhance population linkage across Highways 2, 3, 200, 135, and 95;
4. Address the needs of bears outside the recovery zone line;
5. Inside the recovery zone, a) complete access management in most important areas and b) improve sanitation standards on public lands;
6. Increase outreach and public involvement.

The following is a list of these priority needs and a summary of how the proposed action would address each need. The first three are similar to those assessed in Proctor et al. (2004) as discussed above:

1. **Augmentation should be done in the CYE, specifically 12 to 15 sub-adult females (Proctor et al. 2004b) into the Cabinet Mountains within ten years.**

In 2005, Montana Fish, Wildlife and Parks announced its plan to continue augmentation of the Cabinet Mountains, with one to two female grizzly bears per year. In 2006, the preferred alternative in the State's DEIS on the Grizzly Bear Management Plan for Western Montana supported the earlier recommendation for augmentation (Montana Department of Fish, Wildlife and Parks 1986). The DEIS recommended 10 to 15 grizzly bears should be augmented into the Cabinet Mountains. They released a six-year old female from the NCDE into the Cabinet Mountains in 2005, and a sub-adult female in 2006. Two females were placed in the East Fork of the Bull River in 2008. Another adult female was released near Spar Lake in 2009. In 2010 two sub-adult bears (a male and a female) were transplanted to the Cabinet Mountains. A repeat of the 2010 augmentation occurred in 2011 adding two bears (1 male, 1 female) near Spar Lake. Kasworm et al. (2006) stated that the augmentation program should not be viewed as simply replacing bears lost to human-caused mortality, but should provide for overall increases in the grizzly bear population in the CYE. They estimated that between 12 and 24 female grizzly bears were needed to stabilize the population, again depending upon survival rates and age at the time of relocation. MFWP intends to continue its augmentation program, assuming the Service monitors relocated bears as needed for recovery in the CYE (Jim Williams, pers.comm. 2013).

Montana Fish, Wildlife and Park's augmentation plan fulfills one high-priority conservation need for grizzly bears in the CYE. The proposed action is not associated with and does not affect the State's plan to augment the CYE. However, the Service has expanded its monitoring effort to monitor the augmented bears. Annual funding for the Service to monitor grizzly bears in the CYE is currently tenuous, dependent upon federal funding. Projected federal funding for the next few years is as of yet not adequate to ensure continued monitoring of augmented or native grizzly bears through the Service's current program in the CYE (Chris Servheen, pers. comm. 2006 *in:* USFWS 2006). Montana Fish, Wildlife and Parks will continue to augment the population if the Service monitors the augmented bears (ibid, Jim Williams pers. comm. 2013). Therefore, in addition to the funding for monitoring bears required in the 2007 Rock Creek mine mitigation plan, MMC agreed to provide funding to the Service to monitor native bears as well as grizzly bears augmented into the Cabinet Mountains.

The State's augmentation efforts would be complemented by a corresponding long-term reduction in the *existing* potential human-caused mortality rate of grizzly bears. This reduction is expected to occur both within and outside of the action area as a result of the combined effects of mitigation measures described below and in previous sections of this opinion. The program is also complemented by the maintenance of adequate effective habitat conditions for grizzly bears on Forest lands in the affected BMUs, and in the Cabinet Mountain range in general. The overall reduction in grizzly bear mortality rate is expected to save more than one bear resulting in improved conditions for bears over the existing baseline.

2. Reduction of grizzly bear mortality rates by addressing the sources of human-caused mortality through a) educating the public to reduce bear attractants at homes, farms, hunting camps, and recreation sites, b) hunter education to reduce misidentification kills and minimize attractive ungulate carcasses, and c) controlling human access (via roads).

The measures identified below are designed to not only arrest the grizzly bear population decline in the CYE (57% probability of decline at -0.8%) (Kasworm et.al 2013), but are also intended to have the population reach stability prior to the start of the construction phase.

Specific measures that address this priority are listed below. Previous sections of this biological opinion described and detailed how each contributes to fulfilling the priority need. **Italicized** measures are those that are not reasonably expected to occur in the near future without the funding provided by MMC as required in the mitigation plan, based on past and anticipated levels of government funding.

- *A second Montana, Fish, Wildlife, and Parks' grizzly bear specialist in Libby, prior to construction of the evaluation adit*
- *A second Montana, Fish, Wildlife, and Parks' wildlife law enforcement officer in Libby, prior to construction of the evaluation adit*
- *A Montana, Fish, Wildlife, and Parks' grizzly bear habitat specialist in Libby, prior to construction of the evaluation adit to work as a grizzly bear habitat specialist*
- *Grizzly bear-resistant garbage containers for employees' personal use*
- *Grizzly bear-resistant garbage containers for distribution to the public*
- *Grizzly bear-resistant county garbage transfer station near mine entrance, prior to construction of the evaluation adit*

- *Funding to ensure 13 county transfer stations across the entire CYE are bear-resistant*
- *Funding for 10 initial electric fencing kits and two additional kits annually as needed*
- *Funding ongoing monitoring and research of native grizzly bears in the Cabinet Mountains, beginning prior to construction of the evaluation adit*
- *Funding for ongoing monitoring and research of native bears and bears augmented through State program, beginning prior to construction of the evaluation adit*
- *From the initial work on the evaluation adit through the 30-year life of the project, funding would be available with which to monitor the grizzly bear population to assess grizzly bear population trend and habitat use, to ensure the mitigation measures were effective.*
- *Funding for all sites on the Forest with garbage facilities to be made grizzly bear resistant*
- *Five hundred acres of high risk grizzly bear habitat within the north-south corridor, acquired prior to construction of the evaluation adit by MMC and transferred to the Forest, with an additional 773 acres in the N-S corridor prior to the start of the construction phase*
- *Acquisition or easement of a total of at least 4,934 acres of private, high risk-high value lands within or adjacent to the CYE, prior to construction phase of the mine*
- *Public outreach effort urging support for grizzly bear conservation, sponsored by MMC, prior to construction of the evaluation adit*
- Forest road density management to control access, beginning prior to construction of the evaluation adit. No significant increases in open or total motorized access densities, or decrease in core area.

3. Enhance Population Linkages across Highways in the Cabinet Mountains and the NCDE.

This priority is supported by Proctor et.al 2004. Specific measures that address this priority need are listed below. Previous sections of this biological opinion described and detailed how each contributes to fulfilling the need. **Italicized** measures are those that are not reasonably expected to occur in the near future without the funding provided by MMC as required in the mitigation plan, based on past and anticipated levels of government funding.

- *Funds for continuing the ongoing monitoring of bears to assess and identify key connectivity lands between the NCDE and Cabinet Mountains*
- *Five hundred acres of high risk grizzly bear habitat within the north south corridor, acquired prior to construction of the evaluation adit by MMC and transferred to the Forest and another 773 acres in the N-S corridor prior to the start of the construction phase*
- *Acquisition or easement of a total of at least 4,934 acres of private, high risk-high value lands within or adjacent to (in linkage areas) the CYE, prior to construction and operation of the mine*
- Forest road density management to control access, beginning prior to construction of the evaluation adit.

4. **Address the needs of bears outside the recovery zone**.

The mitigation package would improve current conditions for grizzly bears within the CYE recovery zone. The bear specialists and law enforcement officer would also provide services to areas outside the recovery zone, thus benefiting grizzly bears occurring there. Also, motorized access management for grizzly bears occurring outside the recovery zone improved in 2011, with the Forest Plan access amendment. Additional improvement could occur there should any mitigation lands be acquired in the linkage area east of the CYE.

5. Increase outreach and public involvement

As described in this biological opinion, the proposed action contributes to this measure through measures listed below. **Italicized** measures are those that are not reasonably expected to occur in the near future without the funding provided by MMC as required in the mitigation plan, based on past and anticipated levels of government funding.

- *Enhanced public outreach effort to obtain support for grizzly bear conservation, involving the public, local and county governments and partner agencies, sponsored by MMC, prior to construction of the evaluation adit*.
- Forest will organize and lead regularly scheduled meetings, attended by representatives of participating agencies, the interested general public, and representatives of the county commissioners, mining company, local citizen and other non-government groups to review objectives and implementation of the mitigation measures, and review monitoring and research information.
- *Additional (second) Montana, Fish, Wildlife, and Parks' grizzly bear specialist in Libby, prior to construction of the evaluation adit*. (total of 2 with Rock Creek mitigation plan)
- *Additional (second) Montana, Fish, Wildlife, and Parks' wildlife law enforcement officer in Libby, prior to construction of the evaluation adit*. (total of 2 with Rock Creek mitigation plan)
- *Habitat specialist with Montana, Fish, Wildlife, and Parks' to focus on grizzly bear habitat, in Libby, prior to construction of the evaluation adit.*

6. Access management

As described earlier in this biological opinion, access management related to the proposed action contributes to this priority conservation need. Access management in all affected BMUs will comply with the 2011 access amendment.

- Forest road density management to control access, beginning prior to construction of the evaluation adit; no significant increases in open or total motorized access densities, or decrease in core area; potential decreases in road densities and increases in core as a result of acquisition of mitigation habitat.

In summary, the proposed action contributes to each of the six priority conservation needs for recovery of grizzly bears in the CYE.

Species Response to the Proposed Action

Recent trend estimates for the CYE grizzly bear population suggest a slight (less than one percent) decline; the current probability of decline is 57 percent (Kasworm et al. 2013). As discussed in the *Status of the species* section, the population has been improving since 2006 as demonstrated through several metrics (e.g. reduced probability of decline, reduced annual rate of decline). The population response is in part due to changes in motorized access that provides more secure habitat; improved attractant storage (i.e. bear resistant containers and fencing), and the efforts of bear specialists to inform the public on living in bear habitat. With these improving conditions and the funds to fully implement the proposed action mitigaton plan the population response is expected to continue in a positive direction, and likely at a quicker pace.

It is unlikely that at this time habitat is the factor most limiting the grizzly bear population. The existing small population and correspondingly few reproductive-age female grizzly bears are more plausible factors limiting population growth. Grizzly bear reproductive rates are inherently low, because female grizzly bears typically do not breed until age 4 or older, average 2 cubs per litter, stay with cubs for 2 to 3 years, and have few litters during their lifetime. Cub mortality rates are relatively high. Mortality of adult female grizzly bears is especially deleterious to population growth. The population of grizzly bears in the CYE remains vulnerable to extirpation because of small population size (Proctor et al. 2004).

Small population size, human-caused mortality and reduced habitat connectivity have long been recognized as significant problems in the CYE grizzly bear population, and in other wildlife populations as well. A population of only 40 to 50 grizzly bears makes any number of human caused mortalities, in addition to natural mortality, a significant factor in population decline. Human-caused mortality in the CYE is limiting population increase and contributing to extinction risk (Mattson and Merrill 2004; Procter et al. 2004b). The number of human-caused mortalities of grizzly bears in the U.S. portion of the CYE over the past 30 years is 36, or an average of about 1 per year. The effect on the population has been significant. The existing human-caused mortality rate, given the small grizzly bear population, is not sustainable with or without the Montanore Mine. This presents a management challenge, considering the number of human-caused mortalities (less than 1 per year) compared to the number of people who use or live in grizzly bear habitat in the CYE each year. We are not able to predict and prevent all circumstances that could cause any one specific person, at a specific time and place, to kill or cause the death of a grizzly bear. However, as the human and grizzly bear populations grow, there are actions that agencies and governments can take to reduce the potential for human-caused grizzly bear mortality.

As described in detail earlier in this biological opinion, we expect that one grizzly bear may be killed due to impacts of the mine, but likely not until the construction or operation phase of the mine. During those phases of the mine, the number of people living in the area would increase substantially. We do not anticipate mortality of grizzly bears during the initial two to three years of construction and operation of the evaluation adit due to the up-front completion of the required mitigation actions.

In this biological opinion, we analyzed the anticipated effects of the proposed mine in consideration of the most recent estimated rate of trend and probability of decline (Kasworm et al. 2013; and projections in Proctor et al. (2004b).

The proposed mitigation plan directly addresses each of the primary factors limiting growth of the CYE population:

- small population size,
- human-caused mortality, and
- connectivity,
- as well as the six conservation needs of the grizzly bears in the CYE

The mitigation plan recognizes and addresses the need for specific actions that would work collectively to improve the existing status of CYE grizzly bears prior to commencing with development of the mine. The actions needed would stabilize the population through conservation of effective habitat within the project area and through a substantial reduction in the risk of human-caused mortality of grizzly bears within the project area and throughout the CYE. Improvements in the current conditions are needed to cultivate a grizzly bear population that is able to sustain some level of human-caused mortality over the long-term as the risk of human caused mortality cannot be entirely eliminated. The mitigation plan identifies measures that address and alleviate the problems of small population size and existing rates of human-caused mortality (e.g. food and attractant storage, public education, law enforcement, increasing secure "core" habitat) as well as measures to improve and maintain habitat connectivity (e.g. acquire lands at risk in north-south movement corridor in Cabinet Mountains and linkage area between CYE and NCDE).

MMC agreed to provide additional, significant levels of funding for needed conservation measures. This level of funding dedicated to grizzly bear conservation in the CYE is not likely available through limited federal, state or local government funds. As detailed in this opinion, the 2013 mitigation plan includes measures that reduce or offset the impacts of the mine, but also includes several proactive measures that would alleviate problems related to grizzly bear mortality and habitat connectivity that *is not and would not* be attributable to the mine. These measures were necessary in order to improve the current population status of grizzly bears in the CYE to the point the population could sustain all potential adverse impacts from the mine, over the long term.

Table A14 (below) summarizes the total mitigation plan funding proportions directed at the major issues affecting grizzly bears in the CYE. It outlines both current management efforts and proposed management under the mitigation plan. The table summarizes how issues central to the recovery of grizzly bears in the CYE are currently addressed, and how the proposed project would address each. The mitigation plan allocates resources to various issues in proportion to needs in reducing mortality risk and other risks to CYE grizzly bears.

The proposed action would fund grizzly bear conservation measures outlined above. Critical needs for augmentation, human caused mortality reduction and habitat connectivity are now subject to available agency funding or would not occur. Agency budgets have remained flat or been reduced in recent past and future funding is unclear (Chris Servheen pers. comm. 2013).

As detailed earlier, the mitigation plan requires the Oversight Committee to oversee and monitor the implementation of all mitigation measures by the Forest and MMC, and review all new information on grizzly bears and grizzly bears in the CYE. If needed, the Oversight Committee would develop appropriate modifications or revisions of the management plan and recommend these to the Forest. This information would come from sources including information from the research and monitoring effort conducted over the life of the mine. The Forest and participating agencies would meet regularly with the interested public and local governments, to review implementation of the plan. We expect that this would increase public trust of agency sponsored efforts and public support for grizzly bear recovery.

We conclude that the number and type of measures included in the mitigation plan to reduce human-caused mortality can reasonably be expected to reduce current and future human-caused mortality risks across the CYE, including risks associated with the mine. We expect that the displacement, mortality and fragmentation risks associated with the mine would be fully or more than offset because important aspects of current conditions for grizzly bears in the CYE would be substantially improved (especially few breeding age females and a reduction in human-caused mortality risk), and would continue to improve as time goes by, due in large part to the measures in the mitigation plan, in conjunction with other recovery actions.

Table A14. Major issues affecting grizzly bears in the CYE and mitigation plan funding

Issue	Current management	Enhanced management	Percent of mitigation effort	Percent of mortality
Population size	Low numbers placed opportunistically; Limited monitoring due to limited funding	Monitoring of all placed bears to document survival and reproduction State augmentation of 2-3 bears annually Increased placement increases genetic health and increases fitness	25 percent Funding on-going grizzly bear research and monitoring in CYE	
Mortality	High human-caused mortality risk Risks increasing due to increasing development No bear management specialists, resulting in ongoing conflicts Illegal killing continues	Lower due to: Two bear management specialists advance education and minimize conflict potential. Fenced transfer stations Additional Warden reduces potential for illegal killing and advances efficient investigations of bear mortalities	75 percent combination of: 30 percent MFWP positions; 3 percent sanitation items; 2 percent Access Mgmt changes; and 40 percent habitat replacement	Illegal: 15 percent Mistaken ID 12 percent Self-defense 10 percent Site Conflicts 2 percent
Population trend	Declining	Stabilized and then increasing due to: Enhanced survival due to new programs and actions: sanitation, outreach, hunter education, bear specialist and warden positions State Augmentation with Service monitoring	75 percent mortality control 16 percent augmentation monitoring	
Attractants	Mandatory food storage order on NFS lands Minimal efforts on private lands	Enhanced attractant control due to: Bear specialist positions Bear resistant dumpsters on Forest Bear resistant containers at homes Fencing Transfer stations Portable electric fences for private use	Combination of: 30 percent FWP positions 3 percent bear resistant dumpsters, transfer stations, and outreach	Site Conflicts 2 percent
Linkage	Minimal efforts	Enhanced efforts due to: Monitoring of bears in Hwy 2 area Outreach to local residents regarding sanitation and conflict prevention Easements and acquisitions possible with identification of key crossings Increased bear numbers due to reduced mortality and eventual occupancy of linkage areas Enhanced sanitation in linkage areas, bear resistant containers at private residences	Combination of: 9 percent monitoring bear movements across highway 2 south 3 percent sanitation items 40 percent habitat replacement 30 percent MFWP positions	

The proposed action including the mitigation plan would more than offset the loss of one grizzly bear (due to direct mortality) and the potential reduction in reproduction (or "harm" associated with displacement). The combined effects of measures in the proposed action would ensure the current conditions for bears improved and so would gradually increase the number of grizzly bears in the CYE. Mitigation measures that offset adverse effects related to the mine ensure that the population could sustain and absorb impacts from the mine. The combined measures affect both the project action area and entire CYE. In conjunction with the State's augmentation program, the mitigation plan is expected to contribute to meeting the overall conservation needs of grizzly bears in the CYE (listed above). The measures are reasonably expected to improve the current conditions for grizzly bears by supporting augmentation through improved habitat conditions, reducing the probability of grizzly bear mortality due to the mine, reducing the current rate of human-caused grizzly bear mortality not associated with the mine within and outside the action area, and improving both connectivity within the north-south corridor and within the entire CYE, by aiding in the identification of key parcels linking the Cabinet Mountains with the Yaak portion of the ecosystem and the NCDE. Over time, with full implementation of the proposed action and mitigation plan, we expect to see the number of grizzly bears grow and the population stabilize and then increase toward recovery goals.

VI. CUMULATIVE EFFECTS

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

The cumulative effects of increased public recreational use of the action area, private land development for homes and business, and the significant amount of roads and forest management activities associated with private corporate timber lands within the action area are expected to continue. Recreational use and timber harvest on private property may have considerable local impacts on grizzly bears in the southern portion of the Cabinet Mountains. The Service believes these cumulative effects would adversely impact grizzly bears in the action area. On Plum Creek lands within the action area, Plum Creek applies timber harvest management direction for grizzly bears conservation, following the principles outlined in a September 15, 1993 letter (Plum Creek Timber Co., Inc. 1993) to the Service. The guidelines include direction for managing open road density, road location, cover, size of openings, timing of operations, and riparian habitats. These guidelines moderate the impacts of timber harvest on grizzly bears.

Other projects in the action area pose fragmentation risks in the narrow recovery zone. Two small patented mining properties (Way-up and Fourth of July mines) had been granted a Forest Service right-of-way authorization. The Forest concluded that it was unable to entirely restrict access to private land under ANILCA, nor restrict activities conducted on the private lands. Further, more than a dozen other patented mining properties occur in the corridor between the east and west sides of the southern Cabinet Mountains. The Forest has limited jurisdiction to reduce impacts that could occur on these private properties. Large scale mineral development is unlikely on these small patents (John McKay, Forest geologist, pers. comm. 2000) due to the size of the patents and the nature of the mineral deposits. However, potential activities on some of these private properties that could adversely impact grizzly bears include clear-cutting, small-scale mining activity including surface disturbance and blasting, construction of buildings, hunting camps, and livestock operations with food and attractants. Road access is not currently authorized to all patent owners, but the Forest may not have the authority to adequately manage future access to private lands in ways compatible with grizzly bear recovery.

Activities on private land in-holdings, especially on the east side of the Cabinet Mountains, could potentially affect grizzly bear movements within the north-south movement corridor, effectively constricting the secure habitat for bears to less than 2 miles wide in BMUs 4, 5 and 6. The north-south corridor contains expanses of scree habitat (exposed rock) lacking cover, and steep topography. Many private land inholdings contain cover that would be used by grizzly bears moving through the area.

Further constriction of the corridor may force grizzly bears into contact with people, could increase adverse intra-specific conflicts with other bears, or could displace them from essential habitat to the extent that significant impacts to reproduction and survival result. The impacts of development on private inholdings would be reduced and in some cases eliminated within the north-south corridor in BMUs 2, 4, 5 and 6 through the acquisition or perpetual easement of 1,273 acres as required in the mitigation plan. Revett has recently acquired 273 acres in the north-south corridor, which would be used as mitigation property if the Rock Creek mine is permitted (Carson Rife, Revett, pers.comm. 2005). This property has high value to grizzly bears; it was rated as the number two priority by the agencies in their list of priority lands for acquisition or conservation easement. This property, managed for grizzly bear conservation, will contribute to long term habitat connectivity in the north-south corridor and reduce the potential for displacement of bears into the future.

Montana Fish, Wildlife and Parks began its augmentation effort in the Cabinet Mountains with plans to augment one to two female grizzly bears per year in 2005 (Montana Fish, Wildlife and Parks, 2005). Montana Fish, Wildlife and Parks proposed augmentation in 1986 in *The Grizzly Bear in Northwestern Montana* (1986 FEIS). In 2006, the State released its *DEIS on the Grizzly Bear Management Plan for Western Montana*, which included a preferred alternative to augment the CYE with 10 to 15 sub-adult male or female grizzly bears, or appropriate adult females, from other areas. To date 11 females and 2 males have been placed in the Cabinet Mountains by the MFWP. Of 13 bears released through 2011, 4 are known to have left the target area (one was recaptured and returned), two were killed within 4 months of release, and one was killed 16 years after release. One animal is known to have produced at least 9 first generation offspring and 8 second generation offspring. As a result of augmentation, the number of grizzly bear in the Cabinet Mountains has increased (Kasworm et. Al 2013). Montana Fish, Wildlife and Parks' augmentation plan to relocate grizzly bears, two (or possibly more) female grizzly bears per year, is consistent and compatible with recent conservation recommendations for the CYE (Proctor et al. 2004b), and with the priority conservation needs of grizzly bears in the CYE. Augmentation will significantly improve the short-term conditions for the population of grizzly bears in the CYE. MMC has agreed to provide funding to ensure the Service has adequate annual funds to monitor augmented bears.

One population simulation estimated that 13 female grizzly bears would need to be augmented into the Cabinets to stabilize the population (Proctor et al. 2004b); another estimated 24 females were needed given current mortality rates (relatively low survival rates) or that 12 were needed if mortality rates were lower (higher survival rates) (Kasworm et al. 2006b). In 2004, Proctor et al. (2004b) concluded that the CYE grizzly bear population would need to be augmented and mortality rates would have to be lowered from existing levels to ultimately reduce the likelihood of extinction. The Montana Fish, Wildlife and Parks have a bear management program; however, resources for that program are currently limited in the CYE. Success of Montana Fish, Wildlife and Parks' effort will take several years and must be documented through monitoring augmented bears. Based on the MFWP earlier augmentation efforts in the CYE (described in the *Environmental Baseline* section previously), we expect that augmentation will be successful over the next decade and significantly improve the status of the CYE grizzly bear population. We consider this program critical to the short-term (10 years) health of the population and to recovery over the long-term.

The proposed action would increase the human population by about 2 percent in the local area. Without the proposed mine, Sanders and Lincoln Counties were expected to grow by 32 and 15 percent respectively between 1999 and 2020. Within the action area, development of private land in the center of the CYE near Troy continues. Expected increases in human development in or near the action area may displace bears sensitive to human activities and lead to further constriction of the ecosystem to the north of the action area, impacting grizzly bears in the action area. Human development has inherent risks of habituation, food-related grizzly bear management problems, and increases opportunities for poaching or malicious killing of grizzly bears. Greater sprawl of residences along Libby Creek will continue to impact grizzly bears in the southern Cabinet Mountains. Experience in other grizzly bear ecosystems demonstrates that human population growth can affect grizzly bear populations to varying degrees. The adverse effects of human population growth mentioned above can be moderated where: homes are built adjacent to or within the footprint of existing communities versus rural, dispersed developments; communities implement adequate attractant storage measures; private land owners have access to information on living in grizzly bear habitat; landowners have support in dealing with nuisance bears; hunters and recreationists are informed and aware of grizzly bear conservation needs; and access management on public lands provides adequate grizzly bear security. For instance, the grizzly bear population in the larger Yellowstone grizzly bear ecosystem has grown and expanded its range despite substantial growth in the human population adjacent to and within the ecosystem within the past 20 years. Much of this growth, however, is in part attributable to the large portion of the recovery zone in Yellowstone National Park, where human activity is highly regulated.

Human population growth presents special challenges to maintaining grizzly bear populations as small as the CYE grizzly bear population (see Mattson and Merrill 2004). The human population in Lincoln County is projected to gradually increase over the next 30 years, with or without the mine, as is Sanders County. In addition, the communities of Libby, Troy, Eureka, Noxon, Heron, Trout Creek, and Thompson Falls are expected to grow by one to two percent a year without the mine (USFS 2009e). Reduction of human-caused mortality is a key factor in reversing the decline of the CYE grizzly bear population. It is unlikely that sufficient local or state government sources or private sources of funding would be available for most programs or actions to significantly reduce human-caused mortality in the near term. We anticipate that the increased human population growth that is not associated with the mine would result in additional human-caused grizzly bear mortality in the action area over existing mortality rates over the 30-year life of the mine.

However, if the mine were to proceed, the grizzly bear specialist and law enforcement positions, sanitation measures on private and public land, access management on public lands, and the grizzly bear monitoring effort required in the mitigation plan would work to substantially reduce, but could not entirely eliminate, the adverse impacts of such human population growth within the Cabinet Mountains portion of the CYE. Without measures such as those in the Proposed project's mitigation plan, we anticipate higher human-caused mortality rates.

VII. CONCLUSION

Section 7(a)(2) of the Act requires Federal agencies to satisfy two standards in carrying out their programs. Federal agencies must ensure that their activities are not likely to: (1) jeopardize the continued existence of any listed species, or (2) result in the destruction or adverse modification of designated critical habitat.

Regulations implementing this section of the Act define “jeopardize the continued existence of” as “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species,” and “destruction or adverse modification” as “a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.”

After reviewing the current status of the grizzly bear, the environmental baseline for the action area, the effects of the proposed Montanore Mine and the cumulative effects, it is the Service’s biological opinion that the Montanore Mine as proposed is not likely to jeopardize the continued existence of the listed entity of the grizzly bear. No critical habitat has been designated for this species, therefore none will be affected.

This biological opinion analyzed the effects of the proposed action and mitigation plan on grizzly bears. We concluded that collectively, the measures would reduce, remove, or more than offset the potential adverse effects of the proposed action. The Service believes the mitigation plan addresses the key conservation needs of grizzly bears in the CYE, and ensures that the proposed action would not likely jeopardize grizzly bears. We base our conclusion on the entire analysis found in this document, all information provided by the Forest, discussions with the Forest and with MMC staff, discussions with Montana Fish, Wildlife and Parks biologists, and information in our files.

The Service concludes that the combination of the actions required in the proposed action and mitigation plan would eliminate the likelihood that the proposed action would appreciably diminish survival and recovery of grizzly bears, and would in fact improve conditions over the long-term over the existing conditions, ultimately promoting the recovery of the CYE grizzly bear population. The recovery of the CYE population supports survival and recovery of grizzly bears in the listed entity. The following *summarizes* the primary means by which the proposed action and mitigation plan avoid jeopardy:

1. **Conservation Needs.** Results in Procter et al. (2004b) indicated that three actions could significantly reduce the probability of extinction: a) augmentation of the population, most effective on population growth in the short-term, b) reduction of grizzly bear mortality, most effective on population growth in the long-term, and c) enhanced population interchange, which along with reduction of mortality, had the largest effect on reducing extinction probability. Further the Service considers these three actions as priority conservation needs for recovery in the CYE, along with the following three additional needs: d) increased public outreach, e) needs of grizzly bears outside the recovery zone, and f) access management.

This biological opinion described and analyzed the mitigation plan measures or other measures expected to occur that fulfill several of these recommended actions. These include: a) funding to ensure the Service is able to continue to monitor Cabinet Mountains grizzly bears, both native and augmented bears; b) a comprehensive set of required measures expected to reduce human-caused mortality not only within the action area, but throughout the entire CYE; c) funding to ensure and expedite research that would help enable us to identify existing and potential areas of habitat linkage between the Cabinet Mountains and the NCDE; d) a CYE bear specialist program, increased law enforcement, and a public outreach program sponsored by MMC; and e) no increases in open or total motorized route densities and no loss of core, with potential additional improvements through habitat acquisition. We conclude that these measures would contribute to improving the status of the grizzly bear population in the entire CYE, and be effective at an ecosystem scale to improve the existing conditions for grizzly bears. We also conclude that these measures would contribute to reducing and/or offsetting the potential adverse effects of the proposed action to levels not likely to appreciably diminish survival and recovery of grizzly bears, as analyzed in this biological opinion.

2. **Human-caused Mortality Risk.** To the extent possible, management actions reduce potential mortality risks to grizzly bears in an attempt to meet the intent of the CYE Recovery Plan human-caused grizzly bear mortality *goal* of zero. The Recovery Plan recognized the amplified risks of human-caused grizzly bear mortality in the CYE due to small grizzly bear population size and possible stochastic events. Given the current status of the grizzly bear population, the population would decline with additional unabated loss of sub-adult or adult female grizzly bears.

As mentioned in #1 above, the mitigation plan contains a comprehensive package of measures that have been shown in practice to work together to reduce mortality risks to grizzly bears. Mitigation plan measures to reduce the potential for grizzly bear mortality were discussed in detail in this biological opinion. The mitigation plan also requires a grizzly bear monitoring program that would assist in detecting and identifying the causes of grizzly bear mortality, and in assessing the success of mitigation efforts. However, the mortality risks increase with the direct and indirect effects of the mine and these risks cannot be entirely eliminated over the 30-year life of the mine.

The Service anticipates that no more than one grizzly bear would be killed or removed from the population as a result of the proposed action. We base this expectation on the environmental baseline, existing and past grizzly bear mortality rates, causes of mortalities, and total effects of the mitigation measures. Unmitigated, female mortality would be especially detrimental if it occurred within the near-term before this population benefits from either natural population growth or the combination of augmentation and reduced human-caused mortality. We anticipate that the loss of a grizzly bear, if it occurs, would not occur for a number of years during the construction or operation phase of the mine.

We expect no net increase in human-caused mortality rates even with the potential mortality due to the mine. According to recent scientific population simulations (Proctor etal 2004b), augmentation of the population and a reduction in mortality are essential factors in reducing the probability of extinction. As explained in this biological opinion, the mitigation package includes examples of most of the kinds of measures known to reduce human-caused mortality. The proposed action reduces the potential for grizzly bear mortalities that could be *attributable to the mine*. The mitigation plan goes further in that it is expected to improve the current environmental baseline conditions for grizzly bears by *reducing current and future rates* of human-caused mortality *not directly or indirectly attributable to the mine*. The combination of the State’s augmentation and the project's actions to reduce current rates of human-caused mortality significantly reduces the potential for further decline of the population if a grizzly bear is killed as a result of the mine during the construction or operations phase. We reasonably expect that the measures taken to reduce potential for human-caused mortality, within and outside the action area, would result in no net increase, and more likely a net decrease, in overall human-caused grizzly bear mortality rates within the CYE, even with the one bear lost to the mine itself. The combination of the

State's augmentation and project reduction in human-caused mortality would contribute to avoiding an appreciable reduction in the numbers, distribution and reproduction of grizzly bears.

Further, Montana Fish, Wildlife and Parks expect to relocate at least one to two (possibly more, see Montana Fish, Wildlife and Parks 2006 and Jim Williams pers. comm. 2013) female bears per year, to the Cabinet Mountains. MMC would ensure that the Service has annual funding to monitor bears relocated into the Cabinet Mountains. Augmentation would continue to contribute to the persistence of bears in the Cabinet Mountains and to the eventual stabilization and growth of the CYE grizzly bear population.

The Service anticipates some low level of take would also occur in the form of harm (habitat alteration) or harassment, which would occur as a result of initial disturbance (e.g. noise and activity) near the mine site and the resulting displacement of one or three female grizzly bears from key habitats. We anticipate this take would occur through impaired reproduction in these females, and would occur during the construction phase of the mine, as adult female bears now using the Libby Creek drainage would have to adjust to a relatively sudden and substantial increase in human activity within the action area. This type of take is difficult to quantify and detect, and the likelihood of its occurring is based in part on the nature of individual bears using the action area. However, to offset or minimize such impacts: a) the Forest would continue to provide substantial levels of core habitat and limit motorized route densities in the affected BMUs to levels that are reasonably expected to allow most grizzly bears alternative habitats for use if displacement occurs; b) private land acquisitions and easements on 6,185 acres would contribute to mitigating and alleviating the displacement effects of the mine over the long term by securing existing and additional core habitat for perpetuity; c) over the long term, the State's augmentation program and reduction in human-caused mortality rates would also contribute to alleviating and offsetting the effects of any loss of reproductive potential caused by displacement. Based on existing scientific information on displacement, we expect that within a year or two, the potential for impaired reproduction would diminish as female bears adjust, by using alternative habitats within their home ranges or habituating to the routine disturbance generated by the mine.

We conclude that our projections of anticipated human-caused mortality and harm or harassment related to the mine, when added to other human-caused mortality, would be within the range of mortality that would not lead to population decline. The effects of an anticipated human-caused grizzly bear mortality and the impaired reproduction (resulting from displacement) on the population would be more than offset by both existing and improved habitat conditions, the net reduction in existing and anticipated future grizzly bear mortality rates, and augmentation (Kasworm et al. 2006b; Proctor et al. 2004b). Therefore, we conclude that the effects of the anticipated levels of human-caused female grizzly bear mortality and the temporarily reduced reproductive potential described in this biological opinion would not appreciably diminish the likelihood of the survival and recovery of grizzly bears.

3. **Fragmentation.** The Service expects the project mitigations to reduce or minimize displacement effects of the mine and to maintain and improve habitat connectivity within the Cabinet Mountains, and between the Cabinets and the NCDE. In particular, project actions would ensure grizzly bear use of the habitat within the affected BMUs (2, 5 and 6) and movements between BMUs to the north and south of these BMUs. This would allow (a) adequate use of essential habitat by and movement of grizzly bears within their home ranges, (b) exploratory movements, (c) breeding behaviors and movements and genetic interchange; and (d) dispersal.

Acquisition of 1,273 acres of mitigation properties would be required within the north-south corridor, and must be approved by the Service to preclude significant fragmentation of the north-south corridor. A total of 3,073 replacement acres are required to offset displacement effects of the mine and another 3,112 acres for physical habitat loss. A portion of the additional 4,912acres would likely be within the north-south corridor or at least in the affected BMUs, and would improve long-term habitat security and facilitate movement of bears and use of habitat within BMUs 2, 5, and 6, and potentially BMUs 4, 7, 8 and 22. These mitigation measures would directly and indirectly reduce the connectivity impacts of the mine and offset habitat loss and displacement due to human-caused disturbance.

Interchange of grizzly bears between the Cabinet Mountains and the NCDE is a recovery goal. Population and habitat connectivity within the CYE grizzly bear population, particularly through the North-South movement corridor, would contribute to significantly reducing the likelihood of extinction. The mitigation plan requires funding for continued research aimed at identifying key areas of connectivity between these two recovery zones. The mitigation plan also requires purchase of properties or conservation easement on 6,185 acres, 1,273 of which are required to be in that corridor. The mitigation plan allows up to 1,286 acres to be in the identified linkage area along highway 2 between the two recovery zones. Key private land parcels have been identified and ranked according to habitat value for grizzly bears and risks of development that would affect connectivity. These purchases or easements would enhance and promote long-term connectivity within the narrow Cabinet Mountains portion of the CYE as well as between the CYE and NCDE.

Further, access management, including management of core areas, would enhance connectivity in the north-south corridor. Table A15 summarizes access management conditions within the action area with implementation of the proposed action. Key Forest Plan standards are fully met, in four of seven BMUs, including the three directly impacted BMUs (2, 5, and 6). Core areas within BMUs are substantial and would not decrease. BMU 8 has core area comparable in size to, and five of the remaining six BMUs exceed the average core area size (55%) reported for female grizzly bears in the CYE. With few exceptions, open and total motorized route access would be managed at levels similar to or better than the average reported in grizzly bear research in the CYE (Wakkinen and Kasworm 1997). The Forest would improve conditions for grizzly bears related to human access management on National Forest lands as opportunities arise with the acquisition or perpetual conservation easement of the mitigation properties. Proposed access management would contribute to enhancing north south connectivity in the action area.

Table A15. Projected Access Management Conditions with Implementation of Alt. 3D-R for the Proposed Montanore Mine

BMU	Percent Core	Percent OMRD > 1 mi/sqmi	PercentTMRD > 2 mi/sqmi
2	76 (75)	20 (20)	16 (18)
4	62 (63)	38 (36)	29 (26)
5	65 (60)	27 (30)	18 (23)
6	58 (55)	29 (34)	32 (32)
7	63 (63)	24 (26)	23 (23)
8	55 (55)	32 (32)	24 (21)
22	51 (55)	38 (33)	37 (35)

Numbers in parentheses are Forest Plan Standards (USFS 2011). Shaded values meet Forest Plan standard

We conclude that fragmentation of the north-south corridor would be avoided and connectivity of grizzly bear habitat preserved by existing and proposed access management (see mitigation plan tables 1, 2, and 3 in Appendix C and USFS 2013 BA Figures 6a and 7) in combination with the acquisition of mitigation properties identified to specifically remedy fragmentation issues. The risks of fragmentation and displacement would be reduced to levels that would not significantly impair the movement of grizzly bears within BMUs 2, 5, and 6 and therefore would not contribute to an appreciable reduction in the likelihood of the survival and recovery.

Further, the 2011 Kootenai Forest Plan amendment requires that 21 of 22 BMUs (95 percent) in the CYE reach at least 55 percent core area or more (the average female home range core size) by 2019. Implementation of the mitigation plan will help toward achieving this goal by improving core habitat in BMUs 5 and 6 to be better than their stated core standards (see Table A12).

The combination of reduced rates of human-caused mortality, augmentation of the population, and maintenance or re-establishment of habitat connectivity is expected to more than offset impacts of the mine. This combination of actions is expected to contribute to an increase in grizzly bears in the cabinet Mountains, and so to eventual stabilization and recovery of the CYE grizzly bear population. We conclude that the proposed action, which fully or partially supports this combination of actions, would not appreciably diminish the likelihood of the survival and recovery of grizzly bears.

4. **Oversight and Implementation.** The Service expects the Forest to establish the processes and infrastructure needed to ensure that (a) the mitigation plan is fully implemented and that mitigation measures are timely and effective; (b) the mitigation plan is coordinated and effectively implemented; and (c) adaptive management is used when needed over the 30-year life of the mine.

The Forest has agreed to form and lead an Oversight Committee that develops and oversees implementation of the proposed action and mitigation plan. Committee members would include participating agencies, including Montana Fish, Wildlife and Parks and MDEQ. The Service would participate as an advisor to the group. The Oversight Committee would be responsible for overseeing the full implementation of the mitigation plan measures. The committee would serve as a forum to disseminate progress reports, address concerns, and provide general information regarding the mine to the public. The committee would review new grizzly bear information, including that collected by the required monitoring and research effort, grizzly bear specialist and law enforcement officer, and determine whether the proposed action and mitigation measures are effective. If not, the Forest and MMC would be responsible to take action to remedy the situation, which may include using adaptive management to fully meet the intent and desired goals of the mitigation package, thus avoiding jeopardy. The Service would review any proposed modifications, additions or revisions of the management plan or mitigation plan as appropriate under the provisions of section 7 of the Act.

The Service concludes that with the establishment of an Oversight Committee, the complex and numerous aspects of the proposed action and the mitigation plan would be effectively implemented to reduce the impacts of the proposed mine to levels that are not likely to appreciably diminish the likelihood of survival and recovery of grizzly bears.

VIII. INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations pursuant to section 4(d) of the Act, prohibit the take of endangered and threatened species, respectively without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must also be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to MMC, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest (1) fails to assume and implement the terms and conditions; (2) fails to require any 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, grant, or contract 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, the Forest must report the progress of implementing the action and mitigation measures to the Service as specified in the incidental take statement [50 CFR, Part 402.14(i)(3)].

A. Amount or Extent of Take Anticipated

High motorized route densities increase the risk of incidental take of grizzly bears by habituating some bears, and modifying habitat to levels that displace some bears; both are activities that may significantly impair breeding, feeding, and sheltering. Research in the NCDE (Mace and Manley 1993, Mace et al. 1996) and CYE (Wakkinen and Kasworm 1997) revealed significant displacement of female grizzly bears from highly roaded habitat. Displacement of grizzly bears from highly roaded habitat is significant when it keeps them from preferred or otherwise available habitat to the extent it reduces breeding, feeding or sheltering.

The proposed action, with planned mitigations occurring prior to each phase of the proposed project, would maintain or improve (reduce) open and total motorized route densities and maintain or increase core areas and so is in compliance with the Service's 2011 incidental take statement on the Forest Plan (USDI 2011). Both motorized route densities and core area percentages in the action area BMUs, specifically those most impacted by the project (BMUs 2, 5, and 6), do not change or would improve as a result of the proposed action, which is in compliance with the Service's 2011 incidental take statement (USFWS 2011) of the Forest Plan Amendment (USFS 2011a, c). Motorized route densities are expected to decline (improve) further and core areas may further increase (improve) as mitigation properties are acquired. For most Forest access management actions that comply with the 2011 incidental take statement, we would not anticipate incidental take of grizzly bears over that anticipated in our 2011 incidental take statement. However, the Service concludes that the proposed Montanore Mine would result in displacement effects to grizzly bears in the Libby Creek drainage that are greater than those associated with usual forest management activities and would continue for a longer period of time. The proposed action would result in two types of incidental take: take in the form of harm or harassment due to displacement and due to habituation and resulting mortality.

Indirect take due to harm or harassment may occur due to displacement of grizzly bears, specifically adult female bears, from essential habitat. Although the project conforms with the 2011 biological opinion and incidental take statement (USFWS 2011) on the Forest Plan Amendment for motorized access management, the disturbances generated by increased road use and human activity exceed that anticipated in 2011. Displacement of female grizzly bears from key habitats near the mine site and associated roads could result in their failure to obtain adequate food resources, which in turn could result in reduced fitness and/or reproductive success. We expect incidental take as some impairment of normal breeding and feeding behavior of adult females that affects reproduction, either through failure to breed or failure to complete a pregnancy.

We do not expect sub-adult or cub grizzly bear mortality as a result of such displacement. We do not expect mortality, injury, or significant impairment of breeding, feeding or sheltering of male grizzly bears as a result of displacement.

It is the biological judgment of the Service that one to three adult female grizzly bears attempting to use this area would be affected by the potential long-term displacement from portions of the areas affected by the proposed mine, approximately 7,836 acres. Female grizzly bears are already displaced from 6,276 acres of this area because of disturbance caused by existing open motorized routes, but disturbance levels would increase due to the proposed action. In addition, a total of 17,043 acres would be disturbed for a short-term (about two active bear seasons) by aircraft during transmission line construction. About 8,997 of those 17,043 acres in the CYE, 1,404 are in the Cabinet Face BORZ and the remainder occurring mostly on private lands east of the BORZ. Of the 17,043 disturbed acres, approximately 10,207 are currently disturbed by human use on existing open roads, leaving 6,234 acres of new short-term disturbance due to aircraft use. Construction of the transmission line is limited to the period outside the grizzly bear spring (April 1 - June 15) and den (December 1 – March 31) seasons, thus making the likelihood of actual displacement very low. The timing of transmission line construction and reclamation activities mitigates for the very low potential displacement effect.

As described earlier in the biological opinion (see displacement summary section), the premise that one to three adult female grizzly bears would be impacted over time is based upon (a) information from the Cabinet Mountains related to the number of females with young (Kasworm et al. 2012); (b) the existing population estimate of grizzly bears in the southern portion of the Cabinet Mountains (Kasworm et al. 2112); (c) the lack of detectable significant increases in the population as a whole since 1983 (Kasworm et al. 2012); and (d) the existing disturbances in the Libby Creek drainage and the west side of the divide. This number of adult females may represent three of four known total adult female bears currently living in the Cabinet Mountains (Wayne Kasworm, pers. comm, 2013). (Using a conservative estimate of 21 bears in the Cabinet Mountains, approximately 0.284, or approximately six of these bears would be adult females. Using the upper estimate of 23 total bears, the number of estimated adult females in the Cabinets could be as high as seven.

The Service anticipates that incidental take of grizzly bears resulting from the displacement from mine activities associated directly or indirectly with the Montanore Mine would be difficult to quantify or detect. As described earlier in this opinion, grizzly bears are typically independent and vary in their responses to disturbance. We are unaware of scientific or commercial information available that has quantified the effects of disturbance or displacement on the reproductive or recruitment potential of grizzly bears. We are unaware of scientific or commercial information that could be used to quantify the exact level of incidental take associated with displacement effects, which would manifest itself through impaired breeding and/or feeding in adult females. Where incidental take is difficult to quantify, we use surrogate measures to gauge the impact of the take on the species and determine whether anticipated levels of take would be exceeded. Based on research related to the displacement of grizzly bears from roads and roaded habitat (Mace and Manley 1993, Mace et al. 1996, Wakkinen and Kasworm 1997), in this case we will use the surrogate measures of open motorized route density, total motorized route density, and core to reflect the level of anticipated take and the point at which that level would be exceeded. The proposed levels of open and total motorized route density and core area in BMUs 2, 5, and 6 limit the amount of human access and associated disturbances in grizzly bear habitat. If the proposed route densities are exceeded or if core area is decreased due to the proposed action, then the amount of incidental take anticipated may be exceeded.

Although we cannot accurately quantify incidental take through displacement, we expect that any displacement effects that result in decreased fitness of adult females to a degree that it impaired reproductive fitness would be relatively low based on the rationale found in this biological opinion. Over 30 years, not all female grizzly bears with home ranges encompassing portions of the Libby Creek drainage would be significantly impacted. Further, there are already existing human activities along Forest Road 278 and lower elevation habitat within the drainage and along Libby Creek that already impart disturbance effects on grizzly bears, but bears are known to use the area in general. Grizzly bears that utilize the area are likely conditioned to some level of human activities. The best information suggests that initially there would be increased displacement effects on female grizzly bears using the Libby Creek drainage once construction of the mine begins and human activity levels rapidly and significantly increase along Forest Road 278. The mine would cause higher levels of disturbance on 6,276 acres currently near roads, and affect an additional 1,560 acres. The displacement of female bears would be more pronounced and long term at lower elevations in the drainage, particularly in spring habitat, but could extend initially throughout larger portions of the drainage for a time.

Incidental take due to harm would also occur in the form of injury or mortality of grizzly bears as a result of human actions. We anticipate that incidental take attributable to the proposed mine is most likely to result through habituation and food conditioning of grizzly bears or increased human-grizzly bear encounters, which increases the chance of their removal through management control actions or illegal shooting or legal defense of life. Increased risk of habituation and food conditioning of grizzly bears and encounters are possible with the rapid influx of workers and their families to the action area during construction of the mine and increases in recreation in the area, leading to increased levels of food, garbage and other human related attractants. As described earlier, the mitigation plan incorporated many measures to reduce food habituation of bears, attractants and adverse encounters between people and bears. However, even with full implementation of the mitigation plan and effective use of education and information and law enforcement, there remains a reasonable anticipation that one grizzly bear would be killed as a result of direct or indirect mine-related activities at some time during the more than 30-year duration of the mine.

The Service expects the existing baseline condition of the action area related to Forest access management and the full implementation of the mitigation plan would reduce the potential for human-caused mortalities of grizzly bears related to the proposed mine to no more than one mortality throughout the life of the mine. This premise is based on the estimated number of grizzly bears in the Cabinet Mountains (at least 21), the projected number of augmented grizzly bears, and on the number and causes of past known, human-caused grizzly bear mortality in the Cabinet Mountains (6 from1982 through 2012) (Kasworm et al. 2013).

All human-caused grizzly bear mortality within the action area would be investigated to determine whether the take could reasonably be attributed to the direct or indirect effects of the proposed mine. Take at the mine site, or bears directly killed by mine employees would be attributable to the mine. Take of a grizzly bear on private or public land would require an investigation to determine whether mortality could reasonably be attributed to the effects of the Montanore Mine. Grizzly bears may become habituated and food conditioned for reasons not attributable to the mine, and these bears may eventually run into conflict at the mine, in residential areas occupied by mine employees, or on public lands used by mine employees and their families. Grizzly bears may be struck by vehicles, however we do not anticipate this type of mortality would be attributed to the mine because of the mitigation plan measures, and therefore such take is not exempted. Hunter-related grizzly bear mortality would result in the Service reinitiating consultation on Montana's grizzly bear management program (Montana Fish, Wildlife, and Parks 2001).

All human-caused mortality of grizzly bears within the CYE is investigated by the Service, Montana Fish, Wildlife and Parks, and/or Forest Service law enforcement. The take of one grizzly bear deemed attributable to the mine would trigger re-evaluation of the situation by the Service to determine whether additional measures are needed to reduce the potential for future mortality. In addition, should the monitoring of the attractant related conflicts document that black bears are gaining food rewards in the action area, the Service shall determine whether additional measures should be implemented to reduce the potential for future mortality of grizzly bears. If the human-caused grizzly bear mortality attributable to the mine exceeded one grizzly bear, reinitiation of consultation would be required.

B. Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. As described in the biological opinion, some low level of indirect incidental take may occur as a result of displacement of females from essential habitat, which would impair reproduction but would not result in the death of a sub-adult or adult bear. Several factors moderate the impact of this displacement, as discussed in the biological opinion. Habitat management in the action area, especially motorized access management, provides large blocks of interconnected core habitat, and other areas have relatively moderate road densities. Based on research and road density analysis in the CYE, the baseline levels of open and total motorized route density and core area would substantially moderate the displacement effects of the action within the Libby Creek drainage. Grizzly bears have large home ranges. Those female grizzly bears that use the Libby Creek drainage would likely have alternative habitat to use if displaced. The mitigation plan requires that a total of

3,074 acres be acquired to compensate for the 7,837 acres of disturbance (most of which is already experiencing some level of disturbance), and be managed for grizzly bear habitat. Also, we anticipate that the impacts of disturbance within the Libby Creek drainage on female grizzly bears would decline over time in quality seasonal habitats at higher elevations and further from the roads and mine site as the females habituate to some degree to the disturbance levels and/or select other areas of their home range. Disturbance related effects that impair breeding, feeding or sheltering would likely decline to low levels over time. Further, the proposed action would result in improvements in access management due to a total of 6,185 acres (3,112 acres for physical habitat loss and 3,073 acres for displacement) of habitat acquisition or easement, which is expected to further reduce the overall displacement effects of the mine.

Currently, known human-caused mortality in the CYE is skewed toward females. At this time human-caused mortality of female grizzly bears in the CYE exceeds levels that are sustainable and promote recovery. Whether or not this level of female grizzly bear mortality will continue is unknown. However, the proposed action includes a suite of actions that are expected to diminish the potential for human-caused mortality, both mortality that is attributable to the mine and mortality that is not attributable to the mine. The survival of female grizzly bears is essential to the persistence and growth of the CYE grizzly bear population. Grizzly bear recovery efforts will continue to work toward reducing human-caused mortality.

The Service concludes that the unmitigated loss of one grizzly bear due to the mine over 30 years could affect the length of time needed for recovery of grizzly bears in the CYE. If one female is killed over a 30 year period, the length of time needed for recovery would be more prolonged. Recovery would be most impacted with the loss of an adult female, and less so with the loss of a female cub

However, we anticipate that take would not occur until during either the construction phase of the mine itself or the operational phase, due to the large increase in number of mine employees and associated human population growth in the area. Also, as described earlier in this opinion, we expect that the suite of measures in the mitigation plan would work concurrently and pro-actively to reduce rates of human-caused grizzly bear mortality from current levels. The mitigation plan would work to reduce potential human-caused mortality both attributable to the mine and not attributable to the mine, and both within and outside the action area. The mitigation plan would fully offset the impacts of any take that does occur due to the mine by reducing the current rates of human-caused mortality of grizzly bears across the entire CYE, including the mortality of grizzly bears not attributable to the mine. Therefore, we anticipate that full implementation of the proposed action and mitigation plan would result in a net reduction in future potential human-caused grizzly bear mortality rates in the CYE.

C. Reasonable and Prudent Measures

Biological opinions typically provide reasonable and prudent measures that are expected to reduce the amount of incidental take. Reasonable and prudent measures are those measures necessary and appropriate to minimize incidental take resulting from the proposed Montanore Mine Project . Reasonable and prudent measures are nondiscretionary and must be implemented by the agency in order for the exemption in section 7(o) (2) to apply.

1. Reduce the potential for incidental take of grizzly bears resulting from bear-human encounters.

2. Reduce the potential for incidental take of grizzly bears resulting from displacement of grizzly bears and improve habitat conditions in the north-south corridor in the Cabinet Mountains.

D. Terms and Conditions

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

1. The following terms and conditions implement RPM 1:

    a. MMC will develop a public outreach (information and education) plan in detail for Forest approval prior to starting the construction phase of the Montanore mine. Appendix I outlines essential features of the plan.
    b. The Forest will review and approve, with Service advice, MMC's detailed program for public outreach prior to the start of the construction phase of the Montanore mine.

2. The following terms and conditions implement RPM 2:
    a. Under the direction of the Forest Service, MMC will fund or implement the conversion of Forest Trail #935 (East Fork Rock Creek) from motorized to non-motorized, thus creating additional grizzly bear core habitat prior to the start of the evaluation adit phase.
    b. The Forest Service will require MMC to change the primary access and haul route from the Bear Creek road (Forest Road 278) to the Libby Creek road (Forest Road 231). This change reduces the likelihood that traffic levels on Forest Road 278 would create a fracture zone disrupting grizzly bear movements from den areas west of the road toward spring habitat to the east. It also maintains existing movement corridors toward the linkage area with the NCDE. See Appendix H for comparison of the two routes.
    c. In coordination with and approval by the Forest Service and Service, MMC will plan, fund and implement access management strategies on acquired mitigation land parcels consistent with the intent of the mitigation plan to improve core and access parameters (OMRD and TMRD) prior to transfer to the Forest Service.
    d. The Forest Service will complete an environmental assessment for potential access management changes on National Forest System lands associated with all acquired mitigation parcels located in the CYERZ within five years from the start of the Montanore Mine construction phase.
    e. The Forest Service will implement access changes approved under T&C 2d within two years of that decision signing.

E. Reporting Requirements

a. By April of each year, the Forest shall prepare and submit to the Service an annual report of grizzly bear and black bear sanitation incidents and corrective measures that have occurred within the Cabinet Mountains portion of the CYE and Cabinet Face BORZ taken during the previous year.

b. By April 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.

The Service believes that no more than one grizzly bear will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the likelihood 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.

IX. CONSERVATION RECOMMENDATONS

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. The Service has no additional Conservation Recommendations to provide.

X. REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the request. As provided in 50 CFR §402.16, reinitiating 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, Forest will need to reinitiate consultation if (5) the term of the Forest authorization issued to MMC to develop, operate, close the Montanore Project exceeds 30 years; (6) 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 (6) 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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APPENDICIES

APPENDIX A: RECORD OF CONSULTATION

The record of informal consultations on the *Noranda Montanore Project* from 1988 through 1993 can be found in the project file. Consultation on this project, in that time frame, ended with the issuance of a jeopardy biological opinion (signed April 7, 1993).

August 9, 2006 - Phone conversation between Al Bratkovich (USFS) and Ben Conard (USFWS). Briefly discussed the Montanore Libby Creek Adit – Evaluation Drilling Program. Discussed difference between cooperative landowner and non-cooperative landowner in relation to incidental take statement.

September 1, 2006 - Meeting between USFS (Al Bratkovich) and USFWS (Ben Conard) at Creston, MT. Discussed the proposed project (Libby Creek Adit - Evaluation Drilling Program) in detail, and reviewed the Draft BA which had been forwarded to USFWS earlier in the week. Project mitigation was inadequate. Statement of Findings would be "likely to adversely effect". USFWS requested another Draft BA for review with additional mitigation included.

September 29, 2006 - Meeting between USFS (Al Bratkovich, Wayne Johnson, Lynn Hagarty) and USFWS (Ben Conard) at Libby, MT. Discussed additional mitigation options to off-set project effects for the Libby Creek Adit – Evaluation Drilling Program. Discussed in detail law enforcement options necessary to reduce human-caused mortality risk to grizzly bears. USFWS felt the array of mitigation items presented could result in a "not likely to adversely affect" Statement of Finding.

February 21, 2007 - Meeting between USFS (Al Bratkovich, Wayne Johnson, Doug Speath) and USFWS (Ben Conard) at Libby, MT. Discussed various aspects of the Libby Creek Adit – Evaluation Drilling Program.

November 12, 2008 - Meeting between USFS (Al Bratkovich, Wayne Johnson, Lee Brundin) and USFWS (Ben Conard) at Libby, MT. Lee Brundin initially talked about clarification needed from the USFWS for the phrase “no net loss” as it relates to OMRD and TMRD for the Montanore Project. The remainder of the meeting focused on the Grizzly Bear Mitigation Plan, and included such topics as bear augmentation, specialist positions, land acquisition, and MMCs patented lands. Action items included meeting with Jim Williams (MDFWP) to discuss specialist positions, and meeting with Wayne Kasworm (USFWS) to discuss research and augmentation.

December 1, 2008 - Meeting between USFS (Al Bratkovich, Wayne Johnson) at Libby, MT with Jim Williams (MDFWP) and Wayne Kasworm (USFWS) participating via conference call. Discussed various aspects of the mitigation plan for the Montanore Project. Focused mostly on the issue of augmentation, habitat fragmentation in the southern Cabinet Mountains, and the specialist positions that would be employees of MDFWPs.

December 4, 2008 - Meeting between USFS (Al Bratkovich, Paul Bradford) and USFWS (Mark Wilson, Chris Servheen, Anne Vandahey, Ben Conard, Wayne Kasworm) at Missoula, MT with Wayne Johnson, John McKay, and Bobbie Lacklen (USFS) participating via conference call. The meeting focused mainly on the mitigation plan for the Montanore Project. On a general scale, topics discussed included one facility for both mines, sequential mining (one mine after the other), redelineation of existing BMU boundaries, and perhaps adding new BMUs in corridor areas. More specific issues included habitat fragmentation in the southern Cabinet

Mountains, the increased level of human activity in and adjacent to bear habitat as a result of the mine, specialist positions, and a Trust Fund concept to implement the mitigation package.

January 22, 2009 - Meeting between USFS (Al Bratkovich, Lee Brundin, Jennifer Holifield) and USFWS (Ben Conard) at Libby, MT. The meeting focused on clarification needed from the USFWS for the phrase "no net loss" as it relates to OMRD and TMRD for the Montanore Project. Clarification was also requested concerning the Rock Creek Biological Opinion (10-11-06) which speaks of no loss in OMRD and TMRD within BMUs 4, 5 and 6 for the life of the Rock Creek Project.

February 19, 2009 - Meeting between USFS (Al Bratkovich, Lee Brundin, Jennifer Holifield) and USFWS (Ben Conard) at Libby, MT. The meeting focused on the Trust Fund concept for implementing the mitigation package.

January 26, 2010 – Meeting between USFS (Annie Dueker) and USFWS (Ben Conard) at Creston, MT. Updated Ben with modifications to the transmission line routes changes and potential effects (positive and negative) to grizzly bears.

March 9, 2010 – Phone call between USFS (Annie Dueker) and USFWS (Ben Conard) to discuss a number of clarifications. Discussions included requirements for grizzly bear mitigation for displacement outside the recovery zone, monitoring wells, lynx habitat mitigation, and using the most current information for the baseline instead of the 2006 baseline used in the DEIS.

May 28, 2010 – Meeting between USFS (Annie Dueker) and USFWS (Ben Conard) at Creston, MT. Discussed status of proposed monitoring wells, impacts to HE/displacement and potential mitigation areas, and potential to drop if mitigation is unacceptable. Updated Ben on the status of the alternatives and revisions, and tentatively identified Alternative 3E as FS preferred alternative; DEQ has not identified their preferred alternative because they want to see the final numbers before committing themselves to an alternative. Update on revised acres of mitigated land and method used based on CEM numbers, identified high-use roads and a few new Management Situation 3 lands private. Reviewed the funded mitigation positions for law enforcement, bear specialists and the habitat conservation specialist. We discussed the format of BA under the Section 7 Structured Coordination Process, addressing seasonal effects and effects to linkage zones, and the potential for a jeopardy opinion due to the cumulative effects of both the Rock Creek and Montanore.

July 20, 2010 – E-mail message from USFWS (Ben Conard) recommending some analysis effects to include in the Biological Assessment regarding cumulative effects expansion to at least the Cabinet portion of the Recovery Zone and addressing seasonal habitat effects. He also requested a draft BA to review prior to submission of a final, signed copy.

June 09, 2011 – Jenny Holifield (KNF) met with Ben Conard (FWS) and discussed status of draft BA. Draft BA delayed due to additional revisions. Holifield questioned about the "additional analysis area". Conard replied that the area should have been discussed in general terms, such as potential for displacement during construction and operations of the transmission line and what were any effects to the BORZ requirements.

July 5, 2011 - USFS (Paul Bradford) letter to USFWS (Mark Wilson) requesting formal consultation on the Montanore project.

July 18, 2011 – USFWS (Mark Wilson) letter to USFS (Paul Bradford) acknowledging receipt of July 5, 2010 letter.

September **, 2012 – USFWS (Mark Wilson letter to USFS (Paul Bradford) requesting additional information needed prior to starting formal consultation time line.

October 12, 2012 – USFWS (Anne Vandehey) submits via e-mail a request for additional information from the USFS that is needed before initiating formal consultation time line.

October 19, 2012 – USFS (Jenny Holifield) provided Wayne Johnson (USFWS contract biologist) a copy of the draft supplemental Montanore BA.

November 6, 2012 – Jenny Holifield provided Wayne Johnson copy of 2011 BMU monitoring report and copy of Public Opinion and Knowledge Survey of grizzly bears in the Cabinet-Yaak Ecocsystem Final Report 2008.

November 9, 2012 – Meeting between USFS (Jenny Holifield) and USFWS contract biologist Wayne Johnson at Libby, MT to review Service's comments on October supplement to July 2011 Montanaore draft BA.

January 25, 2013 – USFS (Paul Bradford) sends updated review draft BA to USFWS (Mark Wilson) and gives copy to Wayne Johnson (USFWS contract biologist) on the 29th.

February 7, 2013 –Meeting between USFWS (Anne Vandehey, Wayne Kasworm, Contract biologist Wayne Johnson) and USFS (John Carlson and Jenny Holifield) at Flathead NF SO in Kalispell, MT to discuss possible revisions of the mitigation plan. USFS personnel to take Service's suggestions to Forest Supervisor for his decision on making those changes to the mitigation plan.

February 28, 2013 – Meeting between USFWS representative Wayne Johnson (Wildthing consulting) and USFS Jenny Holifield at Libby, MT to discuss USFWS comments on USFS 1/2013 draft BA.

March 28, 2013 – Meeting between USFS Jenny Holifield and Linda Lampton and USFWS Wayne Kasworm and Wayne Johnson (Wildthing Consulting) at KNF SO in Libby, MT to develop, review and discuss linkage area map of potential mitigation lands outside the CYE.

April 04, 2013 – Wayne Johnson provide Jenny Holifield (KNF) comments on Draft TE mitigation plan that includes new "linkage area" map and implementation table, refinement of habitat conservation specialist position duties and number of position MMC responsible for hiring IF Rock Creek mine project operational.

April 05, 2013 – Conference call including FWS, MMC, KNF. Holifield provided status updated or revised draft BA.

May 03, 2013 – KNF provided revised draft BA to FWS for comment.

May 30, 2013 – Wayne Johnson provided comments on 5/2/13 draft BA to Jenny Holifield (KNF).

June 19 and 21 , 2013 – Meeting of J.Holifield, W. Kasworm and W. Johnson in KNF SO, Libby, MT. to evaluate and rank all potential mitigation lands within an identified linkage area outside the recovery zone on the east side of the Cabinet Mountains. Also reevaluated all potential parcels within the Recovery zone. Bobbie Lacklen and Lynn Hagary (KNF) listened in.

August 12, 2013 – FWS received KNF August 9, 2013 letter requesting initiation of formal consultation on the Montanaore mine project BA, which was attached.

August 21, 2013 – FWS received KNF August 16, 2013 letter with attachments of all information currently available regarding the proposed Montanore Mine project.

September 16, 2013 – FWS received a second copy of FS BA that included errata corrections, analysis changes, mitigation plan updates on grizzly bear habitat mitigation credit and disclosure of wolverine findings.

APPENDIX B.

Montanore Project Summary of Description of Proposed Action

Alternative 3 - DR – Agency Preferred Alternative Description as of March, 2013

For purposes of the USFS Biological Assessment and the USFWS Biological Opinion, the *Proposed Action* is the USFS *Alternative 3 – DR Agency Mitigated Alternative*.

Alternative *3* refers to the preferred mine facilities and tailings impoundment locations. *DR* refers to the preferred transmission line route, pole type, vegetation clearing method, line construction method, etc. Alternative 3-DR is essentially the action proposed by the proponent, with numerous mitigation and other changes incorporated.

This document is organized as follows:

Sections 1.2 and 1.3 expand on the General Project Description with additional details of Agency Proposed Mitigation. Sections 1.2 and 1.3 are also organized by project phase.

The information included in this Proposed Action has been derived from the Montanore Supplemental Draft EIS (SDEIS), 2011. To streamline the information, a general description of the action is presented followed by the more detailed description of the action with the mitigation. *This document is an updated version of the SDEIS produced in March of 2013. It may vary from the Final EIS descriptions and as such, should be considered a draft.*

Following is a table summarizing Montanore project facilities or features and the Alternative 3, Agencies' preferred alternative.

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
Operating Permit Areas	2,157 acres
Disturbance Areas	1,565 acres
Primary Facilities	
Mill site	Libby Plant Site between Libby and Ramsey Creek drainages
Adits and portals	Existing Libby Adit; two additional Libby Adits; Rock Lake Ventilation Adit
Above-ground conveyor	6,000 and 7,500 feet long (depending on the option) between Libby Adit Site and Libby Plant Site mill
Tailings impound-ment and seepage collection pond	608 acres between Poorman and Little Cherry creeks

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
Perennial stream diversion	None
Land application disposal areas	None
Water treatment	Libby Adit Water Treatment Plant expanded to accommodate discharges during a 20-year wet year; Modified to treat nitrogen compounds (primarily nitrates and ammonia) and possibly dissolved metals
Primary access road	NFS road #278 (Bear Creek Road) plus new access road; 26 feet wide; up to 56 feet wide to accommodate haul traffic and public traffic
Concentrate loadout location	Libby Loadout
Facility Details	
New adits: length, grade, and portal elevation	Upper Libby Adit: 13,700 feet long, 7% decline; Elevation: 4,100 feet New Libby Adit: 17,000 to 18,500 feet long, depending on option; 5% decline; Elevation: 3,960 feet Rock Lake Ventilation Adit
New access roads† To Plant Site:	0.7 miles of new road parallel to NFS road #278, connecting existing NFS roads #278 and #2317
Realigned NFS road #278 at impoundment	0.2 miles
To Adit Portal:	None
To Land Application Disposal Area (LAD) Area 1	None – LAD is not part of Alternative 3, Preferred Alternative
To LAD Area 2	None
Pipelines Tailings	Double-walled buried adjacent to access road; 4.2 miles to impoundment
Reclaim water	Double-walled high -density polyethylene buried adjacent to access road
Tailings pump stations	At each crossing of Ramsey and Poorman creeks

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
Borrow areas	Three; 124 acres within impoundment footprint and 92 acres outside of impoundment footprint
Post-mining impoundment runoff	Natural channel to Little Cherry Creek

†Temporary roads within the disturbance area of each facility not listed.

Table 1. Mitigation for Mine Alternative 3 – Preferred Alternative.

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
Barrier Zone	1,000 feet from Rock Lake and 300 feet from Rock Lake Fault until additional data collection and analysis completed
Underground Mine Barrier	Barrier pillar and/or bulkheads within mine, if needed to minimize changes in East Fork Rock Creek and East Fork Bull River streamflow
Sediment Ponds and Ditches	Ponds and ditches containing process water or mine drainage sized for 100-year/24-hour storm
Waste Rock Management Stockpile and Storage	Stored temporarily at stockpiles, lined if necessary, and then hauled to a lined, if necessary, location within impoundment footprint; then used in impoundment dam
Characterization	Collect representative rock samples from the adits; ore zones; above, below and between the ore zones; and tailings for static and kinetic testing. In addition, collect samples of the lead barren zone, mineralized alteration haloes within the lower Revett, and the portions of the Burke and Wallace Formations for static and kinetic testing; assess potential for trace metal release from waste rock; conduct operational verification sampling within the Prichard Formation during development of the new adits
Handling	Segregate potentially acid-generating materials and materials that could create near neutral pH metal leaching as they were mined and placed under sufficient cover to minimize direct exposure to the atmosphere and precipitation,segregate potentially acid-generating materials and materials that could create near neutral pH metal leaching from portions of the lower Revett and Prichard Formations for additional kinetic and metal mobility testing and provide for selective handling as indicated by test results
Geotechnical Testing to Reduce Subsidence Risk	Libby Adit evaluation program part of Alternative 3. Underground geotechnical investigations would be conducted as the Libby Adit was completed; ongoing subsidence monitoring. With the following additions:
	Back-analyze the pillar failure at the Troy Mine using publicly available data to compare the Troy Mine design in effect at the time of the failure with the Montanore design; undertake numerical modeling to further evaluate expected design performance, to assess potential for shear failure at the pillar/roof or pillar/floor interface, and pillar columnization and sill stability between the two ore zones
	Conduct lineament analysis, mapping and statistical analysis of joint frequency and attitude, strain-relief overcoring, and further exploratory drilling
	Complete roof support analyses
Recreation/ Scenery	Design and construct a scenic overlook with interpretive signs south of the switchback on NFS road #231 (Libby Creek Road) downstream of the Midas Creek confluence with views of the tailings impoundment

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
	Fund a volunteer campground host from Memorial Day through Labor Day at Howard Lake campground
	Inspect and maintain access changes used in wildlife mitigation
	Develop a small (4 to 5 vehicle) gravelled recreational parking area at the gate on the Poorman Creek Road (NFS road #2317)
	Develop a new hiking trail between Poorman and Ramsey creeks to provide non-motorized access to upper Ramsey Creek
Scenery	Shield or baffle night lighting at the Libby Adit Site and Libby Plant Site
	Develop final regrading plans for each facility to reduce visual impacts of reclaimed mine facilities
	At the end of operations, place any waste rock not used in construction either back underground or use it in regrading the tailings impoundment
	Complete vegetation clearing operations under the supervision of an agency representative with experience in landscape architecture and revegetation
	Create clearing edges with shapes directly related to topography, existing vegetation community densities and ages, surface drainage patterns, existing forest species diversity, and view characteristics from Key Observation Points
	Avoid straight line or right-angle clearing area edges
	Would not create symmetrically-shaped clearing areas
	Transition forested clearing area edges into existing treeless areas by varying the density of the cleared edge under the supervision of an agency representative
	Mark only trees to be removed with water-based paint, and not mark any trees to remain
	Cut all tree trunks at 6 inches or less above the existing grade in clearing areas located in sensitive foreground areas such as within 1,000 feet of residences, roads, and recreation areas determined and identified by an agency representative before clearing operations
	Locate above-ground facilities, to the greatest extent practicable, without the facilities being visible above the skyline as viewed from the Key Observation Points
Waste Management Solid Wastes	Disposal of materials underground minimized and identified at closure

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
Sanitary Wastes Evaluation and Construction Phases Operations Phase Closure Phase	On-site treatment and disposal at Libby Adit Closed sanitary system with waste stored in buried sewage tanks; tanks pumped and disposed off-site during Operations Phase Sanitary wastes treated and disinfected on-site and then discharged at tailings impoundment during Operations Phase On-site treatment and disposal at Libby Adit
Sound	Operate all surface and mill equipment so that sound levels do not exceed 55 dBA, measured 250 feet from the mill for continuous periods exceeding an hour
	Adjust intake and exhaust ventilation fans in the Libby Adits so that they generate sounds less than 82 dBA measured 50 feet downwind of the portal
	Use specially designed low-noise fan blades or active noise suppression equipment, if necessary
Transportation Bear Creek Road Reconstructed Width	26 feet
Other roads	Single lane, except up to 56 feet wide to accommodate mixed haul traffic and public traffic
Bear Creek Road south of impoundment	Selected segments graveled with 6 inches of gravel at least 16 feet wide
Culverts	Replace as necessary to comply with INFS standards, such as fish passage or conveyance of adequate flows
Bear Creek Bridge	Replace and widened to a width compatible with a 26-foot wide Bear Creek Road
Gated roads	Install and maintain each closure; gates would have dual-locking devices to allow the KNF fire or administrative access
Road Management Plan	Develop and implement a final Road Management Plan
Soil Salvage and Handling	Double-lift salvage at all disturbances where soil is to be salvaged except road disturbances. These disturbances include Poorman Tailings Impoundment, Seepage Collection Pond, Borrow Areas, other disturbances within impoundment area, Libby Plant Site, and Upper Libby Adit Site
	Map soils not mapped at an intensive level before salvage to assure maximum amount of suitable soil was salvaged
	Salvage soils at low moisture content to minimize compaction
Vegetation Removal and Disposition	Prepare a Vegetation Removal and Disposition Plan for lead agencies' approval

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
	Where possible, salvage, chip, and use limited amounts of slash as mulch
Soil Stockpiles	Incrementally stabilize soil stockpiles (rather than waiting until the design capacity was reached) to reduce erosion and maintain soil biological activity
	Segregate first-lift soils based on rock content and stockpiled separately at tailings impoundment
	Second-lift clay-rich glaciolacustrine soils stockpiled separately from other second-lift subsoils at tailings impoundment
	For road disturbances, salvaged soils stockpiled in clearings or in areas of recent timber harvest immediately adjacent to new roads
Soil Replacement	Entire tailings impoundment would be covered with 24 inches of replaced soil using two lifts
	Rocky topsoil would be used as upper 9 inches of re-spread soil on embankment of tailings impoundment to minimize erosion
	Soil would be replaced using two lifts at all disturbances requiring soil replacement except road disturbances
Revegetation Seedbed preparation	Before soil replacement, entire tailings impoundment would be ripped to minimize compaction, break up surface crust and enhance rooting depth
	Agency-approved wood-based organic amendment would be incorporated into upper 4 inches of re-spread soil to improve nutrient content and the organic matter level to 1 percent by volume
	Mycorrhizae would be added to soil in areas where trees are to be planted
Seed Mixtures	Permanent seed mixture only
	Native species only, to the extent they were commercially available
Tree and Shrub Density After 15 Years	400 trees/acre 200 shrubs/acre
Noxious Weeds	Less than 10 percent cover of Category 1 weeds and 0 percent of Category 2 and 3 weeds; would not dominate an area greater than 400 square feet
Total Cover	80 percent of control site total cover
Monitoring Plan	20 years
Monitoring	
Groundwater Dependent Ecosystem	Monitor groundwater-dependent ecosystems overlying the proposed underground mine

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
	Measure flow of any spring overlying the proposed mine twice, once in early June when the area was initially accessible, and once between mid-August and mid-September during the initial inventory and once between mid-August and mid-September if monitored
Surface Water, Groundwater and Aquatic Biology Monitoring	Detailed monitoring around proposed project facilities around project facilities. Additional monitoring in East Fork Rock Creek, East Fork Bull River, Rock Lake and Libby Lakes Use of Wanless Lake and Swamp Creek as benchmark sites Analyze additional parameters, such as chlorophyll *a* and acrylamide Install an array of small-diameter boreholes from, and continuous recording pressure transducers within the mine and adits as construction progressed
Aquatic Habitat in Little Cherry Creek Diversion Channel	None needed – no diversion of creeks in Preferred Alternative
Long-term Mainte-nance of Little Cherry Creek Diversion Channel	None needed – no diversion of creeks in Preferred Alternative
Mitigation Plans	
Water Rights Construction and Operations Phases	Monitor Libby Creek flow at LB-2000, cease appropriating Libby Creek water whenever flow was less than 40 cfs at LB-2000, and treat and discharge water from the Water Treatment Plant at a rate equal to its Libby Creek appropriations during such times
Closure and Post-Closure Phases	Monitor Ramsey Creek flow at RA-300; if baseflow changes in Ramsey Creek may adversely affect the Clevelands' right on Ramsey Creek during any mining phase, develop a plan during final design to convey treated water from the Water Treatment Plant to a location upstream of the Clevelands' point of diversion (RA-300) Place two or more plugs in each adit to isolate the adits hydraulically from the mine void and to ensure any diversion of water from Libby and Ramsey creeks would flow into the adits Treat and discharge water from the adits at the Water Treatment Plant at a rate equal to its Libby Creek appropriations and diversions under the conditions described for the Construction and Operations Phases
Wildlife and Old Growth	
Old Growth	Designate 797 acres of effective or replacement old growth on National Forest System lands
Snags (Cavity Habitat)	Leave snags in disturbance areas, unless required to be removed for safety reasons

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
Big Game Security	KNF to place barriers on five roads year-long: NFS road #14442 Lampton Pond (0.6 mile); NFS road #6205D Big Hoodoo (4.0 miles); NFS road #6787B Hoodoo Bear (1.6 miles); NFS road #6209E Crazyman Creek (1.1 miles); and NFS road #4776B Horse Mountain (2.9 miles)
Mountain Goat *(see BA Mitigation Plan)*	Fund aerial surveys three times annually for 2 consecutive years before construction, and every year during construction activities
	No blasting at adit portals from May 15 to June 15
Forest Sensitive Birds and State Bird Species of Concern	Complete surveys to locate active nests in appropriate habitat and avoid during nesting, or not remove vegetation in the nesting season
Migratory Birds	Fund or conduct monitoring of landbird populations annually on two, standard Region One monitoring transects within the Crazy and Silverfish PSUs
Gray Wolf *(see BA Mitigation Plan)*	Fund FWP personnel to implement adverse conditioning techniques before wolves concentrate their activity around the den site if a wolf den or rendezvous site was located in or near the project facilities
Lynx *(see BA Mitigation Plan)*	Fund habitat enhancement of lynx stem exclusion habitat on between 484 and 566 acres (depending on the transmission line alternative)
Grizzly Bear Road and Trail Access Changes Before Libby Adit evaluation program *(see BA Mitigation Plan)*	Seasonally change access of (install gates) 6 roads totaling 14.5 miles. Decommission or place into intermittent stored service 13 roads totaling 20.3 miles
Before Construction *(see BA Mitigation Plan)*	Decommission or place into intermittent stored service 6 roads totaling between 9.6 and 11 miles. Convert trail #935 in upper Rock Creek to non-motorized access NFS road #4784 (upper Bear Creek Road) year-long for the life of the project NFS road #4724 (South Fork Miller Creek) on a seasonal basis (April 1 to June 30) for the life of the project (see most current wildlife mitigation plan)
Land Acquisition for Physical Disturbance *(see BA Mitigation Plan)*	Secure or protect replacement grizzly bear habitat (through conservation easement, including motorized route access changes or acquisition) of approximate 6,000 acres of private lands in the Cabinet- Yaak Ecosystem and a 5-acre parcel near Rock Lake Meadows below Rock Lake
Personnel Funding *(see BA Mitigation Plan)*	Fund three new full-time wildlife positions, a law enforcement officer before Evaluation Phase, an information and education specialist, and a bear specialist during construction and operation phases

Project Facility or Feature	Alternative 3 Agency Mitigated Poorman Impoundment Alternative
Other Measures *(see BA Mitigation Plan)*	Fund 100 bear-resistant garbage containers plus an additional 20 per year, after the first year of Construction Phase, for distribution to the community Fund fencing and electrification of garbage transfer stations in grizzly habitat in and adjacent to the Cabinet-Yaak Ecosystem Fund an initial 10 electric fencing kits for use at bear problem sites that can be installed by FWP bear specialists, and then 2 replacements per year Not use salt when sanding during winter plowing operations Remove big game animals killed by any vehicles daily from road rights-of-way within the permit area and along roadways used for access or hauling ore
Fisheries Fish loss *(see Fisheries BA Mitigation Plan)*	streams affected by Poorman impoundment site are non-fish-bearing streams
	In Copper Gulch, West Fork Rock Creek, Rock Creek, Flower Creek, or Poorman Creek, mitigation may include: Create genetic reserves through bull trout transplanting to protect existing bull trout populations 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 non-native fish species, especially brook trout, that are a hybridization threat to bull trout MMC would develop final mitigation plans in cooperation with the KNF, USFWS, and FWP.
Sediment *(see Fisheries BA Mitigation Plan)*	Fund maintenance of access changes described for grizzly bear mitigation
Wetlands Mitigation Ratios—Jurisdictional Wetlands	Ratios based on type and timing of mitigation: created wetlands credited on a 2:1 ratio, restored wetlands credited on a 1.5:1 ratio if mitigation not established before project impact or is out of kind; *Corps would establish ratios in the 404 permit*
Mitigation of Non-jurisdictional Wetlands	On a 1:1 ratio *(USFS Executive Order)*
Wetland Soil Management	Wetland soils and sod salvaged and used at mitigation sites to the extent practicable
Pre-construction Hydrologic Monitoring of Mitigation Sites	Six months (April–September) of monthly monitoring before development of sites

1.1 Alternative 3 - DR General Project Description

1.1.1 Construction Phase

1.1.1.1 Permit and Disturbance Areas

Development of the Montanore Project would require construction of an underground mine and adits (underground access), and surface facilities, such as a mill, tailings impoundment, and access roads. In the preferred alternative, the mill would be located in between the upper Ramsey Creek drainage and Libby Creek drainage, outside of the CMW.   Adits would be located in Libby Creek drainage. An additional adit (there is one existing) on private land owned by MMC would be constructed in the Libby Creek drainage. The upper Libby Adit would be on NFS lands and used for emergency exit and ventilation. (There would be a total of 3 adits in the Libby Creek drainage, existing, new, and upper, Figure 23, SDEIS). A ventilation adit on private land owned by MMC east of Rock Lake would be used for exploration and ventilation. A tailings impoundment is proposed to be constructed in the Poorman drainage. Permit area boundaries would be established around each of these facilities.

The underground mine would produce up to 20,000 tons of ore daily, or 7 million tons per year at full production. Currently delineated mineral resources, estimated at about 135 million tons, extend from Rock Lake to St. Paul Lake beneath the CMW .These estimates are based on a limited number of drill holes. The deposit has not been fully delineated and likely extends farther north than the available drilling information. Considering an expected ore extraction of 65 to 75 percent, waste rock dilution, and initial production rates, the mine is anticipated to have a production life of about 16 years. Three additional years may be needed to mine 120 million tons. MMC's proposed construction, operation, mitigation, and reclamation plans for the mine are described in the following sections.

A 230-kV transmission line to supply electrical power would be built from the Sedlak Park Substation to the Plant Site. The preferred alternative route is D-R, Miller Creek route.

In the first 2 years of the Construction Phase, MMC would upgrade NFS roads #278 (Bear Creek Road) and Libby Creek Road; short segments of these roads would be realigned. About 10 miles of the Bear Creek Road (NFS road #278), from U.S. 2 to the Bear Creek bridge, would be reconstructed to applicable road standards set by the either the KNF or Lincoln County. The road would be widened on its existing alignment. While NFS road #278 was upgraded, the Libby Creek Road (NFS road #231) would be used for access. Additional information about access is provided in transportation and access section.

During the Construction Phase, MMC would construct the Plant Site (described in 1.1.1.2 below) and also ventilation Adit on privatel and near Rock Lake, tailings impoundment dams, transmission line, and other ancillary infrastructure necessary to initiate mining activities. Construction of a ventilation adit on private land near Rock Lake may be deferred until initial mine production commeced, depending on ventilation requirements. MMC also would undertake underground delineation drilling in the orebody. MMC also would develop the Libby Loadout Facility at the Kootenai Business Park in Libby for concentration storage and shipping. The Libby Loadout Facility is discussed in section titled *Concentrate Shipment*. U.S. 2 south of Libby to the Bear Creek Road and the Bear Creek Road (NFS road #278) would be the primary access to the mine site. During the Construction Phase, the Bear Creek Road would be widened and surfaced with chip-seal. MMC would use the Libby Creek Road (NFS road #231) during reconstruction of the Bear Creek Road.

Vegetation Management

Before any construction, vegetation would be cleared and suitable soils salvaged. Merchantable timber would be measured, purchased from the KNF, and then cleared before soil removal. Non-merchantable trees, shrubs, and slash would be removed using a brush blade to minimize soil accumulation, piled into windrows, and burned. All requirements of the Montana Slash Disposal Law would be observed.

MMC would salvage and replace soils on most disturbed areas, except where slopes were too steep or where the water table was high. Proposed salvaged depths would vary between 9 and 65 inches, based on physical and chemical data collected during the baseline soils survey. Certain soils on a portion of the tailings impoundment would be salvaged in two lifts. The surface layer would be salvaged in other disturbances.

Soil stockpiles would be located in areas to minimize impacts from wind and water erosion, impacts from ongoing operations, and away from sensitive areas (*i.e.*, wetlands and streams). If necessary, stockpile locations would be modified to meet field conditions and accommodate quantities of soils actually salvaged. Soils with more than 50 percent rock fragments 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 dam and portal patio slopes. Reclamation soil thicknesses would be adjusted, if necessary, according to results of interim reclamation and site-specific conditions, as determined by the lead agencies.

Soil would be salvaged and replaced without stockpiling when feasible, primarily at the tailings impoundment, or stockpiled as close as possible to redistribution sites. Active soil stockpiles would be protected to minimize wind and water erosion. Soil stockpiles would be constructed with 40 percent side slopes and 33 percent sloping ramps where possible. As stockpiles reached their design capacity, they would be stabilized and seeded during the first appropriate season following stockpiling. Fertilizer, mulch, and tackifier would be applied as necessary to promote soil stabilization and successful revegetation. Weed control would be an important aspect of the soil storage and protection. MMC's Weed Control Plan describes the measures that would be employed to minimize noxious weeds.

1.1.1.2 Plant Site and Adits

MMC would build a plant between Libby Creek and Ramsey Creek, consisting of the following facilities:

- Mill and administration building and associated parking
- Tailings thickener tank
- Mine/yard pond
- Coarse ore stockpile building
- Warehouse
- Explosives storage
- Electrical substation

- Other miscellaneous facilities

The new Libby Adit and the Upper Libby adit, parallel, approximately 16,000-foot-long adits would be excavated in the Libby Creek drainage. One adit would serve as the main conveyor adit for ore extraction and an exhaust airway. The other adit would provide an intake for fresh air underground and access for personnel and materials during operations. The adit portals would be outside the CMW boundary. Portal patios, which are flat working surfaces outside the adits, would be constructed by cutting into the sideslope, creating a vertical face for adit construction and an area for staging of supplies. Each adit would be about 30 feet wide by 30 feet high. During adit construction, a lined retention pond would be constructed at the Libby Plant Site to handle water during construction of the Adits. Water would report to this pond from the adits. The pond would provide storage of 62 acre-feet of water (1 week's storage for a temporary inflow of 2,000 gallons per minute (gpm)). After the Starter Dam was built at the impoundment site (see section 1.1.1.4, *Tailings Impoundment*, water would be diverted to the impoundment area for storage and mill startup. The pond would then be enlarged and relined, once storage at the tailings impoundment were available, to the final size required for operations (shown as the mine/yard pond on. The pond would be available for use during construction and would provide additional storage capacity/surge storage during mill start-up and other periods.

Underground development would include excavation of a crusher station and related ore and waste rock bins, and development of main mining benches, haulage drifts, and ore and waste passes. At the terminal end of the Adits, MMC would build an underground primary rock crusher.

MMC would excavate a ventilation raise, the Rock Lake Ventilation Adit, beginning vertically from the center of the orebody, (excavating toward the surface) and then horizontally to private land 800 feet east and 600 feet higher than Rock Lake. Air would be drawn into the ventilation raise to supply fresh air for underground workers. No fans or other facilities are proposed on the surface. The Rock Lake Ventilation Adit would be a combination of a drift from the orebody, a vertical raise, and a short adit to the surface. The portal opening would be about 15 feet wide by 15 feet high and gated with a steel grate or similar structure. The short adit from the vertical raise to the portal would be sloped back into the mine, collecting any water inflow back into the mine. Grouting and other water management techniques would be used to minimize inflow of subsurface water into the raise. The ventilation raise would be constructed from inside the mine and would not require any surface activities, with the exception of creating the surface opening. Total surface disturbance associated with the Rock Lake Ventilation Adit would be about 1 acre. The ventilation adit is not anticipated to be required to support mine construction activities but would be installed during the initial mine production period.

In 2006, MMC received DEQ approval for Minor Revision (MR 06-002) to extend the Libby Adit 3,300 feet to the orebody and to conduct underground evaluation drilling and geotechnical and hydrogeologic studies. The KNF has not approved any activities described in Minor Revision 06-002 that may affect National Forest System lands. MMC would use the upper Libby Adit Site for ventilation and a secondary escape route for underground workers. If the KNF did not approve the evaluation drilling, it would begin at the start of the project. Additional drilling beyond the evaluation drilling would be completed during the pre-production phase of the project to provide information required for mine planning beyond the first 5 years of production.

1.1.1.3 Waste Rock Management

The waste rock sampling plan is described in MMC's waste rock management plan (Geomatrix 2007b). During mining, MMC would collect representative rock samples from the adits; ore zones; above, below, and between the ore zones; and tailings. MMC would conduct static and kinetic testing on these samples to evaluate the acid-producing potential. Acid-base accounting results, total sulfur analyses, and pH measurements would be documented. Waste rock handling would be conducted according the measures outlined in the Alternative 3 Agency Mitigated Alternative.

Table 2. Estimated Schedule for Waste Rock Production and Disposal.

Project Stage	Tons	Bank Cubic Yards	Disposal Area
Evaluation Drilling	298,000	130,000	Temporary lined storage pile at Libby Adit Site, then to tailings embankment
Pre-production Waste Rock	1,548,000	668,000	Temporary unlined storage pile at both adit sites, then to tailings embankment
Ore	333,000	148,000	Temporary unlined storage pile near the Adit portal, then to mill
Initial Production	288,000	128,000	Tailings embankment
Production with Tailings	576,000	256,000	Tailings embankment
	144,000	64,000	Inside mine
Production Only	864,000	384,000	Inside mine
Total Waste Rock	3,718,000	1,630,000	

1.1.1.4 Tailings Impoundment

Table 3. Daily and Total Tailings Production Estimates.

Time Frame	Daily Production (tons per day)	Total Production (tons)
Years 1-5	12,500	23 million
Years 6-10	17,000	31 million
Years 11-16	20,000	44 million
Years 17-19	20,000	22 million (excess capacity)
Maximum Capacity		120 million

1.1.1.4.1 Borrow Areas

To supplement materials excavated during Diversion Channel construction, material would be excavated from designated borrow areas within the disturbance area of the impoundment.

Material requirements and quality would vary by facility. Borrow material would be required for rip rap, road material, reclamation capping, and other uses.

1.1.1.4.2 Seepage Collection

In the 1992 and 1993 RODs and the DEQ Operating Permit #00150, the lead agencies required Noranda to modify the impoundment design to minimize the seepage from the tailings impoundment to the underlying groundwater. MMC incorporated this requirement into the current tailings impoundment design. A seepage collection system would collect seepage from in and around the tailings impoundment. The collection system would consist of a Seepage Collection Dam and pond, underdrains beneath the dams and impoundment, blanket drains beneath the dams, and a pumpback well system, if required. The seepage collection system would be constructed concurrently with the Starter Dam.

MMC committed to implementing seepage control measures, such as pumpback recovery wells, if required to comply with applicable standards. Seepage pumpback wells could be installed along the downstream toe of the tailings dam. Given the heterogeneity of the foundation soils, additional wells could be required to ensure that all flow paths were intercepted. The wells may require active pumping, depending on the artesian pressures within the wells (Klohn Crippen 2005).

1.1.1.4.3 Orebody Characteristics

The orebody is composed of two nearly parallel mineralized horizons that range from 14 to 140 feet thick and are separated by an average of 30 feet of waste rock called the barren zone. The average thickness of the lower horizon (the B ore zone) is about 34 feet, while the average thickness of the upper horizon (the B1 ore zone) is about 30 feet. The orebody outcrops near the northern end of Rock Lake, and plunges about 15 degrees to the north and northwest. The orebody may extend farther to the north and northwest. Overburden thickness ranges from 0 feet at the ore outcrop near the northern end of Rock Lake to more than 3,000 feet near St. Paul Lake. The ore consists of quartzite, silty quartzite, and siltite of the lower Revett Formation. Section 3.9, *Geology and Geochemistry* provides a more detailed discussion of the orebody geology. Rock strength tests were conducted on samples collected from drill cores collected in the early 1980s. Data from the test work was used in mine design, pillar sizes, and other important criteria.

1.1.1.4.4 Mining Method

The ore deposit would be mined using conventional room-and-pillar methods, with both diesel and diesel-electric underground equipment. A room-and-pillar method is where some ore is not mined to provide pillars or columns of ore. MMC’s preliminary mine design is based on a rigid-pillar approach. Rigid-pillar design means that all the pillars are designed to carry loads in excess of their strength and are designed not to yield. Different pillar types, based on their location within the deposit, are planned to support the overburden ceiling.

Preliminary mine planning was based on a standard pillar size of 40 feet wide by 60 feet long, laid out in a regular grid basis. Average mining height of 48 feet and a panel width (area between pillars) of 40 feet were assumed for initial mine planning. Until a sill analysis can be conducted, pillars would be aligned between the upper and lower zones. Initial estimates indicate 65 to 75 percent of the mineable reserves would be removed. Actual pillar sizes would vary depending on the ore thickness, overburden thickness, local rock quality, and hydrologic conditions. MMC would develop the final pillar design after the Libby Adit and subsequent underground testing were complete.

As part of the Libby Adit Evaluation Phase, MMC would conduct additional underground core drilling before developing final mine plans. The drilling would be used to collect detailed information on underground geologic structures, ore thicknesses, ore grades, and hydrology.

Initial mine development would start in the central section of the deposit. Mining would progress generally toward the outcrop area and take 7 to 8 years to reach the upper portion of the deposit near Rock Lake. As outlined in the Agency Mitigated Alternative 3, MMC would stop mining 1000 feet from Rock Lake and 300 feet from the Rock Lake Fault. It is expected that the Rock Lake Fault varies in structural thickness. Drilling would define the fault zone and establish the starting point for the a barrier, as described in preferred Alternative 3, in advance of approaching the buffer zone. Before the final barrier pillar design/location is completed, MMC is not proposing to mine within the buffer zone but would conduct hydrologic and geotechnical studies to determine whether closer mining could be conducted. The following parameters would be determined by exploratory drilling ahead of development and flow testing:

- Fault location and slope
- Hydraulic conductivities and storage capacities for the fault zone and adjacent transition zones
- Width of the fault and transition zones
- Water pressures in the fault and transition zones

Similar studies would be conducted on the Rock Lake barrier pillar if mining were proposed closer than 1000 feet to Rock Lake. These studies would be reviewed by the lead agencies and approval would be required before MMC could mine within a smaller buffer area. Microseismic and conventional monitoring would be used to evaluate long-term stability. Monitoring sensors would be located in operating and abandoned sections of the mine. The sensors would be connected to a continuous monitoring system and would record the size and approximate location of seismic events.

During full production, ore would be hauled from the ore passes to the primary underground crusher using 26- and 50-ton electric haul trucks. Crushed ore would be sent to the ore stockpile building via a 1,200-foot overland conveyor for further crushing and ore recovery. The conveyor crossing at creeks would be completely enclosed to minimize fugitive dust and a secondary containment trough would catch falling rock to prevent ore from falling. Spillage within the conveyor structure would be shoveled onto the belt or removed at clean out points at either end of the structure.

1.1.1.4.5 Geotechnical Monitoring

Geotechnical monitoring would be completed to collect rock mechanic data and geologic information that were pertinent to mine design criteria and employee safety. The geotechnical monitoring would be an update to geotechnical monitoring procedures and methods specified in DEQ Operating Permit #00150 and the 1993 ROD. The monitoring would include logging drillholes and mapping of the mine workings and surface features. Rock quality analysis would evaluate fracture and fault frequency, orientation, and other properties, rock strength testing for stress, strain, and strength, and *in situ* geomechanical tests. Microseismic monitoring would be used to assess long-term stability. Microseismic monitoring would include installation of sensor stations in operating and abandoned sections of the mine, and continuous monitoring of sensor stations. Stress monitors would be located near or on faults, barrier pillars, sill pillars, and other important structures/features. Data would be compiled, assessed, and reported to the lead agencies in an annual report.

The monitoring plan would be developed as mine activities were initiated during construction. Mapping would be completed as the adits, development, and mining activities progress. Drilling would be completed as part of the delineation drilling that would occur in advance of mine development and mining. The core would be available to assess fractures, faulting, and establish if the monitoring plan should be modified to include any new features or address any new issue.

1.1.1.5 Milling

1.1.1.5.1 Ore Processing

The mill would operate 7 days per week, 350 days per year for a total processing capacity of 7 million tons per year (20,000 tons of ore per day). Initial production would be 12,500 tons per day (tpd). The milling process would involve five major steps: crushing, grinding, flotation, concentrate dewatering, and tailings storage (see Figure 24 in MMC 2008). Crushing would occur underground while the remaining processes would occur in the mill facility. Reagents added during the flotation process would separate the copper and silver minerals (sulfides) from the host rock (generally quartzite), producing a copper-silver concentrate.

Ore would be processed into a concentrate using a conventional milling process known as froth flotation. In froth flotation milling, finely ground ore is mixed with water and various reagents and air is forced through the mixture in a series of large tanks called flotation cells. Sulfide minerals, such as copper, attach to air bubbles (or froth) that float to the top of the cell and are skimmed off the surface of the flotation cells and collected. Silver is found in its native form and is attached to the sulfide minerals, such as bornite, associated with the ore deposit. Silver would be collected concurrently with the sulfide minerals. Potassium amyl xanthate would be used as the collector and methyl isobutyl carbinol as the frother. These would be the only reagents required for flotation of the Montanore ore minerals. A polyacrylamide flocculant, such as Percol 352, would be used to assist the settling of the concentrate and the fine fraction of the final tailings in their respective thickeners. Percol 352 contains acrylamide, a regulated volatile organic chemical in Montana. The proposed reagents are the same reagents used at the nearby Troy Mine. Material safety data sheets for the proposed reagents are presented in MMC's Plan of Operations (MMI 2005a, MMC 2008).

The non-mineralized rock, called tailings, which would consist mainly of quartzite, would sink to the bottom of the flotation cells (see section 1.1.1.6, *Tailings Management)*. Bench-scale testing of Montanore Project ore and evaluation of the Troy Mine milling process, which processes an ore similar to Montanore ore, indicate that the mill process would operate at a near neutral pH. MMC does not anticipate the need for pH control. Process chemicals may be required periodically for testing, pH modification, or cleaning the flotation circuit and other process circuits in the mill. The flotation process would continue through cleaner flotation cells and would be repeated several times to improve mineral recovery and concentrate quality. After the flotation circuit, the concentrate would be sent to a dewatering system and stored until it was transported to the Libby Loadout for shipment to the smelter. The concentrate would be the final economic product of the milling process.

1.1.1.5.2 Concentrate Shipment

After dewatering, the concentrate would be stored in a covered building and then loaded into 20-ton, covered, highway trucks by a front-end loader. Truck covers would be used to minimize loss of concentrate. At peak production, about 420 tons of concentrate, or 21 trucks per day, would be trucked daily via NFS road #278 (Bear Creek Road), reconstructed sections of NFS road #278, and U.S. 2 to Libby, and then to an unnamed road accessing the Kootenai Business Park to a loadout facility. The loadout would be next to the Troy Mine loadout. MMC would limit concentrate haulage to daylight hours and not during major shift changes. Concentrates would be stored at the loadout inside an enclosed building with rail access on private land at the Kootenai Business Park in Libby, Montana, and then shipped via rail to a smelter. For storage and handling of concentrates, a new building would be erected and either an existing concrete pad or a new pad constructed for the building would be used. The facility would be covered to eliminate any precipitation and runoff issues. Trucks would back onto a concrete pad and dump concentrate into the concentrate building. A front-end loader would stack the concentrate in the building for shipping. Rail cars would be loaded by a conveyor belt fed by a front-end loader. Dust control devices would be used during rail loading activities to minimize fugitive dust. The rail car would be located inside an enclosed area to minimize fugitive dust associated with concentrate handling and loading. The openings of the rail car loadout building would be covered with heavy plastic strips or other similar devices. The railroad track would be extended to permit storage of rail cars. Covers for the rail cars would be used to minimize loss of concentrate.

MMC and the Kootenai Business Park have signed a letter of intent to operate the loadout facility. During final design, MMC would finalize this agreement and discuss retention of the facility for future use by the Kootenai Business Park. For purposes of planning, Kootenai Business Park and MMC expect the building would be retained.

1.1.1.6 Tailings Management

1.1.1.6.1 Tailings Pipelines

Tailings from the milling process would be separated at the mill and tailings impoundment into coarse-textured sand (sand tailings) and fine-textured clay (fine tailings) fractions. The sand fraction and water would flow as a slurry by gravity through a 10-inch diameter double-walled, pipe on the surface from the mill 6.4 miles to the tailings impoundment, where the slurry would be sent to cyclone separators (cyclones) for further separation of dam construction material. Fine tailings from the mill would be transported to the tailings impoundment through a double walled steel pipeline (agency mitigated alternative). Reclaimed process water would be returned to the mill from the tailings impoundment in a 14-inch to 16-inch HDPE pipe or similar pipe.

The fine tailings would flow to a thickener northeast of the mill. Thickener overflow (water) would be diverted directly back into the process circuit or to the mine/yard pond. All pipelines would be routed in part on the ground surface along the existing road. A pump station would be needed at a low spot near a new Poorman Creek bridge. This pump station also would pump tailings and water to the tailings impoundment to clear the line in the event of a temporary shutdown due to mechanical or power failure.

A leakage sensing system would continuously monitor operation of the lines, and the sensing system would include the installation of magnetic flowmeters on the tailings line at the mill and at the tailings pond. If a flow differential signal were received at the control room, an alarm would sound, and the mill would be systematically shut down, starting with the feed conveyors to the grinding mills. Valves on the tailings line at the mill would be closed. The final tailings pump would by-pass the cyclones and pump directly to the tailings thickener. Sensors would also be installed along each pipeline to monitor the space between the inner and outer pipes. If a leak were detected, the signal would be sent to the control room, and the shutdown procedures would be initiated.

MMC designed measures to prevent or mitigate ruptures in the tailings pipelines. MMC would construct a second sand fraction tailings line to use when the first line was in need of repair or replacement. The pipelines would be double-walled and fitted with air release/vacuum valves to ensure consistent flow. An automated leakage sensing system would continuously monitor line operation, and the sensing system would include the installation of magnetic flowmeters on the tailings line at the mill and at the tailings pond. If a flow differential signal were received at the control room, an alarm would sound, and the mill would be systematically shut down, starting with the feed conveyors to the grinding mills. Valves on the tailings line at the mill would be closed. The final tailings pump would by-pass the cyclones and pump directly to the tailings thickener. Sensors would also be installed along each pipeline to monitor the space between the inner and outer pipes. If a leak were detected, the signal would be sent to the control room, and the shutdown procedures would be initiated. The surface pipelines between the mill and the tailings impoundment would be visually inspected each shift. An additional inspection would take place during scheduled maintenance shutdowns. The pipelines would be routed in a 24-foot-wide flat bottom ditch to contain any leakage from the pipelines. An unlined 6-foot-wide ditch paralleling the entire length of the road and pipelines would intercept any released tailings. Containment and surface water runoff ditches would be constructed with an earthen berm between them. This berm would ensure that in the event of a rupture of the double-walled pipe, all tailings would remain in the ditch and not come in contact with surface waters. A lined flume and trestle would be constructed where the pipelines would cross Poorman Creek.

1.1.1.7

1.1.1.7.1 Project Water Requirements

The project water balance is an estimate of inflows and outflows for various project components). Actual volumes for water balance variables (*e.g.*, mine and adit inflows, precipitation and evaporation, dust suppression) would vary seasonally and annually from the volumes estimated. MMC would maintain a detailed water balance that would be used to monitor water use (see Appendix C). During the Evaluation and initial Construction phases, mine and adit inflows would be sent to the Water Treatment Plant.

1.1.1.7.2 Water Rights

MMC holds two 1902 surface water rights on Libby Creek, one for mining near the Libby Adit site in Section 15, Township 27N, Range 31W (with a maximum diversion of 44.9 gpm between April 1 and December 19, and maximum volume of 50.97 acre-feet), and one for domestic use in the same section (15 gpm year-round, and a maximum volume of 1.5 acre-feet). MMC also holds a 1989 ground water right near the Libby Adit site in Section 15, Township 27N, Range 31W (with a total diversion of 40 gpm year-round). These rights would likely be sufficient to meet anticipated potable water use and dust control, but insufficient for mining uses. In all mine alternatives, MMC would acquire new surface water and groundwater appropriations from the DNRC to use water for mining purposes. MMC applied for new surface water and groundwater rights using the project components of Alternative 3 (MMC 2012a). These applications are discussed in section 2.4.3.4.2, *Water Rights.*

1.1.1.7.3 Wastewater Discharges

The DEQ issued a MPDES to Noranda in 1997 for Libby Adit discharge to the local groundwater or Libby Creek. Three outfalls are included in the permit outfall 001 – percolation pond; outfall 002 – infiltration system of buried pipes; and outfall 003 – pipeline outlet to Libby Creek. Only Outfall 001 has been used since permit issuance. The percolation pond has an estimated capacity of 25 acre-feet (8.1 million gallons). If the pond reaches capacity, an overflow pipe routes water to a direct discharge to Libby Creek (outfall 003) (DEQ 2006). Since MMC began dewatering of the Libby Adit, it has only discharged to outfall 001. The DEQ renewed the permit in 2006. A minor modification of the MPDES permit in 2008 reflected an owner/operator name change from Noranda to MMC. 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. These outfalls would be needed in Alternative 3. In 2011, the DEQ determined the renewal application was complete and administratively extended the permit (ARM 17.30.1313(1)) until MMC receives the renewed permit. Other outfalls may be identified during the MPDES permitting process.

During operations, MMC would maintain the permitted outfalls at the Libby Adit Site and would apply for additional outfalls for wastewater disposal.

The EPA established Effluent Limitations Guidelines (ELGs) applicable to mines that produce copper and silver and mills that use the froth-flotation process for the beneficiation of copper and silver (40 CFR 440.100). The following discharges subject to the ELGs would include, but not be limited to: mine and adit drainage, tailings impoundment seepage, tailings impoundment dam runoff, runoff and seepage for waste rock stockpiles, runoff from facilities constructed of waste rock if subjected to precipitation, and runoff of excess water from LAD Areas 1 and 2. The discharges would be regulated at an outfall in a MPDES permit. The following discharges would be subject to Montana’s storm water regulations, but not to the ELGs: soil stockpiles, access roads, parking areas, and runoff or seepage of facilities not constructed of waste rock or tailings. Management of stormwater discharges are discussed in the subsequent section on Tailings Seepage.

As part of the conditions of DEQ Operating Permit #00150, MMC designed an underdrain system to collect tailings water from beneath the tailings impoundment to minimize seepage to underlying groundwater). Water collected by the underdrain system would flow beneath the tailings dam, down a short segment of the former Little Cherry Creek, and be captured by the Seepage Collection Dam. MMC estimates 25 gpm of tailings water seepage would not be collected by the underdrains and would discharge to groundwater. A pumpback well system downgradient of the impoundment, if required to comply with applicable standards, would collect tailings seepage after it mixed with groundwater beneath the impoundment (see section 1.1.1.4.2, *Seepage Collection*).

Water Treatment Plant

The Water Treatment Plant at the Libby Adit Site could be used to treat 500 gpm mine and adit water at its current capacity. Actual flow rate would depend on mine and adit water quality. The existing infrastructure at the Libby Adit Site would allow piping of the water from the Ramsey Adit and mine workings via the Libby Adit. A series of collection sumps would be constructed to remove sediment before discharge to the Water Treatment Plant.

Collection and segregation of “clean” groundwater from normal mine drainage water in areas where large water inflows occur could reduce the volume of water requiring treatment. The technique involves drilling an array of holes into a water producing zone and directing the water into a collector pipe. The inflowing groundwater would be unaffected by mining activities and could be discharged without treatment while maintaining compliance with MPDES permitted effluent limits. Segregation of water may be difficult and not practical or feasible. This technique would not affect the water balance, but could reduce the mine water volume needing treatment.

Underground Water Management - Grouting

The bedrock encountered by the adits and mine would have low permeability. Several large faults and many smaller fractures, capable of storing and transmitting groundwater, would be encountered during mine development. To reduce the amount of water entering the adits and mining areas, MMC would grout areas where water was flowing into the adits and mine workings. Drilling would occur ahead of drift development to allow identification of potential inflows. Grouting would be used as the primary mechanism to reduce adit and mine inflows.

Tailings Impoundment Storage

An estimated 71 million gallons of water (220 acre-feet) would be required to initiate mill operations, and MMC plans to slowly build this water inventory during construction activities. The lined Starter Dam would be designed to hold the required amount of water for mill startup.

During Starter Dam construction, a temporary water retention structure upstream from the Starter Dam would be constructed to hold water temporarily until the Starter Dam was complete. Once the tailings facility was in full operation, MMC expects there would be ample storage capacity to hold excess water

Erosion Control

MMC would use standard Best Management Practices (BMPs) for sediment control such as interim reclamation, diversions, berms, sediment fence, sediment traps and ponds, and straw bales. Revegetation practices would be used to control water erosion by providing a stabilizing cover. Interim stabilizing measures such as water sprinkling, mulch, and tackifiers would be used until vegetation becomes established. Sediment would be contained from processing and material handling operations in lined sediment control ponds. Soil would be salvaged in two lifts at the impoundment. Subsoil with increased rock fragment content would be placed on the 4H:1V tailings dam face.

Reclamation equipment would be worked along contours where possible to minimize creation of erosion channels. When work on slopes must be perpendicular to contours, crawler tracking or dragging would be used. Windrows of woody debris or logs would be placed parallel to slope contours and the bases of long fills.

Reclaimed sites would be inspected periodically throughout the reclamation effort to assess progress toward meeting reclamation objectives. Slopes would be visually inspected for rills, gullies, and slope failures and repaired as needed.

1.1.1.8 Fugitive Dust Control

Measures to control and minimize fugitive dust are provided in MMC's Application for Air Quality Preconstruction Permit (TRC Environmental Corp. 2006a). A final fugitive dust control plan would be developed and implemented. MMC would use BMPs during construction, operation, and closure to control wind and water erosion. All appropriate precautions would be taken to minimize fugitive dust from all construction and operation activities related to the project, including concentrate transfer and loading activities at the Libby Loadout. These measures would include watering or applying dust suppression agents on unpaved roads and work areas on an as-needed basis.

Dust emissions from ore crushing, conveying, and other handling activities would be controlled with water sprays, wet Venturi scrubbers, and enclosures. Such control devices would be included on the primary crusher located underground, the conveyor belt, and the ore stockpile located adjacent to the mill facilities.

MMC's expects that seasonally, dust control at the tailings impoundment would occur continuously, but the decision to operate sprinklers at the tailings impoundment would be made based on regular inspection of the tailings impoundment during the day and on-site weather criteria to be established as part of the fugitive dust control plan. The presence of visible emissions, observed through shift inspection of the tailings impoundment by environmental personnel trained in visual opacity monitoring and by shift operators staffing the tailings impoundment, would prompt sprinkler operation. In addition, specific thresholds for weather conditions such as wind speed, precipitation, and humidity would be developed as part of the fugitive dust control plan to indicate the potential for fugitive dust emissions to occur, prompting sprinkler operation. Weather conditions and sprinkler operations if required would be documented (TRC Environmental Corp. 2006a).

All transfer operations and storage areas at the Libby Loadout would be completely enclosed. Concentrate transported by haul truck to the loadout would be dumped in an enclosed storage bin, and then transferred to rail cars. Loaded rail cars waiting for consolidation into a unit train would be covered to prevent wind losses and water pollution. The potential accumulation of concentrate along the haul truck turn-around, at the concentrate storage area, and along the railroad tracks would be limited, and would be managed by regular clean-up with sweepers (TRC Environmental Corp. 2006a). Groundwater monitoring wells would be installed at the loadout. Regular visual inspections would be completed by site personnel on reclaimed areas to evaluate where fugitive dust emission control measures were in place and properly functioning.

Table 4. Estimated Mine-Related Traffic during Operations.

Vehicle Daily Round	Trips	Vehicle Types	Time
Concentrate Trucks	21	20-ton capacity	Day shift
Supply Trucks	5	Various	Day shift
Pickups/Vans	30 (10 per shift)	0.5 to 1 ton capacity	Three shifts
Employee Transportation	10	Buses/Cars/Pickups	Day shift – 5; Swing shift – 3; Night shift – 2

Source: MMC 2008

Access road maintenance, including weed control, would be MMC's responsibility, unless additional use by the KNF or other interests would warrant a cost-share agreement. This responsibility would revert to the KNF or road owner following project completion.

1.1.1.9 Communications

Communications for the project would be provided by both a telephone system and a two-radio system. Telephone and data communications would be via new, buried utilities along the Bear Creek Road from Libby. MMC currently has radio communications to the Libby Adit Site and would use this system for secondary emergency communications. MMC is currently authorized to use the local county emergency radio system to communicate with emergency responders. In addition, a fiber optic line would be included on the transmission line and would provide communications between the substations. No additional disturbance would be required for any of the communication systems for the project.

1.1.1.10 Project Employment

Construction would commence during Year 1, with the hiring of 135 employees, and would last about 3 years (Table 5). Construction employment would peak at 155 employees during Year 2. During Years 3 and 4, construction employment would be 65 employees. Total operations employment during Year 1 would be 30 employees, and is expected to reach 450 employees from Years 6 through 16 of the project. The mine is expected to operate 24 hours per day, 7 days per week, for 350 days per year. Maintenance repair and security activities would be scheduled during the remaining 2 weeks of the year.

Much of the construction work would be equipment and specialty services required for the project development. Each vendor or supplier may have a local distributor or hire local construction employees to assist in the installation or construction of their particular piece of the project. MMC expects up to 80 percent of the construction workers would be hired locally. MMC is committed to local hire and would encourage contractors to use local hire where possible, including partnerships with local businesses. MMC would work with local job services and educational institutions to outline the types of jobs and skills necessary for training purposes.

Table 5. Projected Project Employment.

	Construction			Production			
Year	**1**	**2**	**3**	**1**	**2-5**	**6-10**	**11-16†**
Production Rate (tons per day)	0	0	0	12,500	12,500	17,000	20,000
Construction‡	135	155	65	65	0	0	0
Operations	30	130	246	246	246	450	450
Total	165	285	311	311	246	450	450

†Production would continue for 3 to 4 more years if 120 million tons were mined; much lower employment during the 10- to 20-year closure period.

‡Construction employment includes a 23-person crew for the transmission line construction.

1.1.2 Reclamation Phase

Borrow Areas

The borrow areas would remain until the impoundment reclamation plan was completely implemented to ensure no fill material was required. The borrow area slopes would be reduced to at least a 2H:1V slope and graded to ensure storm water does not leave the borrow area. The bottom of the borrow pit would be ripped to reduce water retention. Once the areas were no longer needed, the areas would be covered with soil and reseeded.

Post-Closure Water Management

Following cessation of mining, the tailings impoundment would be partitioned to provide an area for water storage. The water level within the tailings would be lowered so construction equipment can work on the surface. Dewatering the top few feet of tailings would be accomplished by promoting natural drying and evaporation. MMC anticipates some difficulty in dewatering the tailings in the center portion of the tailings impoundment surface containing the fine tailings. The tailings in this area would have low bearing capacity. Subgrade reinforcement, such as a geotextile, may be needed for construction equipment to work on the tailings surface. MMC estimates that 10 percent of the area would require this technique and would likely be focused in the area where the final impoundment pond existed.

Seepage through the tailings dams would continue following reclamation. The seepage collection system would remain in place. Seepage to the underdrain system is expected to decrease from 930 gpm to 200 gpm 10 years after closure, stabilizing at a rate of 50 to 100 gpm over a longer period (Klohn Crippen 2005). Seepage collected in the pond would be pumped to the tailings impoundment where it would evaporate, be distributed to Water Treatment Plant, if necessary, or be used to irrigate reclaimed areas. Seepage from the tailings not collected by the underdrain system is estimated to decrease from 25 gpm during operations, and 22 gpm at closure, to 17 gpm in the first 10 years after closure, and stabilizing at 5 gpm over the long term (Klohn Crippen 2005). The seepage would mix with the underlying groundwater and be intercepted by the pumpback well system, if required to comply with applicable standards. MMC would operate the seepage collection and the pumpback well systems until groundwater adjacent to the reclaimed impoundment met BHES Order limits or nondegradation criteria without additional treatment. Long-term treatment may be required if BHES Order limits or nondegradation criteria were not met. The length of time these closure activities would occur is not known, but may be decades or more.

Following removal, the Seepage Collection Dam and Pond would be graded to blend in with the original slope. After BHES Order limits or nondegradation criteria were met and the Seepage Collection Dam and Pond was removed, seepage from the underdrain system would flow down the former drainage.

Roads retained after mine operations and reclamation plans are discussed in MMC's Road Use Technical Memo (MMC 2007). MMC's *general* road reclamation approach would be as follows:

- Bear Creek Road – The Bear Creek access road (NFS road #278), from U.S. 2 to south of the tailings impoundment, would not be returned to its pre-mine width. Cut-and-fill slopes associated with widening the Bear Creek access road from U.S. 2 to the Plant Site access road would be reclaimed immediately following construction. ***(See further discussion of details in Alternative 3 – Preferrred Alternative)***
- New Roads – All new roads, except the Bear Creek access road, constructed for the project would be reclaimed, which includes grading to match the adjacent topography, obliterating the road prism. This would include all roads constructed for the project.

- Open Roads – Reclamation of open roads upgraded for operations previously open to the public use would be completed to allow the road to be retained and used in a manner consistent with the pre-operational conditions. The surface would be bladed and sediment control systems inspected and replaced, as necessary. The bridge on NFS road #6210 would be removed and would be reclaimed consistent with open roads.
- Closed or Restricted Roads – Closed roads used for mine operations would be reclaimed to pre-mine conditions. Access restrictions would be upgraded or installed (gates, kelly humps, etc.) as required by the KNF, and the road surface would be scarified and seeded.

Available soil would be salvaged from disturbed areas and redistributed on fill and cut slopes where possible. Where soils were not salvaged during road construction, the road surface would be scarified and prepared for seeding. Soil would not be respread on cut slopes in consolidated material. Resoiled slopes would be broadcast seeded or hydroseeded with the planned seed mixture, dozer tracked where possible, and fertilized and mulched as necessary. Planting of trees and bare-root shrubs is not planned for the roads that were not completely obliterated. MMC would inspect sediment control features and repair or replace controls as needed.

1.1.2.2 Interim and Concurrent Reclamation

To maximize site stabilization, weed control, and early completion of final reclamation, MMC would identify appropriate areas each year for interim and concurrent reclamation. Interim reclamation would be conducted in areas where disturbance was required during construction and/or operations. Potential interim reclamation areas include soil stockpiles, road cut/fill sections, borrow pits, plant site fill slopes, and other similar areas. Concurrent reclamation would be completed in areas where mine activities were completed and where no additional disturbance was anticipated. Potential concurrent reclamation areas include the tailings impoundment dam face, borrow pits, temporary roads, and other similar features. Interim and concurrent reclamation would be carried out using the same techniques, seed mixtures, and fertilizer types/application rates as described in the final reclamation activities for the project. Where possible, interim and concurrent reclamation would occur within the same year of disturbance. The necessity for additional reclamation in areas where interim reclamation had occurred would be evaluated by the lead agencies at closure.

1.1.2.3 Revegetation

Compaction and handling would be minimized as much as possible. Soil replacement depths would average 24 inches on the tailings impoundment dam and 18 inches on all other disturbed areas. Soils would be removed in two lifts on a portion of the tailings impoundment area. The areas selected for double lift salvage would have more rock fragments in the subsoil.

Before soil redistribution, compacted areas, especially the adit portal areas, roads, soil stockpile sites, and facilities area, would be ripped to reduce compaction. Ripping would eliminate potential slippage at layer contacts and promote root growth. Soil salvage and redistribution would occur throughout the life of the operation.

Selection of plant species for revegetation was based on pre-mine occurrence; post-operation land use objectives; establishment potential; growth characteristics; soil adaptation and stabilizing qualities; wildlife palatability; commercial availability; and expected moisture, temperature, and soil conditions. Two plant mixtures are proposed: one dominated by species typically found in moist, relatively cool sites, and one with species suited to a wider range of growing conditions. Seed mixtures may be modified, with the lead agencies' approval, due to limited species availability, poor seed quality, site differences, poor initial performance, or advances in reclamation technology. Forbs would not be used in seed mixtures used on roadsides to avoid attracting bears. Seed mixtures would be dominated by native species. Before reclamation, MMC would submit seed information such as seed content and germination testing results to the lead agencies. The lead agencies would adjust seed mixtures as appropriate for site conditions and to meet any KFP changes.

Seeding rates were designed to average 90 to 100 live seeds per square foot for drill seeding and roughly twice that for the broadcast seeding. Drill seeding would occur on slopes of 33 percent or less. Rocky slopes, areas where organic debris had been spread, or slopes greater than 33 percent would be broadcast or hydroseeded.

On slopes of 33 percent or less, the seedbed would be disced and harrowed. After seeding, straw mulch would be applied at 0.5 to 1.5 tons per acre and anchored with a straw crimper. Some hydroseeded areas of slopes steeper than 33 percent would be mulched with a cellulose fiber mulch and a tackifier. Fertilizer application rates would be based on soil tests; phosphorus fertilizer would be applied before seeding; and nitrogen fertilizer would be applied in growing seasons after seeding.

Tree and shrub seedlings would be planted in selected areas of the Plant Site, the Libby Adit Site, and the tailings impoundment. Shrubs and trees would not be planted on soil stockpile sites, portal patios, or along road corridors. Planting density would be 435 trees per acre and 200 stems per acre for shrubs. (Agency mitigation requires 400 and 200, respectively, after 15 years). Seedlings would be planted either continuously in strips on steeper slopes or in highly visible areas, or in randomly placed groupings on level to gently sloping areas. Containerized seedlings would be used when available. When bare-root stock was used, planting densities would be increased by 10 to 15 percent, depending on planting success of containerized stock versus bare-root stock.

Interim revegetation would take place on certain disturbed areas, such as roads, stockpiles, transmission lines, pipelines, and other areas, to reduce erosion and sedimentation. These areas would be broadcast seeded with the interim seed mixture, mulched, and fertilized as necessary. As the tailings dam increased in height, only final slopes would be reclaimed using the permanent seed mixture. All other unreclaimed disturbances would be reclaimed within 2 years after mining completion.

If feasible, seed or plant materials would be collected on site, and soils used for planting trees and shrubs would be inoculated with mycorrhizae. Seeds of species preferred by grizzly bears may be collected and used to supplement existing seed mixtures. When available, blister-rust resistant species would be used.

1.1.3 Temporary Cessation of Operations

Although a temporary cessation of operations is not planned, uncontrollable circumstances may cause a short-term stoppage in operations. Temporary cessation of operations refers to the suspension of ore processing and/or mining for an anticipated period of up to 1 year. Major steps to be undertaken would include the following:

- Continuing mine dewatering
- Maintaining water management (including treatment, etc.)
- Maintaining all monitoring activities
- Clearing and repairing site drainage and sedimentation control structures to ensure proper runoff and sedimentation control over a sustained period of time
- Contouring and seeding areas susceptible to erosion
- Securing monitoring wells, pumps, and intake structures to prevent equipment damage
- Maintaining access roads to insure project access
- Inspecting, repairing, or replacing signs and fencing around the property
- Implementing facility inspections
- Controlling noxious weeds
- Continuing dust suppression activities on the tailings beach and dam face

MMC would maintain the operation so that startup could be initiated quickly when the situation causing the temporary closure was eliminated. Staffing levels may be reduced to levels necessary but would provide staffing and coverage properly to maintain the facilities and permit. MMC would notify the lead agencies 30 days before any project startup. If the temporary closure were required for an extended period of time (greater than 1 year), MMC would meet with the lead agencies to discuss the project and issues that should be addressed in a temporary closure plan. MMC would submit the temporary closure plan that would outline the specific activities necessary to provide interim protection of resources.

1.1.4 Monitoring Plans

MMC would conduct operational and post-operational monitoring (as described in SDEIS and FEIS Appendix C) and provide monitoring results to the lead agencies in the annual report for hydrology, aquatic life, tailings impoundment, air quality, revegetation, and cultural resources. Proposed monitoring associated with waste rock is described in section 1.1.1.3, *Waste Rock Management* and monitoring associated with wetlands is described in section **Error! Reference source not found.**, *Monitoring*.

1.1.4.1 Hydrology

Surface water and groundwater would be monitored during operations at various locations throughout the project area. Groundwater monitoring would consist of periodic groundwater level measurements and collection of samples for laboratory analysis. Proposed monitoring well locations would be located above and below all major project facilities. MMC would install the groundwater monitoring wells before mine construction to establish pre-construction conditions. If the lead agencies determined additional monitoring wells were required for land application in the tailings area, these would be installed before construction activities.

Surface water monitoring would be conducted during the life of the project in conjunction with monitoring of aquatic life. Surface water monitoring would consist of periodic streamflow measurements and collection of samples for laboratory analysis. Any adit discharge would be monitored for quality and flow. Water levels in the tailings impoundment would be measured periodically. Sediment sampling at LB 2000/L2 downstream of the confluence of Little Cherry

Creek with Libby Creek would be conducted daily during construction activities, every other day during initial mine operation, and once per week during mine operations/reclamation.

MMC would implement monitoring at Rock Lake to estimate existing groundwater discharge to the lake that would allow subsequent detection of small changes in discharge due to possible dewatering effects of the project. Water budget variables would be measured or estimated, including evaporation, precipitation, surface water inflows and outflows, groundwater inflows and outflows, and continuous lake levels. The lake monitoring system design and evaluation would be coordinated with the lead agencies. If substantial increased mine inflows occurred near Rock Lake, MMC would submit continuous lake level data, weather permitting, and any other lake level data accumulated during the year, within 5 working days and would provide data and evaluation at an increased frequency as determined by the lead agencies.

MMC would collect monthly samples to establish pre-construction conditions in the Poorman Creek groundwater wells from March, or as soon as weather permits, through November of the same year. If nitrate or ammonia concentrations increased in groundwater, MMC would notify the lead agencies within 2 weeks and initiate twice-a-month monitoring of all adjacent surface water and groundwater stations.

MMC would prepare a report briefly summarizing hydrologic information, sample analysis, and quality assurance/quality control procedures following each sample interval. Data would be submitted to the lead agencies by MMC within a reasonable time (5 to 7 weeks) after each sampling trip. MMC would submit an annual report to the lead agencies summarizing data over the year. In the annual report, MMC would present a detailed evaluation of the data. Data would be analyzed using routine statistical analysis, such as analysis of variance.

1.1.4.2 Aquatic Life and Fisheries – (refer to USFS Fisheries BA, 2013)

MMC would monitor aquatic insect and periphyton populations at nine sampling locations in the project area. Sampling locations would include one each in Poorman, Little Cherry, and Bear creeks, and five in Libby Creek. MMC would monitor during three periods: in April before runoff, in August during late summer flows, and in October before ice forming in the streams. MMC would monitor fish populations in Libby Creek at 2-year intervals in four stream reaches in lower Libby Creek. Population densities of each fish species captured during the monitoring would be estimated. The condition of all captured fish would be recorded. MMC would estimate the seasonal variation in fine sediment loading (embeddedness) at each sampling station using the “substrate score” methodology. If bull trout spawning or bull trout redds were observed at the four fish monitor stations (L1, L3, L9, and Be2), the surface embeddedness monitoring would be supplemented with the “McNeil Core” substrate sampling methodology, using five representative core samples.

MMC would measure background concentrations and document potential changes in the concentrations of cadmium, mercury, and lead in the fish of Libby Creek. Each year, for 5 years, MMC would collect 10 cuttbow trout, each greater than 4 inches in size, and 10 adult sculpins from Libby Creek at three stations. Collections would be completed during the late-summer to early fall low-flow period. Tissue samples, including homogenized flesh and skin from each fish, would be analyzed to determine cadmium, mercury, and lead concentrations. Thereafter, MMC would resample each site at a 3-year interval to document the trends in bioaccumulation of these metals. MMC would tabulate sampling data and present the monitoring results in the annual reports.

1.1.4.3 Tailings Impoundment

The monitoring consists of four primary areas to be monitored: milling and material production; water balance; geotechnical stability and dam construction; and environment and closure (Table 6).

Reconciliation of the mass balance would be carried out on an annual basis, in conjunction with the water balance. Milling, production, and cyclone records would be kept to document “as-built” conditions. Records of dam construction, including borrow, mine waste rock, and cyclone sand volumes would be maintained. During operations, annual surveys of the impoundment, including water stored of the pond, would be carried out to assist in the reconciliation of mass balance.

The water balance would be reconciled on an annual basis, in conjunction with the mass balance. Records of all flows would be reconciled and the water balance also would use the measured precipitation and evaporation rates on site and observations of areas of beaches and water ponds.

Table 6. Tailings Impoundment Monitoring

Technical Area	Item	Monitoring Parameters	Frequency	Comments
Milling and Materials	Thickener underflow feed line to tailings impoundment	Tons and Gallons	Daily	Compiled monthly and reconciled on an annual basis with the water balance Reconcile mass balance with density of tailings (dam and impoundment)
	Secondary cyclone feed line to dam.	Tons and Gallons	Daily	
	Secondary cyclone – underflow and overflow	Tons and Gallons	Daily	
	Water storage in impoundment	Volume of water	Annually	
Dam Volumes	Cycloned sand, borrow, and mine waste rock)	Tons and cubic yards per year	Annually	Annual reconciliation of fill materials
Water Balance	Reclaim pumping rates (volume)	Gallons/day	Daily	Compiled monthly and reconciled on an annual basis
	Irrigation pump rates	Gallons/day	Daily	
	LAD application rates	Gallons/day	Daily	
	Underdrain collection flows	Gallons/day	Weekly	
	Precipitation	Inches	Daily	
	Evaporation	Inches	Daily	
	Approximate pond areas	Acres	Monthly	

Technical Area	Item	Monitoring Parameters	Frequency	Comments
	Approximate wet and dry beach and dam areas	Acres	Monthly	
Water Quality	Reclaim water	All parameters listed in Operating Permit #00150 or MPDES Permit MT-0030279	Monthly	
	Mine water		Monthly	
	Groundwater seeps		Quarterly	
	Groundwater monitoring wells - Main dam (10) - South dam (1) - North dam (2)		Quarterly	
Geotechnical Stability	Piezometers - Main dam (10) - South dam (2) - North dam (2) - Diversion dam (2)	Piezometric levels	Monthly	Monitoring of potential pore pressures in the clay; and "normal" dam monitoring
	Inclinometers - Main dam (3)	Deformation (inches)	Monthly	To be located in areas of potential clay
Dam	Material properties	Density and gradation	Weekly	A QA/QC plan would be implemented to measure and monitor density and gradation
Environment	Dust	Visual	Monthly	Routine observations to document potential dust and wildlife use of area
	Wildlife	Visual	Monthly	
Closure†	Consolidation of tailings (10 - settlement plates)	Inches of settlement	Quarterly to annually	
	Piezometers in the impoundment (10)	Phreatic level	Quarterly to annually	
	Revegetation plots	Acres of replanting	Quarterly to annually	

†The operational monitoring would continue for the decommissioning stage until "steady state" conditions were met. Frequency would progressively decrease to quarterly and annually.

Groundwater monitoring wells would be installed downstream of the Main Dam and downstream of the Seepage Collection Dam. The groundwater monitoring wells would be installed along the two representative hydrogeological sections of Libby Creek and Little Cherry Creek. The location of groundwater monitoring wells would be determined during final design. The wells would be installed at various depths to monitor the main hydrogeologic units including both shallow and deep soil/weathered rock units. Additional wells would be installed downstream of the North Saddle Dam and South Saddle Dam, later in the life of the mine. A preliminary schedule of monitoring wells is presented in Table 6; final well number and locations would be determined during final design. Flow measurement weirs also would be installed downstream of the Seepage Collection Dam and, during operations, in any areas of observed flows. Flow in the Little Cherry Creek Diversion Channel would be measured monthly, and dam seepage flows would be measured quarterly.

During operation, stability monitoring would include the following:

- Piezometers in the dam foundation and fill
- Inclinometers extending through the potential clay units in the foundation
- Seepage monitoring

Electric piezometers would be installed in the dam foundation to measure pore pressures during construction, with particular attention to areas where the glaciolacustrine clay is present in the foundation. Appropriate "trigger" levels would be established, in conjunction with the detailed stability analysis, to provide a management tool to respond to higher than predicted responses. Piezometers also would be installed in the cycloned sand section to monitor the "drawdown" of cyclone water within the dam fill. The piezometers cables would be buried and led to a common readout station at the toe of each dam. Continuous data reading equipment would be installed.

Inclinometers would be used to monitor potential deformation of the dam foundation. The inclinometers would be installed in areas of glaciolacustrine clay and would be extended up through the dam fill. Quarterly observations of any seepage would be documented. The seepage observations would include evidence of piping, flow estimate, and water quality.

Construction QA/QC of dam construction activities would be carried out by a qualified consultant. Responsibilities of the site engineer(s) during construction would be detailed in a field manual before construction and would include standard field and laboratory quality control tests.

Observations would be taken and documented during operations, such as dust from the tailings beaches, including length of time dust was generated, and aerial extent of dried area. The use of the area by wildlife, such as waterfowl, also would be noted.

The monitoring would continue into the closure stage, although the frequency of records would be reduced accordingly as steady state conditions were reached. The following monitoring would be carried out during the reclamation phase:

- Piezometers would be installed within the tailings impoundment area to monitor the progressive "drawdown" of the phreatic surface
- Settlement plates would be installed over the tailings impoundment area to monitor the consolidation/settlement of the tailings to help confirm predicted consolidation behavior for closure
- Monitoring of the success of the ongoing progressive revegetation would be continued until steady state conditions were reached

Stability monitoring of the dam would be performed during operation and after closure. The downstream slope and toe of the tailings dam, the North and South Saddle dams, the Diversions Dam, and the Seepage Collection Dam would be visually inspected daily for evidence of seepage exiting the slope or the downstream toe. A V-notch weir would be located at the downstream toe of the dam to monitor seepage rates. If seepage were noticed, both the seep location and estimated quantity of flow would be recorded and the project geotechnical engineer immediately contacted for inspection and recommendation for mitigation measures, if necessary. During operations, the dam and associated structures would be inspected weekly and measurements taken of freeboard adequacy; beach width; cracking, sloughing, depressions, and erosion of the dam and abutments; changing trends in seepage quantities, piping, and wet spots; and the condition of the Diversion Channel.

1.1.4.4 Air Quality

MMC committed to implementing the monitoring requirements developed by the DEQ for the draft air quality permit. The monitoring plan is summarized in this section and discussed in the DEQ's draft permit (DEQ 2011). MMC would install, operate, and maintain three air monitoring sites near the mine and facilities. The exact location of the monitoring sites would be approved by the DEQ. MMC would begin air monitoring at the commencement of mill facilities or the tailings impoundment and continue air monitoring for at least 1 year after normal production was achieved. MMC would analyze for metals shown in Table 7 on the PM_{10} filters once the mill facilities and tailings impoundment were operational. At that time, the DEQ would review the air monitoring data and determine if continued monitoring or additional monitoring were warranted. The DEQ may require continued air monitoring to track long-term impacts of emissions for the project or require additional ambient air monitoring or analyses if any changes took place regarding quality and/or quantity of emissions or the area of impact from the emissions.

Table 7. Required Air Quality Monitoring, All Alternatives.

Location	Site	Parameter	Frequency
Plant Area	Site #1	PM-10[1] PM-2.5[3]	Every 3rd day according to EPA monitoring schedule
		As, Cu, Cd, Pb, Zn[2]	
Tailings Area (Up-drainage)	Site #2	PM-10[1] PM-2.5[3]	Every 3rd day according to EPA monitoring schedule
		As, Cu, Cd, Pb, Zn[2]	
Tailings Area (Down-drainage)	Site #3	PM-10[1] / PM-10[1] Collocated	Every 3rd day according to EPA monitoring schedule
		As, Cu, Cd, Pb, Zn[2]	
		PM-2.53 / PM-2.53 Collocated	(Collocated every 6th day)
		Windspeed, Wind Direction, Sigma theta[4]	Continuous

[1] PM-10 = particulate matter less than 10 microns.
[2] As = Arsenic, Cu = Copper, Cd = Cadmium, Pb = Lead, Zn = Zinc.
[3] PM-2.5 = particulate matter less than 2.5 microns.
[4] Sigma Theta = Standard Deviation of Horizontal Wind Direction.

1.1.4.5 Revegetation

MMC would complete soil tests to determine the appropriate fertilizer mix required for successful reclamation. The fertilizer mix and rate would be approved by the lead agencies before being used. Interim reclamation activities would provide opportunities to evaluate the most effective use of fertilizers for final reclamation. The vegetation cover, species composition, and tree planting success would be evaluated during the first year following reseeding or replanting. In addition to a general evaluation, MMC would conduct vegetation monitoring every 2 years during operations at sites representative of various types of disturbance. Control sites in areas unaffected by the project would be established to provide information on site conditions. Reports summarizing survey data would be submitted to the lead agencies. MMC would develop reclamation bond release criteria as part of the overall reclamation plan reviewed and approved
by the lead agencies. Part of the release criteria would involve specific, qualitative measurement of revegetation success.

At the end of mine operations, MMC would conduct similar vegetation monitoring every year at sites representative of various types of disturbance. The following characteristics would be evaluated:

- Plant species responses (germination, growth, competition)
- Total and vegetative cover
- Plant species and plant diversity (including weeds)
- Procedures to reclaim steep rocky slopes
- Soil redistribution depth
- Soil rock fragment content
- Effects of fertilizer rates
- Tree planting techniques
- Tree stocking rates
- Viability of bare-root versus containerized stock

MMC would request bond release in phases as specific tasks were completed. The following criteria for revegetation success and bond release would apply to areas where revegetation is the primary reclamation objective:

- Cover – Total cover was least 80 percent of the control site total cover, or the site met a total cover of 70 percent with at least 60 percent of that cover being a live plant community
- Diversity – Dominance by no more than three acceptable plant species, either in the seed mixture or the local native plant community
- Noxious Weeds – No more than 10 percent noxious weeds
- Rills and Gullies – No rills and gullies greater than 6 inches deep and/or wide

Success criteria must be met for 3 years to meet reclamation objectives. If success criteria were not met, MMC would modify seed types and reclamation techniques as appropriate and conduct a second seeding. If the site were stable but still did not meet vegetative release criteria, MMC may modify the plan and reseed again, and would request bond release by the lead agencies.

MMC would regrade and revegetate areas where rills and gullies exceeded the release criteria. If rills and gullies persisted, MMC would review run-on conditions and regrade and/or install sediment control features as appropriate. If site stability were still not achieved, MMC would consider armoring the rills and gullies with riprap, rock lining, or other similar materials to provide a stable drainage pathway. Once the site exhibited stability for 3 years, MMC would request bond release by the lead agencies.

Vegetative monitoring also would assess noxious weeds. Measures outlined in MMC's Weed Control Plan approved by the Lincoln County Weed Control District would be followed during operations and reclamation to minimize the spread of weeds to reclaimed areas. If weed content were above 10 percent, MMC would implement additional weed control methods and apply weed control treatment for 2 years. If after 3 years, the percent of weeds at the reclaimed site were 50 percent of the control site's weed population, MMC would request bond release.

1.1.4.6 Cultural Resources

All remaining un-inventoried potentially affected areas would be intensively inventoried for prehistoric and historic resources. If previously undiscovered cultural resources were encountered, work in the immediate area would stop, and the KNF and the State Historic Preservation Office would be notified. MMC would meet with KNF personnel to determine potential resource value and implement recordation and/or excavation as required. Site documentation would be provided to the KNF. No additional disturbance would proceed until the lead agencies gave approval.

1.1.5 Mitigation Plans

1.1.5.1 Fisheries – (refer to USFS Fisheries BA, 2013)

MMC would be responsible for maintenance of all fisheries mitigation projects until mitigation of fisheries losses were complete and accepted by the lead agencies. MMC would submit project surveys and designs for consultation and agencies' approval before implementation of any fisheries mitigation project. Five years of monitoring data indicating stable or increasing mitigation success would be required.

1.1.5.2 Grizzly Bear

The Montanore Project would affect existing grizzly bear habitat. The KNF's 1993 ROD revised the grizzly bear mitigation outlined in the 1992 Final EIS, and adopted the USFWS recommendation of a "reasonable and prudent" alternative identified in a 1993 Biological Opinion for the project. The USFWS' reasonable and prudent alternative is the basis for MMC's porposed grizzly bear mitigation plan. The plan consists of habitat protection, measures to reduce mortality risks, and mitigation plan management. The plan has been updated with Agency Mitigations. ***(see updated USFS Terrestrial BA - Mitigation Plan, 2013.)***

1.1.5.2.1 Habitat Protection – (see updated USFS Terrestrial BA - Mitigation Plan, 2013)

Habitat protection would consist of three parts: road management, habitat acquisition, and management of patented mill claims. Each part is discussed briefly below. As part of its mitigation, access changes would be implemented on roads including the following:

- NFS road #4784 (upper Bear Creek Road) would be closed year-long for the life of the project. The change would be at the location of the existing seasonal gate, which is 2.1 miles from the end of the road.
- NFS road #4724 (South Fork Miller Creek) would be closed on a seasonal basis (April 1 to June 30) for the life of the project. The change (6.6 miles) would be at the junction of the main Miller Creek NFS road #385.

MMC would purchase private lands (see updated mitigation plan) to mitigate for habitat losses not offset by KNF's road access changes. Acquired lands would be approved by the KNF, in consultation with the USFWS and FWP. The location of acquired lands would be within the Cabinet portion of the Cabinet-Yaak Ecosystem. Preference would be given for lands within the affected Bear Management Units and lands along the eastern side of the Cabinet Mountains. For biological reasons, and because of the potentially limited amount of lands that may be available for acquisition within this area, lands within other portions of the Cabinet Mountain area of the Cabinet-Yaak Ecosystem may be considered.

Information on acquisition of properties is outlined in subsequent sections of this document. ***(refer to Terrestrial BA Mitigation Plan for inclusive details)***:

1.1.5.2.2 Measures to Reduce Mortality Risks (see updated Mitigation Plan, 2013)

MMC would **(*depending on final mitigation plan*)** fund two wildlife positions, a law enforcement officer, and an information and education specialist, with duties aimed directly at minimizing effects on grizzly bears. The estimated total cost would be about $3.1 million over the life of the project. MMC would fund both positions on an annual basis and coordinate with the employing agency to establish a collection agreement. Funding for both positions may be shared by other mining companies.

Duties of the law enforcement officer would be established by the KNF in counsel with the USFWS and FWP, and would be focused toward those enforcement activities needed to: (1) deter illegal killing of bears; (2) investigate reported/suspected bear deaths and help prosecute illegal actions; (3) minimize/eliminate mortality due to mistaken identity during black bear hunting seasons; (4) enforce applicable federal and state laws, regulations, and policy/guidelines regarding proper sanitation practices and elimination of bear attractants; and (5) enforce road access changes and help prosecute violations of road access changes and vandalism. Similarly, the duties of the information and education specialist would focus on: (1) education of school-age children regarding grizzly bear conservation; (2) development of educational materials and programs oriented toward mine employees; (3) implementation of informational/educational materials and programs oriented toward the general public and local community; and (4) integrating with the actions and programs of the Interagency Grizzly Bear Committee and its Subcommittees.

MMC would take additional measures to reduce mortality risk, including the following:

- Report road-killed animals to FWP as soon as road-killed animals were observed; FWP would either remove road-killed animals or direct MMC how to dispose of them
- Prohibit MMC employees from carrying firearms into permit areas
- Bear-proof all garbage containers

- Prohibit the feeding of bears and leaving of food or other bear attractants in the field

1.1.5.2.3 Plan Management

The KNF would prioritize and direct the land acquisition of the grizzly bear habitat preservation program. MMC would be responsible for carrying out the acquisition, either directly or through contract with a third party. The KNF's duties in overseeing the mitigation plan would include: **(Refer to USFS Terrestrial BA – Mitigation Plan)**

- Prioritize and direct the land acquisition and grizzly bear habitat preservation program
- Evaluate proposals and approve specific habitat enhancement projects for acquired lands
- Review MMC's annual progress reports on the status of the mitigation
- Direct the Information and Education program, and determine if the program were needed after 5 years or if the program's funds should be redirected to other mitigation needs
- Evaluate the effectiveness of reclamation and determine if and when access changes on roads as part of the mitigation could be reversed, and the specific timing for releasing acquired lands
- The Forest Service, in counsel with the USFWS and the FWP, would be responsible for approval of each acquisition before purchase and approval of conservation easements

1.1.5.3 Hard Rock Mining Impact Plan

MMC submitted to Lincoln County an update of the Hard Rock Mining Impact Plan that Lincoln County approved in 1991. The plan describes how the Montanore Project would affect local government services, facilities, costs, and revenues. The plan specifies the measures MMC would undertake to mitigate adverse fiscal impacts to local governments. MMC would prepay about $180,000 in taxes before construction to offset the net negative fiscal impact to the county budget during the first year. Lincoln County approved the updated plan in 2007. Because the Montanore Project as currently proposed would change employment projections, MMC submitted a petition for an amendment for consideration by the Hard Rock Mining Impact Board (Klepfer Mining Service 2008b). The Board approved the petition for amendment in 2008.

1.2 Mine Alternative 3 - Agency Mitigated Poorman Impoundment Alternative

The modifications and proposed mitigations that comprise Alternative 3 - Agency Preferred Mine Alternative, are described in further detail, along with a description of phases, in the following sections.

1.2.1 Issues Addressed

Under the Agency Preferred Mine Alternative 3, MMC would develop the Poorman Tailings Impoundment Site north of Poorman Creek for tailings disposal, use the Libby Plant Site between Libby and Ramsey creeks, and construct two additional adits in upper Libby Creek. Any excess water would be treated at the Water Treatment Plant at the Libby Adit Site and discharged at existing permitted outfalls. The issues addressed by the modifications and mitigation measures are summarized in Table 8.

The Poorman Impoundment Site was retained for detailed analysis because it would avoid the diversion of a perennial stream (Issue 2), and the loss of aquatic habitat (Issue 3), and would minimize wetland effects (Issue 7).

The Libby Plant Site could be built 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. Avoiding the use of waste rock in plant site construction would address (acid rock drainage and metal leaching (Issue 1). The adits in would be in the upper Libby Creek drainage.

Table 8. Response of Alternative 3 Modifications and Mitigations to Issues.

Key Issue	Mine Plan	Tailings Storage	Water Use and Manage-ment	Reclamation	Monitoring and Mitigation Plans
Issue 1-Acid Rock Drainage and Metal Leaching	✓		✓	✓	✓
Issue 2-Water Quality and Quantity	✓	✓	✓	✓	✓
Issue 3-Aquatic Life	✓	✓	✓		✓
Issue 4-Visual Resources	✓	✓		✓	
Issue 5-Threatened or Endangered Species	✓	✓		✓	✓
Issue 6-Wildlife	✓	✓		✓	✓
Issue 7-Wetlands and Non-wetland Waters of the U.S.	✓	✓	✓	✓	✓

MMC would use the Libby Adit Water Treatment Plant to treat water before discharge.

All other aspects of MMC's mine proposal would remain as described in the general project description as proposed and described in the beginning of this document. (Chapter 3, SDEIS contains a more detailed discussion of how the modifications and mitigating measures would reduce or eliminate environmental impacts.) MMC would submit a final Plan of Operations after final design, including all monitoring and mitigation plans, to the KNF for approval. MMC would submit a final application for a modification of Operating Permit #00150, including all monitoring and mitigation plans, to the DEQ for approval.

1.2.2 Evaluation Phase

1.2.2.1 Objectives

MMI acquired the DEQ Operating Permit #00150, private land at the Libby Adit Site and in the Little Cherry Creek drainage, and water rights previously held by Noranda (now Montanore Minerals Corporation). In 2006, MMI proposed and received approval from the DEQ for two minor revisions to DEQ Operating Permit #00150. The revisions involved reopening the Libby Adit and re-initiating the evaluation drilling program that Noranda began in 1989. The KNF determined the activities associated with the Libby Adit evaluation drilling were a new Plan of Operations under the Federal Locatable Minerals Regulations (36 CFR 228 Subpart A), and MMC needed KNF approval before 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 of the overall Montanore Project in this EIS. The Libby Adit evaluation program would be the first phase of the Montanore Project in Alternatives 3 and 4. The objectives of the evaluation program would be to:

- Expand the known higher grade zones of the deposit
- Develop additional information about the deposit to support a bankable feasibility study
- Assess and define the mineralized zone that extends beyond the current resource boundary
- Provide additional data for geotechnical, hydrological, and other information required to complete a final, bankable feasibility study

1.2.2.2 Proposed Activities

The evaluation drilling program is designed to delineate the first 5 years of planned production. An estimated 35,000 feet of primary drilling and 12,800 feet of infill drilling are planned. The drill core would be used to support resource modeling, mine planning, metallurgical testing, preliminary hydrology assessment, and rock mechanic studies for the full Montanore Project. 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, and regrade and revegetate the disturbed areas. Additional information about the evaluation drilling program and site operations and reclamation can be found in MMC's *Notification to Resume Suspended Exploration and Drilling Activities for the Montanore Project, Revision 2* (MMC 2006), on file with the lead agencies.

The Libby Adit would be rehabilitated and the drift extended 3,300 feet. An additional 7,100 feet including the 16 drill stations would be developed under the currently defined ore zones. During the Evaluation Phase, MMC would drill ahead of the drifts and keep all drill stations 300 feet from the Rock Lake Fault and 1,000 feet of Rock Lake. During the dewatering of the Libby Adit, an array of small diameter boreholes would be installed from within the Libby Adit, and instrumented with continuous recording pressure transducers. Because the intent of the underground piezometers is to obtain pre-mining pressure data and to track drawdown as the mine void was dewatered, the piezometers would be drilled out in front of the existing working face. At each station, the two inclined piezometers would be drilled from a cutout as close to the working face as possible without causing risk to the piezometers during subsequent blasting. The piezometers would be equipped with pressure recording devices before the drift or adit was advanced. Additional description of the Pre-Evaluation and Evaluation Phase monitoring is presented in Appendix C.

An estimated 256,000 tons (174,000 cubic yards) of would be generated and stored on private land at the Libby Adit site. The waste rock storage areas would be lined to collect runoff from the area and seepage through the waste rock. A sump would be located at the toe of the pile where runoff and seepage would be collected and pumped up to the Water Treatment Plant. MMC would implement two monitoring programs to assess water quality of runoff and seepage from waste rock. These two programs would be a waste rock test pad and waste rock column tests. The information collected by these tests would assist the agencies in determining if the full facility would be lined as proposed in this plan. MMC would submit the information and a request to modify the plan if lining was not needed to meet MPDES permitted effluent limits. MMC would install a small lined test area near the top of the waste rock storage area. Initial development rock from the Libby Adit would be placed onto a lined area. A sump would be constructed that would collect any runoff and seepage from the waste rock and pump it back through the Water Treatment Plant and the treated water would be discharged in one of the three MPDES-permitted outfalls. Runoff and seepage from the waste rock pile would be analyzed for metals and nitrate, consistent with the MPDES permit monitoring requirements. In the waste rock column tests, MMC would collect samples at the face before material being removed for disposal on the lined facility. The objective of the test would be to determine the amount of residual nitrate and ammonia that remains in the waste rock; metal analyses also could be completed.

The Libby Adit would be dewatered and water would be treated before discharging to one of three permitted outfalls. MMC’s MPDES permit MT-0030279 regulates wastewater discharges from the Libby Adit, and sets effluent limits for both surface water and groundwater. Treated water would be discharged to a percolation pond located at the Libby Adit Site. Some of the downstream surface water quality monitoring stations used in assessing effects of the discharges would be located on the National Forest System lands or MMC’s private land.

The underground evaluation is anticipated to last 18 to 24 months. MMC would employ 30 to 35 people at the Libby Site and would work two 10-hour shifts 7 days per week. The hours of operation would fluctuate based on daily requirements, but would operate 7 days per week.

Supporting surface facilities are located on private lands at the Libby Adit Site and include an office, shop, generators, waste rock stockpile, and other ancillary facilities. All of the proposed underground work, except for the portal area, is within the KNF. Power to the Libby Adit would be supplied by up to two EPA Tier 3 diesel generators and the combined total maximum rated design capacity of the diesel engine/generators would not exceed 1,500 brake horsepower. The new diesel stationary engines would be required to meet EPA’s Tier 3 nitrogen oxides emission standards and comply with the federal engine emission limitations. The generators would be supplied by a third-party contractor, which would provide the generators and be responsible for holding an air quality permit for them.

MMC would use Libby Creek Road, NFS road #231, and Upper Libby Creek Road (NFS road #2316) as the primary year around access to the surface facilities at the Libby Adit Site. These roads would continue to be snow plowed to allow access during winter.

1.2.2.3 Reclamation

MMC would reclaim facilities associated with the evaluation program in the following manner if the full project was not approved, or if MMC decided not to proceed with the project. MMC may retain the dewatering pumps and operation of the treatment plant beyond the evaluation program. Dewatering and water treatment would continue until a bedrock portal plug was installed. As part of permanent closure and site reclamation, a portal plug would be installed in bedrock near the bedrock/colluvial contact point 600 feet from the portal opening. To ensure long-term stability, waste material would be backfilled into the adit from the bedrock plug out to the surface opening where another plug would be re-installed as originally designed. Once this surface plug was installed, excavated material would be placed back over the portal plug and general opening and regraded to match the surrounding topography. Other surface features, such as the waste rock stockpiles and the percolation pond would be regraded. All surface facilities, buildings, power supply and equipment would be removed. The stockpiled 18 inches of soil would be placed over the regraded and scarified areas. The disturbed sites would be reseeded.

1.2.2.4 Agency Mitigation

The KNF developed specific design features and mitigation for the Evaluation Phase of the project. Some measures would be implemented before dewatering the Libby Adit and other measures would be implemented before beginning any underground activities. The fisheries mitigation measures for the Evaluation Phase are described in section 0,

1.2.7.1 Wetlands, Waters of the U.S., and Fisheries. Mitigation for wildlife is incorporated into the overall wildlife mitigation plan (see section 0,

1.2.7.3.1 Grizzly Bear); italicized item listed in section 0,

1.2.7.3.1 Grizzly Bear would be implemented before the Evaluation Phase. Most design features and mitigation measures are for the Evaluation Phase of the Libby Adit would remain in place for the life of the Montanore Project. Mitigation measures associated with MMC's use of the Libby Creek Road would no longer be applicable once the Bear Creek Road was reconstructed. MMC would implement the all other design features and mitigation for the full Montanore Project before beginning the Construction Phase of the mine. The agencies' hydrology and aquatic life monitoring during the Evaluation Phase is described in Appendix C.

1.2.2.5 Final Design Process

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 in the following sections is uncertain. The tailings facility design would be based on additional site information obtained during the design process, which likely would include a preliminary design phase and a final design phase. Site information would be collected during field exploration programs during the design phase. A preliminary site exploration program would be completed to confirm the geotechnical suitability of the site should Alternative 3 be selected as the preferred site. The field exploration program would include a site reconnaissance and a drilling and sampling program to evaluate:

- Site geology and foundation conditions
- Groundwater conditions and water quality
- Borrow material availability
- Geotechnical characteristics of foundation and borrow materials

Based on these data, a preliminary design of the Alternative 3 site would be completed to confirm the site layout and design/operation feasibility. A field exploration program would be completed to collect data and material samples necessary for the final design. In Alternative 3, MMC would, during final design:

- Incorporate guidelines from the Idaho Administrative Code Safety of Dam Rules and the California Department of Water Resources, Division of Safety of Dams for seismic stability as appropriate
- Use the most recent attenuation relationships that are based on instrumental records of attenuation collected in the United States and internationally (*e.g.,* Spudich *et al*. 1999 Boore and Atkinson 2007 and Petersen *et al*.)
- Complete circular failure plane assessments through the near-dam tailings and dam section and through the dam crest and slope
- Revise the pumpback well design and analysis using geologic and hydrologic data collected as part of the field exploration plan, with a focus on minimizing drawdown north of impoundment
- Minimize and avoid, to the extent practicable, filling wetlands and other waters of the U.S., such as described in Glasgow Engineering Group, Inc. (2010); specific wetlands to be avoided are LCC-15 and LLC-16 in the tailings impoundment area and LCC-05 near the Libby Creek infiltration gallery discussed in section 2.5.4.3.2, *Water Rights.*
- Submit final design to the agencies for approval
- Fund a technical review of the final design by a technical review panel established by the lead agencies
- Submit an Operations and Maintenance Plan and Emergency Preparedness Plan that met the DNRC dam safety program requirements

Technical review of the final design would be made by a technical review panel established by the lead agencies. The panel would advise the KNF and the DEQ and would consist of agency staff and other interested local, state, and federal (including EPA) agencies, and tribal governments. The review would encompass the technical aspects of design including the short- and long-term stability of the tailings storage facility. If supplemental rock and tailings characterization data and geochemical testing showed a potential for acid generation not presently anticipated, the review also would include an evaluation of the seepage collection system to ensure that no seepage would reach surface water. The technical review panel would assist in the development of the QA/QC protocols. The panel would ensure that any environmental impacts associated with final design remained within the scope of those impacts identified in the Final EIS. If the final design generated additional impacts and they could not be mitigated, additional

MEPA/NEPA documentation may be required. The lead agencies would review and approve the final design before construction.

1.2.3 Construction Phase

1.2.3.1 Permit and Disturbance Areas

All operating permit disturbance area boundaries would be marked in the field with fenceposts and signed to limit potential disturbance outside permitted disturbance areas. The operating permit area would total 2,157 acres and the disturbance area would total 1,565 acres (Table 9).

In Alternative 3, MMC would complete before any ground-disturbing activities an intensive cultural resources survey and a jurisdictional wetland delineation on all areas proposed for disturbance for any areas where such surveys have not been completed and that would be disturbed by the alternative. Similarly, MMC would update surveys for threatened, endangered, and Forest and state sensitive plant species on National Forest System lands for any areas that would be disturbed by the alternative where such surveys have not been completed or for any species listed since 2005. The surveys would be submitted to the agencies for approval. If wetlands, cultural resources or species of concern were identified and adverse effects could not be avoided, MMC would develop appropriate mitigation plans for the agencies' approval. The mitigation would be implemented before any ground-disturbing activities. MMC also would complete a detailed Order I soil survey for all areas that have not been intensively surveyed and from which soils would be salvaged. The survey would be completed and submitted to the agencies for approval before any ground-disturbing activities.

During the Construction Phase, MMC would reconstruct portions of the Bear Creek Road (NFS road 278). These activities are described in 1.2.4.5.3, *Bear Creek Road (NFS Road #278) and Libby Creek Road (NFS Road #231)*.

1.2.3.2 Vegetation Clearing and Soil Salvage and Handling Plan

During final design and after all areas were intensively surveyed, MMC would submit a final Soil Salvage and Handling Plan to the lead agencies for approval. The plan would include means to ensure that the necessary amount of suitable soil was salvaged in disturbed areas, that soils would be stockpiled and redistributed properly, and that losses from handling and erosion on stockpiles and in reclaimed areas would be minimized. Also, the timing and sequencing of stockpile use (for re-spreading) would be detailed to ensure that visual impacts would be mitigated, and that direct-haul methods would be maximized.

Table 9. Mine Surface Area Disturbance and Operating Permit Areas, Preferred Alt. 3.

Facility	Disturbance Area† (acres)	Permit Area (acres)
Existing Libby Adit	18	219
Upper Libby Adit	1	1
Rock Lake Ventilation Adit	1	1
Libby Plant Site and Adits	76	172

Poorman Tailings Impoundment	1,272	1,506
Poorman Tailings Impoundment and Seepage Collection Pond	608	
Borrow areas outside impoundment footprint	92	
Soil stockpiles	48	
Other potential disturbance (roads, storage areas, ditches, etc.)	524	
Access Roads†		
Bear Creek Road (NFS road #278 from U.S. 2 to Tailings Impoundment permit area)	90	0
Tailings Impoundment permit area to Libby Plant Site (NFS roads 2317 and #4781, NFS road #278, NFS #6210 and new road)	66	214
Libby Plant Site to Libby Adit Site and Upper Libby Adit Site (NFS roads #6210 and #2316)	41	44
Total	1,565	2,157

†Disturbance area shown for roads excludes 33 feet of existing disturbance along roads.

1.2.3.2.1 Vegetation Removal and Disposition

As part of final design, MMC would prepare a Vegetation Removal and Disposition Plan for the agencies' approval. The plan would evaluate the opportunities to minimize tree and other vegetation clearing, particularly in RHCAs, and consider 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 (see transmission line Alternative D-R.)

Because of observed metal leaching problems and low pH seepage from soil stockpiles containing large amounts of coniferous vegetation at other mine sites in Montana, the majority of coniferous forest debris would be removed before soil removal. Merchantable timber would be measured, purchased from the KNF, and then cleared before soil removal. Non-merchantable trees, coniferous forest debris, and slash from vegetation clearing in the mine disturbance areas and along the transmission line would be managed in accordance with Montana law regarding reduction of slash (76-13-407, MCA) and, on National Forest System lands, KNF objectives regarding fuels reduction. Except where used in wildlife or fisheries mitigation, excess slash would be removed or burned in all timber clearing areas and within 0.5 mile of any residence. Slash management on Plum Creek and other private lands not owned by MMC would be in accordance with Montana law and the landowner/MMC easement agreement. Non-merchantable trees and coniferous forest debris would be removed using a brush blade or excavator to minimize soil accumulation. MMC would comply with open burning requirements. Where possible, slash of non-coniferous forest debris or dead coniferous forest snags would be salvaged and chipped to be sold, used as mulch, or used as an additive to stored soil. All mulching materials would be certified weed-seed free.

1.2.3.2.2 Soil Salvage

MMC would salvage soils in all disturbed areas, as described previously in this document.

1.2.3.2.3 Soil Stockpiles

Most soils would be stockpiled as close as possible to redistribution sites, and constructed and handled as described below. In Alternative 3, MMC would incrementally stabilize soil stockpiles (rather than waiting until the design capacity was reached) to reduce erosion and maintain soil biological activity in the surface. Seeding should be done as soon after disturbance as possible rather than waiting until the next appropriate season. Immediate seeding of road cuts-and-fills would reduce erosion on Forest Service roads regardless of planting time. To the extent possible, MMC would stockpile soils in clearings or recent timber harvest areas that were immediately adjacent to new roads, which would be operational for mine life, rather than stockpiling along the entire road corridor.

Soil stockpiles would have organic matter and fertilizer added to help retain soil quality and promote successful revegetation. Noxious weeds on stockpiles would be controlled throughout the stockpile life, and sprayed before soil redistribution.

MMC would report soil stockpile volumes and disturbance acres in each annual report to the lead agencies. MMC would prepare an annual soil reconciliation report to document that the soils in stockpiles were sufficient to reclaim the current disturbed acres. If a shortfall existed, MMC would submit a plan to make up for the soil shortfall in the following year (see next section regarding replaced soil thickness).

1.2.3.2.3 Soil Replacement and Handling

MMC would replace soils in all disturbed areas, with the exception of soil stockpiles and cut slopes in consolidated material. In Alternative 3, where redistributed soils cover non-native material, the replaced soil depth would average 24 inches using two lifts, including over the entire tailings impoundment. If any waste rock stockpiles remained at the end of mining, and depending upon acid generation or near neutral metal leaching potential and size and amount of rock fragments, 24 inches of replaced soil in two lifts may be needed to provide sufficient rooting depth. Soils replacement depths at other disturbances where soil is to be replaced, except road disturbances, would be 18 inches and would be applied in two lifts. If MMC demonstrated through test plots that site-specific soils would provide sufficient root zone and revegetation success with thinner soil replacement, the replaced soil thickness could be reduced with the lead agencies' concurrence.

Soils in the impoundment area would be replaced based on soil erodibility and slope steepness. For example, the least erodible colluvial/glacial soils having the greatest rock fragment content for both first lift and second lift soils, would be used on the impoundment face to minimize erosion potential. The soils with the greatest erodibility, primarily glaciolacustrine soils, would be used on slopes less than 8 percent, such as the relatively flat tailings impoundment surface. Soil salvage and redistribution would occur throughout the life of the mine operation. Soils should be handled and worked at the minimal moisture content to reduce the risk of compaction and tire rutting.

Disturbed areas, such as parking areas, roads, adit portal areas, and building sites would be ripped to 18 inches deep with dozer ripping teeth before soil replacement to reduce any root zone barriers due to compaction and to facilitate storm water infiltration after reclamation. Any disturbed area to be seeded would be scarified to a depth of 6 to 12 inches before seeding for best seed establishment. All disturbed areas would be seeded, fertilized, and mulched as necessary. Where soil fertility may be low and tilth poor, organic matter (weed-free agencies-approved wood-based compost) would be incorporated into respread soils before planting. All permanent cut and fill slopes on roads would be seeded, fertilized, and stabilized with hydromulch, netting, or by other methods.

Mycorrhizae, which are structures in the soil important in maximizing plant establishment and productivity, especially for woody plants, are eliminated in soil stored for prolonged periods. In reclaimed areas where trees would be planted, an agencies-approved wood-based compost would be incorporated into the upper 6 inches of respread soil that had been stored for prolonged periods to promote the rebuilding of mycorrhizae in the soil (Plantenberg, pers. comm. 2006), and/or inoculated tree-planting stock with the appropriate mycorrhizal fungi would be used, or mycorrhizal fungi would be incorporated into the soil as pellets during seeding. Additional nitrogen fertilizer may be needed to compensate for wood-based mulch.

1.2.3.2.4 Direct Haul and Temporary Storage of Soil

Direct haul soil salvage and replacement would be required for use whenever, and as much as possible, to enhance revegetation success of native unseeded species (Prodgers and Keck 1996). Direct haul would be done primarily at the tailings impoundment.

Areas such as road cut-and-fill slopes, transmission line structure locations and access roads, and other disturbances that would remain post-mine should be reclaimed as soon as final grades were achieved with direct haul soil or soil that had been stockpiled for less than 1 year. This would increase the chances of direct transplantation and propagation of many of the local ecotypes on the reclaimed surface (Prodgers and Keck 1996).

1.2.3.3 Libby Plant Site and Adits

Under Alternative 3, the Libby Plant Site would be located on a ridge separating Libby and Ramsey creeks). Access to the plant site would be via NFS roads #2316 and #6210. A permanent bridge would be constructed across Ramsey Creek to provide access to NFS road #6210 from the Ramsey Creek Road. The bridge would be built in compliance with the INFS standards and guidelines (USDA Forest Service 1995). Soil from the Libby Plant Site would be salvaged and stored in a stockpile at the Plant Site.

In Alternative 3, four adits would be required for the project. All would be in the Libby Creek drainage area. The ventilation adit would be located near Rock Lake as proposed and the existing Libby Adit would be enlarged. The Rock Lake ventilation adit would be used only as an air intake adit and any pollutant emissions from the adit would be prohibited. The existing Libby Adit would be enlarged to about 30 feet wide by 30 feet high. An additional adit would be constructed on MMC’s private land near the existing Libby portal and would be 17,000 to 18,000 feet long and decline to the orebody at 5 percent grade, depending on the portal location selected. One adit would contain the underground conveyor and the other would be used for personnel access and material delivery into the mine. The exact location of the second adit on private land has not been determined. Two options for this adit portal were identified.

A third adit (Upper Libby Adit), upstream of the Libby Adit Site, would provide ventilation and emergency access. This adit would be 13,700 feet long, and decline to the orebody at about a 7 percent grade. To the extent feasible, the Upper Libby Adit would be constructed from underground, and waste rock hauled out of the Libby Adit Site, and not the Upper Libby Adit site.

Ore would be conveyed via an above-ground covered conveyor from the Libby Adit Site 6,000 or 7,500 feet (depending on the adit location) to the covered coarse ore stockpile at the Libby Plant

Site. The conveyor would parallel NFS roads #2316 and #6210. The agencies identified two options for the conveyor: one would be about 10 feet wide and 10 feet high, and the other would be lower (8 feet), but wider (16 feet). The conveyor and any transfer points would be fully enclosed to minimize contact with precipitation and loss of ore. A “wraparound” conveyor would achieve these objectives and would eliminate the need for a transfer point at the intersection of NFS roads #2316 and #6210. A completely enclosed conveyor may also be used. Any spillage would be promptly cleaned up to avoid contact with precipitation.

Geotechnical investigations of the Libby Plant Site have not been completed. If the depth to bedrock at the site were similar to the Libby Adit Site, preliminary 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. Consequently, the fill slopes at the plant site would not be subject to the ELGs, and a MPDES outfall would not be needed at the site.

Electrical power the initial Construction Phase would be supplied by two diesel generators located at the Libby Adit. A buried 34.5-kV transmission line along Bear Creek Road and the Libby Plant Access Road may be installed to replace the generators before the installation of the main transmission line. If the buried 34.5-kV line were installed, the generators would be used as standby power during construction operations. To provide power to the Libby Adit activities, a temporary substation would be installed along the Libby Plant Site Access Road. If constructed, the 34.5-kV line along Bear Creek Road and the Libby Plant Access Road would connect to this substation. Power would be distributed from the temporary substation to the Libby Adit Site and Libby Plant Site.

At the Libby Plant Site, a substation would be built to distribute electricity through lower voltage lines to equipment in various locations at the Libby Plant Site, the Libby Adit Site, the Poorman Tailings Impoundment site, and within the underground mine. Once the power was available from a transmission line (either the buried 34.5-kV line or the overhead 230-kV line), the generators at the Libby Adit Site would be moved to the Libby Plant Site and used as a backup power source. The backup generators would not be used more than 16 hours during any rolling 12-month time period.

1.2.3.4 Waste Rock Management

Waste rock developed extending the Upper Libby Adit and the new Libby Adit would be hauled to a waste rock stockpile within the Poorman Tailings Impoundment footprint, the location of which would be determined during final design. As part of the Libby Adit evaluation program, MMC would complete a test of water that infiltrated and ran off of the waste rock stockpile at the Libby Adit Site (see section 1.2.2, *Evaluation Phase)*. This testing was a condition in DEQ’s approval of Minor Revision 06-002. If monitoring results or other waste rock testing indicated water treatment would not be necessary, a retention pond sized to store a 10-year/24-hour storm would retain any runoff. The Seepage Collection Pond or the Starter Dam may serve this purpose if they were constructed before waste rock generation. If monitoring results or other waste rock testing indicated treatment would be necessary, 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. MMC would provide a stability analysis if the area were lined. If treatment were necessary, collected water would be pumped to the Water Treatment Plant at the Libby Adit.

Limited pre-mining access to subsurface portions of the Montanore deposit makes additional sampling of waste and ore during the Evaluation Phase necessary. Further sampling and analysis also would be conducted during mine construction and operation. Together with baseline information, these data would be used to confirm and/or refine MMC's plans for operational waste rock sampling, selective handling and management of mined rock and tailings (Geomatrix 2007a). During the Evaluation Phase, MMC would:

- Collect representative samples from previously unexposed zones of waste rock. Specifically, these zones should include any unsampled, mineralized alteration haloes within the Revett, Burke and Wallace formations, as well as portions of the Prichard Formation to be exposed during construction of new adits. Samples will be analyzed using acid base accounting (ABA), multi-element whole rock analyses, and petrography to determine (1) conformity of new sample populations with previously analyzed samples and described field-scale geochemical analogs; (2) overall adequacy of sampling; and (3) relative need for additional metal mobility and/or kinetic testing. The number of samples required to statistically compare populations, and anticipated needs for kinetic and metal mobility testing, are estimated in Appendix C, but would be adjusted based on professional judgment at the time of sampling.
- Collect representative samples of ore within the portion of the Revett Formation to be exposed in the evaluation adit, for additional evaluation of metal release potential. The number of required ore samples is also estimated in Appendix C.
- Collect a bulk ore sample for metallurgical test work, to obtain representative tailings for additional geochemical analysis using ABA, whole rock, synthetic precipitation leaching procedure (SPLP), and mineralogy methods. The primary goal of these analyses is to refine estimates of metal release potential for tailing. Five tailing samples are estimated in Appendix C, but the number required would be contingent upon the metallurgical test design.
- Re-evaluate predicted water quality using Evaluation Phase kinetic and metal mobility test results. Kinetic test methods would reflect the geochemical environment of proposed rock management facilities (*e.g.*, saturated or unsaturated, aerobic or anaerobic conditions). In particular, MMC would use geochemistry data to further refine the predicted volume and quality of groundwater flow post-closure and assess potential for solute attenuation downgradient of the tailing impoundment.
- If appropriate, update operational sampling and analysis plans based on all available data.
- Identify operationally achievable handling criteria for waste management.
- Re-evaluate proposed methods of managing exposed underground workings (*e.g.*, grouting, barrier pillars, and bulkheads), backfilling waste rock, and managing impounded tailings using data obtained during the Evaluation Phase.

Until water quality predictions, operational geochemistry, and rock management plans are finalized using Evaluation Phase data, MMC would:

- Isolate and place waste rock on a liner as described in section 1.2.2, *Evaluation Phase*

- Continue to treat water from the adit and waste rock stockpiles at the Water Treatment Plant

RC Resources is the proposed operator of the Rock Creek Project, a proposed mine on the west side of the Cabinet Mountains. RC Resources funded the development of a geochemical database that contains all data relating to ore, waste rock and tailings of the formations likely encountered by the Montanore Project and the Rock Creek Project, such as the Revett, Pritchard, and Burke formations. The database is part of the Montanore and Rock Creek project record. MMC would fund the maintenance and updating of the database. Should RC Resources continue the development of the Rock Creek Project, funding for the maintenance and updating of the database would be shared equally by MMC and RC Resources.

1.2.3.5 Tailings Management

The agencies developed a conceptual layout of a tailings impoundment at the Poorman Tailings Impoundment Site as an alternative because it would avoid the diversion of Little Cherry Creek, reduce the loss of aquatic habitat, and minimize wetland effects. The Poorman Tailings Impoundment Site would not provide sufficient capacity for 120 million tons of tailings without a substantial increase in the starter dam crest elevation if tailings were deposited at a density as proposed by MMC. The tailings thickener requirements to achieve higher tailings slurry density (and hence higher average in-place tailings density) are uncertain without additional testing of simulated tailings materials. Such testing would be completed during the Evaluation Phase. These issues and the development of the Poorman Impoundment Site for tailings disposal are discussed in the following sections.

Tailings management depends on the amount of solution or water mixed into or removed from the tailings, *i.e*., the slurry density, for purposes of deposition. The most appropriate method of tailings management for a given project depends on several factors including tailings characteristics, disposal site conditions, and project-specific factors such as production rates and environmental constraints. A detailed description of the agencies' analysis of tailings deposition methods available under current technologies is provided in section 6.0 of the *Tailings Disposal Alternatives Analysis* (ERO Resources Corp. 2011a) and summarized in section .

In Alternative 3, tailings would be thickened to a density greater than 55 percent at a thickener plant at the impoundment site. Slurry density can vary between deposition methods depending on the physical and geotechnical characteristics of site-specific tailings. Deposition of tailings slurries at thicker densities can offer several advantages over tailings slurries at 55 percent or less, including increasing water recovery; reducing requirements for make-up water and water storage; providing greater impoundment stability; and under certain conditions, potentially depositing tailings higher than the level surface of the tailings. The Poorman Impoundment Site is amenable to thickened tailings deposition from the upstream perimeter slopes, whereas the Little Cherry Creek site has limited capacity for thickened tailings deposition from slopes upstream of the impoundment. The Poorman Impoundment Site could be used for deposition of slurry tailings at a 55 per cent slurry density. In order to hold a volume equal to 120 million tons of tailings, the main dam would be 20 feet higher and would require more borrow material to construct as compared with a dam for thickened tailings deposition (greater than 55 percent).

1.2.3.5.1 Poorman Tailings Impoundment Site Location

The Poorman Tailings Impoundment Site would be located between Little Cherry and Poorman creeks in an ephemeral watershed tributary to Libby Creek could be developed to hold 120 million tons of tailings and support facilities. The site would be entirely on National Forest System lands. Private property not owned by MMC would be located 300 feet east of the southern two-thirds of the tailings dam alignment. The Poorman site is in Sections 24 and 25, Township 28 North, Range 31 West. Tailings would be transported to the site from a mill as a slurry, the same as proposed by MMC and described in the general description section of this document. At the site, the tailings would be sent to a thickener plant and deposited in the impoundment as high-density tailings.

The Poorman Tailings Impoundment Site is a broad, east-facing slope about 0.25 mile west of Libby Creek. Like the Little Cherry Creek site, groundwater beneath the site exhibits artesian pressures in the base of the slopes above Libby Creek (Morrison-Knudsen Engineers, Inc. 1989a). The geology and near surface soils of the site are similar to the materials found during investigations in the Little Cherry Creek tailings site, except that soft weak clays do not appear to be present in the soil strata (Morrison-Knudsen Engineers, Inc. 1989a).

1.2.3.5.2 General Proposed Facilities

In Alternative 3, the cyclone overflow (the fine tailings fraction after the sand is removed to build the sand dam), would be deposited as high-density tailings slurry with an average slurry density of 70 percent. The agencies assumed thickening to an 80 percent density for the Rock Creek Project, which is proposing the mine in the same formation as the Montanore Project (see discussion of the geologic similarities between the Rock Creek and Montanore deposits). At a 70 percent slurry density, the average settled density of the tailings over the life of the project is estimated to be 85 pounds per cubic foot (pcf). As excess water drains from the fine tailings mass and the mass consolidates under long-term conditions, the average mass density could exceed 90 pcf. The time frame for such consolidation and the final average tailings density would depend upon the characteristics of the tailings and deposition patterns around the impoundment. The tailings slope is estimated to be 5 percent and the tailings shear strength sufficient to remain stable. During final design, laboratory tests would be run to confirm the slurry densification and shear strength characteristics, and seepage-induced consolidated tests would be performed on representative tailings samples to determine the appropriate slurry density, slope at deposition, and expected consolidation behavior of the tailings.

Site development would include site stripping and foundation preparations followed by construction of a Starter Dam built from waste rock and borrow materials (as in Alternative 2), a Rock Toe Berm from waste rock and borrow materials under the toe of the Main Dam for stability, a drainage system within the impoundment area (as in Alternative 2), a Seepage Collection Pond and associated pumpback well system (as in Alternative 3), a Saddle Dam on the north side of the impoundment, a tailings thickening plant, a waste rock stockpile, topsoil and subsoil stockpile areas, and relocation of NFS road #278.

The tailings dam would consist of three sections, the Starter Dam along the upstream toe of the Main Dam section, a Rock Toe Berm to buttress/support the sand dam along the Main Dam section, and a Main Dam section consisting of the sand fraction cycloned from the tailings. The dam would have a final crest length of 10,300 feet at an elevation of 3,664 feet. The dam would have a vertical height of 230 feet above the Rock Toe Berm and 360 feet including the Rock Toe

Berm. The dam layout is designed to maximize the height of the dam section based on estimated quantities available from the cyclone operations and to minimize fill requirements to balance the fill volume required for the total dam. Based on initial evaluation, the layout is considered feasible, but would be revised in final design, if possible, to reduce total fill quantities.

An impoundment with a Main Dam crest of 3,664 feet would contain almost all of the thickened tailings. With an average in-place density of 85 pcf at completion of tailings deposition (91.4 million tons), about 1 foot of additional dam crest would be required for complete storage of the tailings at a level surface. Assuming a level tailings surface, the impoundment capacity at the estimated dam crest elevation in the final years of operation would not allow for water storage within the impoundment area nor account for lost capacity due to the slope of the tailings surface. The dam maximum crest would be set at about 3,664 feet based on the Starter Dam and Rock Toe Berm layouts and the volume of cyclone sand available for construction of the Main Dam. Perimeter tailings deposition from an elevated position along the back slope of the impoundment would be required to store all of the tailings and allow for water storage within the impoundment during the final years of operation as discussed in subsequent sections. The cross-section shown in shows the estimated height and slope of the tailings surface with deposition from the perimeter slopes.

Foundation Preparations

Based on limited field data, no unsuitable foundation conditions relative to dam stability are anticipated in the Poorman Site. In the event unsuitable materials were identified in subsequent design studies, or otherwise encountered in the site, such material would be excavated and stored in a stockpile. The material would be used for cover material in closure of the tailings facility or backfilled into borrow areas.

Rock Toe Berm

A Rock Toe Berm would be constructed as a compacted rock fill structure in the toe area of the Main Dam. The Rock Toe Berm is designed to reduce the volume of cyclone sand required to construct the dam to the design height, and limit the height of the sand dam to allow a steeper downstream face to reduce the required sand volume. The Rock Toe Berm would be a free draining structure to prevent buildup of a water surface in the toe of the Main Dam. The Rock Toe Berm would have a 30-foot wide crest at an elevation of 3,440 feet with a 2.5H:1V downstream slope and a 3H:1V upstream slope. 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. The crest length is 4,400 feet and the vertical height at the maximum section is 140 feet. The total estimated volume of the Rock Toe Berm is 2.7 million cubic yards. About 1.2 to 1.5 million cubic yards of waste rock would be available from initial mine development and early mine operations. The balance of material would be obtained from either a rock borrow quarry developed in the upper elevations of the site where soil cover is minimal or from suitable sand and gravel lenses noted in the glacial deposits located at the site (Morrison-Knudsen Engineers, Inc. 1989a).

Starter and Saddle Dams

The Starter Dam would be a compacted earthfill embankment with a 70-foot wide crest at an elevation of 3,480 feet. Upstream and downstream slopes would be 2.5H:1V. The wide crest was selected to reduce sand requirements in the Main Dam. The estimated crest length is 6,000 feet and the maximum section about 100 feet high. The Starter Dam would be constructed with borrow material excavated from surface and near surface glacial deposits within or adjacent to the impoundment. The conceptual layout volume is estimated to be 1.7 million cubic yards. The fill would be placed in maximum uncompacted lifts of 1 foot or less and compacted with suitable equipment. All boulders larger than 8 inches diameter would be removed from the fill. A Saddle Dam of similar construction would be required in the north perimeter of the impoundment area. The Saddle Dam volume is estimated to be 730,000 cubic yards. The estimated volume of available borrow within the impoundment area is in excess of 5 million cubic yards. During Starter Dam construction, a temporary water reclaim/storage pond would be constructed upstream from the Starter Dam to hold water until the Starter Dam was complete.

After the Starter and Saddle Dams were constructed, the impoundment footprint would be prepared for tailings deposition after operations began. Any soft, unsuitable materials would be either excavated and transported as backfill for the borrow areas, or filled with suitable material, such as general fill from borrow areas. All wetland soils would be excavated and used at wetland mitigation sites (see section 0,

1.2.7.1 Wetlands, Waters of the U.S.). Final design for management of these types of materials would be submitted to the agencies for approval. A HDPE geomembrane liner would be placed beneath a portion of the tailings impoundment and keyed into the low permeability zone of the dam.

Borrow Materials

The primary source for borrow materials for the starter and Saddle Dams would be local borrow materials from within the impoundment footprint. The borrow source for the Rock Toe Berm would be waste rock from the mine stockpiled at the site supplemented by local borrow within or adjacent to the impoundment area. Borrow for the Rock Toe Berm from within the impoundment site would consist of sands and gravels obtained for lenses in the underlying glacial alluvial material or bedrock obtained from a quarry site that could possibly be developed in the higher elevations where soil cover appears to be shallow compared to most of the impoundment area. Ideally, the quarry would be below the proposed relocated access road and within the upper tailings area.

Drain materials would be obtained from on-site crushing and screening of suitable borrow (such as the sand and gravel lenses referenced in the glacial alluvial deposits) or obtained from a commercial source. Table 10 is a summary of anticipated material and volumes based on the conceptual layouts for Alternative 3.

1.2.3.5.3 Seepage Collection

Table 10. Estimated Tailings Impoundment Facility Volumes, Alternative 3.

Facility	Volume (million cubic yards)
Starter Dam	1.7
Rock Toe Berm	2.7
Cyclone Sand Dam	22.2
Saddle Dam	0.7
Seepage Collection Pond Fill	<0.1

In Alternative 3, a seepage collection system similar to that proposed in Alternative 2 would be used. A system of trunk drains and smaller lateral drains over the impoundment floor and beneath the tailings dam would convey seepage to the toe of the dam . Smaller secondary drains would convey water laterally into the trunk drains. It is assumed tailings seepage would be equal to the flow rates estimated for Alternative 2. For example, the estimated seepage flow rate into the foundation below the impoundment is 25 gpm and the seepage water from tailings consolidation is based on 75 percent of consolidation water migrating downward and 25 percent moving upward into the surface pond.

Artesian conditions are present along the toe area of the dam footprint. A drainage collection system would be designed (similar to Alternative 2) and installed under the Rock Toe Berm and extend upstream under the Main and Starter dam footprints as necessary to collect and control groundwater. The Rock Toe Berm would be designed as a separate facility, but with its base layer compatible with the underlying drain system. Design of the groundwater drain system in the toe area of the dam would be separate from the tailings impoundment seepage collection system to enable separate monitoring of the two systems before flowing into the Seepage Collection Pond. Final design of the groundwater drain system would consider the need and benefit of a seepage collection trench along the toe of the dam upstream of the private property.

Drain designs would utilize both gravity and pressure relief drains. Drains within the impoundment would be installed in trenches into the native ground and covered with a permeable protective layer to prevent erosion and plugging of the drains during initial placement of the tailings. During construction of the seepage collection and drain system, any wetlands uphill of the Main Dam would be filled. All drains would be placed in a geomembrane-lined trench and consist of a core of highly pervious 1- to 4-inch rock wrapped in geotextile and surrounded by sand and gravel filter material. Locally available sand and gravel alluvial material would be used to cover the drains to prevent the fine tailings from piping into the drain materials during operations. Seepage collection drains through and under the dam footprint would be designed as integral parts of the dam foundation and compatible with each of the overlying dam sections. MMC would install pumpback recovery wells to collect tailings seepage not intercepted by the Seepage Collection System. The pumpback recovery wells would be located beyond the dam toe, and would be designed to collect seepage not collected by the drain system.

A Seepage Collection Pond and return facility would be 500 feet west of Libby Creek, 500 feet downstream of the impoundment. The facility design would include collection of water from the impoundment seepage collection drains, the groundwater relief drains, and runoff from the downstream slope and toe area of the tailings dam facility. The pond would have a crest elevation of 3,240 feet and be lined with HDPE (or equivalent). The outside compacted fill slopes would consist of material excavated from the pond area and graded to have 2.5H:1V slopes. The perimeter crest would be 30 feet wide for maintenance purposes. The design criteria for the pond would be to contain up to 30 days of drain flow plus runoff from the 6-hour PMP storm event.

(The Seepage Collection Pond in Alternative 2 was designed to accommodate the smaller 100-year/24-hour storm.) The capacity of the Seepage Collection Pond shown in is 153 acre-feet (50 million gallons).

A pump station would be located on the west side of the Seepage Collection Pond. 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. The pumps would be rated at 125 percent of the estimated maximum flow into the ponds.

1.2.3.6 Subsidence

Subsidence is the sudden sinking or gradual downward settling of the earth's surface with little or no horizontal motion. Subsidence is a concern because the underground mine would be beneath the CMW. In addition to MMC's proposed underground geotechnical monitoring discussed on page 16, MMC would implement the following measures to reduce the risk of subsidence:

- **Pillar Design**—Using publicly available data (Davidson 1987), the pillar design at the Troy Mine that led to the pillar failure would be back-analyzed to compare the Troy Mine design in effect at the time of the failure with the Montanore design. As pillar designs were refined, numerical modeling would be undertaken to further evaluate expected design performance, including the potential for shear failure at the pillar/roof or pillar/floor interface.
- **Structural Setting**—Improving the understanding of the structural setting, including faulting, jointing, bedding, and the horizontal stress regime would improve the geotechnical design. The description of the Troy Mine pillar design (Davidson 1987) indicates that adverse pillar orientation with regard to bedding dip may have played a role in the pillar collapse, and the Troy Mine sinkhole events appear to be related to faulting. Hydrologic effects could be exacerbated by reactivation of fault zones, such as the Rock Lake Fault or any sympathetic and/or undocumented faulting that may exist. A better understanding of the structural environment at Montanore would benefit the mine design effort and improve the understanding of potential impacts that may arise. These data would be obtained through lineament analysis, mapping and statistical analysis of joint frequency and attitude, strain-relief overcoring, and further exploratory drilling.
- **Interaction of Workings**—MMC completed some initial numerical modeling to examine the issue of pillar columnization and sill stability between the two ore zones. The modeling would be expanded during final design, as interaction of workings may be crucial to overall pillar/sill stability.
- **Entry Stability and Primary Support**—Roof support analyses would be completed during final design to finalize the support plan and mining span.
- **Final Plan Submittal—**MMC would submit a final mine plan, including final plans for geotechnical monitoring, following completion of the Libby Adit evaluation program to the agencies for approval.
  (Note: Montanore Final EIS contains further mitigation measures for reducing risk for subsidence.)

1.2.3.7 Other Modifications

1.2.3.7.1 Reporting

MMC would submit as part of its annual report to the lead agencies a discussion of its compliance with all the monitoring and mitigation requirements specified in the DEQ Operating Permit and the KNF's approved Plan of Operations. Each monitoring and mitigation requirement of the selected alternative would be listed in the report.

1.2.3.7.2 Sound

MMC would operate all surface and mill equipment so that sound levels would not exceed 55 dBA, measured 250 feet from the mill for continuous periods exceeding an hour. Backup beepers may exceed 55 dBA 250 feet from the mill. MMC would adjust intake and exhaust ventilation fans in the Libby Adits so that they generate sounds less than 82 dBA measured 50 feet downwind of the portal. If necessary, specially designed low-noise fan blades or active noise suppression equipment would be used.

1.2.3.7.3 Scenery and Recreation

MMC would design and construct a scenic overlook with information and interpretive signs on NFS road #231 (Libby Creek Road) downstream of the Midas Creek crossing with views of the tailings impoundment. MMC would develop two interpretative signs, one on the mining operation and another one on the mineral resource and geology of the Cabinet Mountains. Parking would be developed in cooperation with the KNF.

1.2.3.8 MMC would gate certain roads currently open in the mine permit areas during operations (see section 1.2.4.5*, Transportation and Access*).

In Alternatives 3, MMC would check the status of the closure device twice-a-year (spring and fall), and repair any gate or barrier that was allowing access.

MMC would fund a volunteer campground host from Memorial Day through Labor Day at Howard Lake Campground during the construction and operation phases of the mine. MMC would shield or baffle night lighting at all facilities.

MMC would complete vegetation clearing operations under the supervision of an agency representative with experience in landscape architecture and revegetation. Where practicable, MMC would create clearing edges with shapes directly related to topography, existing vegetation community densities and ages, surface drainage patterns, existing forest species diversity, and view characteristics from Key Observation Points (KOPs). MMC would avoid straight line or right-angle clearing area edges. MMC would not create symmetrically-shaped clearing areas.

MMC would transition forested clearing area edges into existing treeless areas by varying the density of the cleared edge under the supervision of an agency representative.

MMC would mark only trees to be removed with water-based paint, and not mark any trees to remain.

MMC would cut all tree trunks at 6 inches or less above the existing grade in clearing areas located in sensitive foreground areas such as within 1,000 feet of residences, roads, and recreation areas. These locations would be determined and identified by an agency representative before clearing operations.

MMC would submit plans and specifications to the agencies to locate above-ground facilities, to the greatest extent practicable, without the facilities being visible above the skyline as viewed from the KOPs.

1.2.4 Operations Phase

1.2.4.1 Mining

The mine plan is described in previous sections of this document. In addition, by Year 5 of operations, MMC would assess the need for barrier pillars and/or bulkheads to minimize changes in East Fork Rock Creek and East Fork Bull River streamflow. If needed, MMC would submit a revised mine plan to the agencies for approval. One or more barriers would be maintained underground, if necessary, after the plan's approval.

1.2.4.2 Tailings Management

1.2.4.2.1 Main Dam

The Main Dam would be a compacted cyclone sand dam constructed by the centerline method to an elevation of 3,664 feet. A crest width of 70 feet was used to account for the upstream slope of the sand deposition and working crest area for the proposed cyclone towers. The downstream slope was set at 2.75H:1V and would be buttressed by a Rock Toe Berm described above. Based on the height and position of the Rock Toe Berm, the vertical height of the Main Dam would be 230 feet above the Rock Toe Berm crest. The final crest length would be 10,300 feet, and the main north-south axis would be 5,000 feet long. The left and right abutment sections would be both angled back at about 75 degrees from the main section centerline and tie into the existing ground at the crest elevation. The dam would be raised with cyclone underflow sand hydraulically placed and compacted in cells as described for Alternative 2. The cyclone overflow (fine tailings fraction) would be routed to the tailings thickener plant and combined with the primary thickener underflow and thickened to a 70 percent slurry density.

1.2.4.2.2 Tailings Deposition

For Alternative 3, it is assumed that all tailings deposited into the impoundment would be routed through a thickener plant and deposited as high-density tailings. This would allow a higher average in-place tailings density and stacking of tailings along perimeter areas above the Main Dam crest. Both parameters lead to a reduction in the total impoundment volume required to store conventional tailings slurry.

Tailings Pipelines

Tailings slurry would be pumped in buried double-walled HDPE or HDPE/steel combination pipelines from the mill at the Libby Plant Site to a thickener facility west of the impoundment. The thickener facility would remove water, or dewater, the tailings to a target slurry density of about 70 percent solids and deposited to achieve an average in-place tailings density of 85 pcf or greater. Water removed from the tailings would be sent to the water storage pond on the north end of the Poorman Tailings Impoundment.

In Alternative 3, the pipeline corridor would parallel the road except where the road was very curvy . Tailings pipelines would be double-walled to reduce the risk of leaks; one type of pipeline used successfully at the Stillwater Mine complex consists of a HDPE pipe inside a steel pipe. The leak detection system proposed by MMC would be used. In the event that the leak detection system monitored a leak, the mill operator would change flows to the second tailings line and flush the other line of all solid material. The investigation of the leak would then commence.

MMC would bury tailings pipelines adjacent to the proposed access road between the Libby Plant Site and the Poorman Impoundment Site in most locations. Unless it was impracticable, pipelines would be buried at least 3 feet deep adjacent to the access road. The pipelines would not be buried at the Ramsey Creek and Poorman Creek crossings, but would in a lined, covered trestle adjacent to the bridge. The creek crossings would have secondary containment built into the crossings besides the double-walled pipe. The containment would be covered and drain toward a designed sump or tank system. Values would be installed on either side of the crossings to minimize the quantity of tailings that would reach the creek. The ditch proposed by MMC in Alternative 2 would not be constructed. MMC would prepare an as-built drawing showing pipeline depths. Burying the pipelines would provide better protection from vandalism, eliminate the visible presence of the pipelines, and facilitate concurrent reclamation in the pipeline corridor along most of the route between the mill and the tailings thickener plant. In addition to the pump station at the Poorman Creek crossing proposed in Alternative 2, another pump station, similar to the Poorman Creek pump station, would be needed at the Ramsey Creek crossing. These pump stations would be outside of the 100-year floodplain to comply with INFS requirements . Once the pipelines were no longer needed, they would be flushed out into the tailings impoundment. They would be removed from all stream crossings and anywhere they were less than 3 feet below the surface. For other segments of the pipelines, the pipelines would be left in place. They would be cut at 0.5-mile intervals, and capped.

Thickener Facility

It is anticipated that either a high compression thickener or a deep tank thickener system would be required to remove sufficient water for the slurry to create a 70 percent slurry density. A high compression thickener is basically a high rate thickener with higher sidewalls so that a higher mud level is maintained in the thickener. This produces a higher percent solids underflow, referred to as high-density slurry. (The high-density slurry is an Agency mitigation.) The deep tank thickener has a high sidewall so that the aspect ratio of diameter to height is about 1:1. A higher mud level and residence time results in higher percent solids than the high compression thickener. The appropriate selection would be based on a series of rheology tests (test to evaluate the physical relationship between the slurry density and size/material type of the pipe to determine the “pumpability” of the slurry) using representative tailings samples. The number of thickeners would depend on the test results coupled with the production rate. The plant would be expanded in stages to accommodate the increasing tailings production rate over time (from 12,500 to 20,000 tons per day). The water removed from the tailings slurry would be routed to the storage pond in the impoundment and then returned to the mill as make-up water.

The area required for the facility would depend on final design and arrangement of the thickeners. An area up to 300 feet by 200 feet would be located above the impoundment area. The main building and any exterior thickeners/facilities would be painted to help reduce visual impacts. Vegetation surrounding the thickener plant would be retained or planted to help visually blend the plant site with adjacent hillsides. The thickener plant would be designed to receive, dewater, and pump up to 20,000 tons of tailings per day.

Pumping and Deposition

The selection of pumping equipment would depend largely on the type of thickener selected, the pumping pressures required, and rheology of the tailings. Either centrifugal pumps or positive displacement pumps likely would be required for this alternative. The selection would be determined as part of final design studies.

Initially, the high-density slurry would be applied to the ground surface from the crest of the Starter Dam and initial raises of the Main Dam, and retained by a Starter Dam and subsequent Main Dam similar to Alternative 2. Deposition from the dam crest would continue through about Year 5 of operation to establish a back slope for the upstream side of the sand dam and a contact with the tailings slurry. After about Year 5, the thickened tailings would be deposited to the ground from multiple points upslope of the tailings impoundment area to form several mounds of tailings. As tailings deposition continues, the slope of the mounded tailings would overlap and migrate down into the impoundment area. The thickened tailings would form a surface at about a 3 to 5 percent gradient to create a slope of tailings graded down into the impoundment area (. The mass of tailings deposited to form the slope would be balanced with the tailings volume within the impoundment area so as not to exceed the height of the Main Dam and provide adequate solution and storm water management capacity within the impoundment area. The last year or two of operation, tailings would be deposited to facilitate final 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.

The functionality of Alternative 3 tailings impoundment would depend on determination and design of the water removal system (such as deep tank or high compression thickeners) and the strict control of final slurry parameters such as moisture content, deposition sequences, and impoundment water management. During final design, MMC would determine the proper thickener and distribution system and deposition plan for the tailings. MMC would develop an optimum filling plan and operation and monitoring manual that addressed plant operations, tailings thickening parameter tolerances, contingencies for tailings density not meeting specifications, monitoring of the thickening process, and reporting to the lead agencies. See also Appendix C, Montanore SDEIS, FEIS.

Dust Control at Impoundment

The DEQ’s draft air quality permit (DEQ 2011) has specific requirements for tailings dust management. Spigots distributing wet tailings material and water would cover about one-half of the total tailings at any time. The spigots would be moved regularly and would cause wetting of all non-submerged portions of the tailings impoundment to occur each day. This wetting would be supplemented by sprinklers as necessary when weather conditions could exist to cause fugitive dust.

MMC would develop a general operating plan for the tailings impoundment site including a fugitive dust control plan to control wind erosion from the tailings impoundment site. Before commencing operations, MMC would submit to the agencies for review and approval a general operation plan for the tailings impoundment site including the fugitive dust control plan. The plan would include, at a minimum, the embankment and cell (if any) configurations, a general sprinkler arrangement, and a narrative description of the operation, including tonnage rates, initial area, and timing of future enlargement. Should these measures not be adequate to control wind erosion from the impoundment, MMC would submit a revised plan to the agencies for approval, incorporating alternative measures, such as a temporary vegetative cover. At closure, MMC would maintain wind erosion control during the interim period after the end of active tailings deposition and before final reclamation of the site. Any revisions to these requirements in the final air quality permit would be implemented.

1.2.4.3 Water Use and Management

1.2.4.3.1 Project Water Requirements

In Alternative 3, Water Treatment Plant at the Libby Adit Site would be used instead of land application (LAD) water treatment (see section 1.2.4.3.3, *Water Treatment*), all mine and adit inflows would be treated and discharged from Libby Adit Water Treatment Plant; additional water would be discharged from the Libby Adit Water Treatment Plant during Operations, Closure and Post-Closure phases whenever flow in Libby Creek at LB-2000 was less than 40 cfs, and make-up water for ore processing would be diverted from an infiltration gallery adjacent to Libby Creek. MMC would maintain a detailed water balance that would be used to monitor water use. Actual volumes for water balance variables (*e.g.*, mine and adit inflows, precipitation and evaporation, and dust suppression) would vary seasonally and annually from the volumes shown in Table 11.

Table 11. Average Water Balance, Alternative 3.

Phase—>	Evaluation Phase Years 1-2		Construction Phase Years 3-5			Operations Phase Years 1-5	Operations Phase Years 6-10	Operations Phase Years 11-19	Closure Phase Years 1-5	Post-Closure Phase Years 6-11
Project Year—>	**Project Year 1**	**Project Year 2**	**Project Year 3**	**Project Year 4**	**Project Year 5**	**Project Years 6-10**	**Project Years 11-15**	**Project Years 16-24**	**Project Years 25-29**	**Project Years 30-35**
Production Rate—>	**0 tpd**	**0 tpd**	**0 tpd**	**0 tpd**	**0 tpd**	**12,500 tpd**	**17,000 tpd**	**20,000 tpd**	**0 tpd**	**0 tpd**
Component	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**
Mine and Adit Flow										
Adit inflow	230	230	340	395	450	270	270	200	0	0
Mine inflow	30	30	30	30	30	110	110	170	0	0
Total flow	**260**	**260**	**370**	**425**	**480**	**380**	**380**	**370**	**0**	**0**
Water Treatment Plant										
Inflows - mine and adit flows	260	260	370	425	480	380	380	370	0	0
Runoff from Libby Adit waste rock stockpile	3	3	0	0	0	0	0	0	0	0
Water from tailings impoundment seepage/runoff collection	0	0	98	75	20	0	0	0	405	270
Mitigation water from impoundment during low flow (August-March) ‡								**395**		
Water treatment plant discharge†	**263**	**263**	**468**	**500**	**500**	**380**	**380**	**765**	**405**	**270**
Mill Inflow										
Flows from mine/adit	0	0	0	0	0	0	0	0	0	0
Water from tailings impoundment seepage/runoff collection	0	0	0	0	0	498	815	1,044	0	0
Make-up water from Libby Creek alluvium stored in tailings impoundment‡	0	0	0	0	0	380	380	370	0	0
Subtotal	**0**	**0**	**0**	**0**	**0**	**878**	**1,195**	**1,414**	**0**	**0**
Mill Outflow										
Water transported with tailings at deposition	0	0	0	0	0	872	1,186	1,405	0	0
Water in concentrate	0	0	0	0	0	6	9	9	0	0
Subtotal	**0**	**0**	**0**	**0**	**0**	**878**	**1,195**	**1,414**	**0**	**0**

Phase—>	Evaluation Phase Years 1-2		Construction Phase Years 3-5			Operations Phase Years 1-5	Operations Phase Years 6-10	Operations Phase Years 11-19	Closure Phase Years 1-5	Post-Closure Phase Years 6-11
Project Year—>	**Project Year 1**	**Project Year 2**	**Project Year 3**	**Project Year 4**	**Project Year 5**	**Project Years 6-10**	**Project Years 11-15**	**Project Years 16-24**	**Project Years 25-29**	**Project Years 30-35**
Production Rate—>	**0 tpd**	**0 tpd**	**0 tpd**	**0 tpd**	**0 tpd**	**12,500 tpd**	**17,000 tpd**	**20,000 tpd**	**0 tpd**	**0 tpd**
Component	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**	**(gpm)**
Tailings Impoundment Inflow[*]										
Precipitation on stored water pond	0	0	2	33	33	181	357	323	67	9
Seepage collection pond net precipitation	0	0	84	165	165	139	139	139	32	5
Runoff captured from impoundment dam/ beach/catchment area	0	0	18	24	24	212	138	162	44	0
Runoff from waste rock stockpile within impoundment	0	0	4	4	4	3	10	0	0	0
Water transported with tailings at deposition	0	0	0	0	0	872	1,186	1,405	0	0
Water released from fine tailings consolidation	0	0	0	0	0	28	101	137	102	20
Water released from sand tailings consolidation (dams)	0	0	0	0	0	133	181	214	0	0
Groundwater interception/ seepage collection	0	0	0	0	0	221	221	221	221	221
Make-up water from Libby Creek alluvium[‡]								765		
Subtotal	**0**	**0**	**108**	**226**	**226**	**1,789**	**2,333**	**3,366**	**466**	**255**
Tailings Impoundment Outflow[*]										
Dust control	0	0	5	6	6	12	24	24	6	0
Evaporation	0	0	8	45	45	216	444	423	81	10
Water retained by tailings voids	0	0	0	0	0	710	965	1,143	0	0
Water recycled to mill (to Water Treatment Plant in pre/post operations)[‡§]	0	0	72	75	20	498	815	1,414	405	270
Seepage to groundwater	0	0	0	0	0	15	25	25	25	25
To Water Treatment Plant during August-March[‡]								395		
Change in water stored in impoundment	0	0	23	100	155	338	59	(59)	(51)	(50)
Subtotal	**0**	**0**	**108**	**226**	**226**	**1,789**	**2,333**	**3,366**	**466**	**255**

gpm = gallons per minute
[†]Water Treatment Plant discharge rates are based on current plant capacity, which would be increased in Alternatives 3 and 4
[‡]Rates of water to the impoundment and from the impoundment to Water Treatment Plant for water rights mitigation discussed in section 1.2.4.3.2, *Water Rights* were calculated for full operations
[§]Rates of water to Water Treatment Plant during Closure and Post-Closure phases are based on current plant capacity, which would be increased in Alternatives 3 and 4; see section 2.5.4.3.3, *Water Treatment*

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 the Evaluation Phase when water was used beneficially, water would be discharged whenever flow in Libby Creek at LB-2000 was less than 40 cfs. The capacity of the existing Water Treatment Plant would be expanded to accommodate operational discharges (see section 1.2.4.3.3, *Water Treatment*). Diversions from Libby Creek would be necessary to provide adequate water for project use. Section 1.2.4.3.2, *Water Rights,* discusses appropirations and discharges associated with water rights.

Using thickened tailings may affect the ability to use the impoundment as a reservoir to maintain a water balance. In final design, MMC would re-evaluate the water balance and the tailings deposition plan. Several options for water storage would be available. One option would use the drainage in the northern end of the impoundment area as a dedicated water storage area and readjust the dam alignment and deposition plan. If chosen, during the final few years of operation, the dedicated water storage area could be in-filled if needed as part of final tailings deposition and contouring for reclamation. Preliminary evaluation of this option indicates that this may be possible with only minor changes to the Alternative 3 layout and site development. A second option would be to use the Seepage Collection Pond for excess water storage. A third option would be to use one or more borrow areas for storage. The Alternative 3 water balance assumes that all collected water would be returned to the impoundment and no water storage would occur in the Seepage Collection Pond.

In 2011, MMC applied to the DEQ to renew the existing MPDES permit and requested the inclusion of five new storm water outfalls for Alternative 3 under the permit. In 2011, the DEQ determined the renewal application was complete and administratively extended the permit (ARM 17.30.1313(1)) until MMC receives the renewed permit. Other outfalls may be identified during the MPDES permitting process.

1.2.4.3.2 Water Rights

MMC submitted four water rights applications to the DNRC for the use of surface water and groundwater associated with the project (MMC 2012a). One application was subsequently withdrawn and two applications were modified. If permitted, the three rights would be in addition to MMC’s two existing surface water rights and one groundwater right in Libby Creek. The three water right applications are summarized in Table 12.

Table 12. Summary of MMC's Beneficial Use Permit Applications.

Variable	Water Source		
	Groundwater	Groundwater	Surface Water
General Description	Groundwater from pumpback wells	Groundwater from Libby Creek alluvium	Precipitation captured by impoundment
Purpose	Mining	Mining	Mining
Period of Use	1/1-12/31	4/1-7/31	1/1-12/31
Point of Diversion	Poorman Impoundment Site	Libby Creek alluvial groundwater near Poorman Impoundment Site	Poorman Impoundment Site
Point of Use	Libby Plant Site and Poorman Impoundment Site	Libby Plant Site and Poorman Impoundment Site	Libby Plant Site and Poorman Impoundment Site
Average Flow Rate (gpm)	250	765	625
Maximum Flow Rate (gpm)	250	1,125	1,950
Maximum Volume (acre-feet/year)	403	410	1,038

The values shown for each permit is what MMC requested and may be different from those in any beneficial use permit issued.
Source: MMC 2012a.

MMC intends to acquire a parcel along Swamp Creek for wetland mitigation and the water right associated with this parcel allows for flood irrigation of 26 acres of hay meadow. MMC would file for a change of use and change of location for this water right for use on the 20-acre wetland mitigation site, if water was needed for the mitigation. If the amount of water consumed from Swamp Creek would increase, MMC would apply for a new water right for beneficial use.

Construction and Operations Phases Diversions and Discharges

The Forest Service has an instream water right for 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. Senior rights have an earlier priority date and claimants who hold them have a higher priority to divert water from a stream or water body than those with later, or junior rights. Consequently, MMC would divert groundwater from Libby Creek during high flows (April through July) and store it in the tailings impoundment, Seepage Collection Pond, or mine water pond at the Libby Plant Site. No appropriation would be made whenever flow at LB-2000 was less than 40 cfs. Storage of diverted water would occur during the late Construction Phase after the Starter Dam was lined and MMC began storing water for mill startup, during the Operations Phase, and during the Closure Phase until the impoundment was dewatered for reclamation.

MMC would establish a flow gaging station at LB-2000 near the upstream point-of-diversion of the Forest Service's 40-cfs right. The gaging station would consist of a staff gage and pressure transducer. The pressure transducer would be set to collect stream stage data at 1-hour intervals and transmitted electronically to the mine office. MMC would review the transducer data daily at 9 AM and if it indicates a flow below 40 cfs, MMC would cease appropriating Libby Creek water. Site-specific flow measurements would be conducted at the gaging station for a range of low, medium, and high flow measurements to establish a rating curve for the staff gage and pressure transducer data. A specific height on the staff gage would be identified that equates to a flow of 40 cfs in Libby Creek. After initial equipment setup and verification of proper operation, the staff gage would be measured monthly, and the pressure transducer data would be downloaded monthly.

In an average precipitation year, 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 gpm and a maximum flow rate of 1,125 gpm (410 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 (403 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 in Table 12 are what MMC requested and may be different from 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 at a rate equal to all Libby Creek appropriations. 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, 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. Any water from the tailings impoundment to be treated and discharged would be mine drainage and precipitation commingled with process water. No process water would be discharged unless one of the two exemptions in the ELGs was met (40 CFR 440.104(b)(2)).

On Ramsey Creek, David Cleveland, John Cleveland, and Libby Placer Mining Company (collectively "the Clevelands") jointly have a 1 cfs surface water right on Ramsey Creek between RA-200 and RA-400. When the 3D model was updated after the Evaluation Phase, MMC would re-evaluate baseflow changes in Ramsey Creek. If baseflow changes in Ramsey Creek may adversely affect the Clevelands' right on Ramsey Creek during any mining phase, MMC would develop a plan during final design to convey treated water from the Water Treatment Plant to a location upstream of the Clevelands' point of diversion (RA-300). Discharge to Ramsey Creek would equal MMC's Ramsey Creek baseflow changes whenever the flow at RA-300 was less than 1 cfs. Discharge of treated water to Ramsey Creek would require a new outfall in the MMC's MPDES permit.

Closure and Post-Closure Phases Diversions and Discharges

During operations and at closure, the three adits would be hydraulically connected to the mine void, and without plugs, water would drain toward the mine void until the void filled to the level of the adits. During the Closure Phase, MMC would place two or more plugs in each adit. The plugs would be located to isolate the adits hydraulically from the mine void and to ensure any groundwater tributary to Libby and Ramsey creeks would flow into the adits, and remain within the Libby Creek watershed. The plug locations would be determined by the agencies using the 3D groundwater model maintained and updated throughout the project. MMC would provide a plugging design and the required groundwater modeling as part of the Final Closure Plan.

Following adit plugging, water flowing into the adits would begin to refill the adits. As long as MMC appropriated or diverted water from Libby Creek whenever flow at LB-2000 was less than 40 cfs, MMC would treat stored and adit water, if necessary to meet MPDES permitted effluent limits, and discharge it to Libby Creek at a rate equal to all of MMC's Libby Creek appropriations or diversions occurring at that time. Discharges to Ramsey Creek also would be required if the modeling indicated adit inflows during the Closure Phase would adversely affect the Clevelands' water right on Ramsey Creek.

After facilities were reclaimed and precipitation was no longer intercepted, appropriations or diversions from the Libby Creek watershed would be limited to adit inflows and pumping from the pumpback well system. Inflow into the adits, during the period when Libby Creek would have a flow of 40 cfs or more at LB-2000 would begin to refill the adits. Whenever flow at LB-2000 was less than 40 cfs, MMC would set a datum at the current water level in each adit. The datum would be the location of the water level in each of the adits at the time water would be required for mitigation. Through discharges, MMC would maintain water levels in each adit at that datum as long as flow in Libby Creek at LB-2000 was less than 40 cfs. In other words, MMC would discharge from the adits so as not to increase the storage in any adit whenever mitigation was required. Discharges would cease and water levels in the adits would increase whenever flow in Libby Creek at LB-2000 was 40 cfs or more. A new datum would then be established whenever mitigation was again needed.

When the water level in the adits reached the bedrock-colluvial interface (about 800 feet from the adit portal), MMC would place an additional plug in bedrock at the bedrock-colluvial interface and allow the adits to reach steady-state hydrologic conditions. Construction of the second plug would begin when flow at LB-2000 was 40 cfs or more. A third plug would be placed at the opening of each adit. The adit portals then would be reclaimed.

Water appropriated by the pumpback well system during the Closure and Post-closure phases would be treated and discharged at the Water Treatment Plant. After the second plug was placed in each adit, no further discharges to Libby Creek other than from the pumpback well system would be required to prevent injury to senior water right holders.

1.2.4.3.3 Water Treatment

Currently, MMC is permitted by the DEQ under Operating Permit #00150, Minor Revision 06-002, to treat Libby Adit inflows through an existing Water Treatment Plant at the Libby Adit Site before discharge to MPDES-permitted outfalls. In Alternative 3, the existing Water Treatment Plant would be used solely to treat any waters before discharge at the existing MPDES-permitted outfalls. Water would not be discharged at the LAD Areas.

The agencies anticipate that the Water Treatment Plant would be modified to increase capacity and to treat nitrogen compounds (primarily nitrates and ammonia) and possibly dissolved metals. MMC's analysis of discharges during Operations indicated maximum discharges would be 1,024 gpm during an average year, and 1,178 gpm during a 10-year wet year (36 inches of precipitation) (MMC 2012a). A discharge of 1,178 gpm would exceed the current design capacity of the Water Treatment Plant, estimated to be 500 gpm. During final design, MMC would estimate the maximum discharge rate during a 20-year wet year using best available precipitation data and modify the Water Treatment Plant such that it would have adequate capacity to treat discharges during a 20-year wet year. MMC also would evaluate the size of the percolation pond at the Libby

Adit, and enlarged it, if necessary, to accommodate higher flow rates. The increased capacity and treatment modifications would be in place at mill startup.

MMC would maintain the current MPDES permit MT0030279 with three outfalls at the Libby Adit Site. On Ramsey Creek, the Clevelands have a 1 cfs water right for mining between RA-200 and RA-400. The baseflow is estimated to be about 0.38 cfs in Ramsey Creek at the CMW boundary, and may be about 1 cfs at this right's point of diversion on Ramsey Creek. The maximum predicted baseflow decrease due to mine inflows is 0.04 cfs at the CMW boundary and would be similar at the point of diversion. This reduction would adversely affect this water right whenever flow at the point of diversion was less than 1 cfs. MMC would monitor flow in Ramsey Creek at RA-300, above the point of diversion (see Appendix C, Section C.10). When the 3D model was updated after the Evaluation Phase, MMC would re-evaluate diversions from Ramsey Creek. If MMC's Ramsey Creek diversions may adversely affect Cleveland's right on Ramsey Creek during any mining phase, MMC would develop a plan during final design to convey treated water from the Water Treatment Plant to a location upstream of Cleveland's point of diversion. Discharge of treated water to Ramsey Creek would require a new outfall in MMC's MPDES permit.

MMC evaluated several treatment alternatives for treating nitrogen compounds (Apex Engineering, PLLC and Morrison-Maierle, Inc. 2008). The recommended alternative for treating nitrates and ammonia is a moving bed biofilm reactor (MBBR). In a MBBR, microorganisms grow as a biofilm on the surfaces of plastic carriers, called media, in a treatment reactor. Air is forced into the reactor, and as the media circulate through wastewater in the reactor, the microorganisms remove nitrogen compounds through biological processes. The media provide high surface area and protected interior space for growth of the microorganisms, enabling high treatment capacity in a very small footprint. This system is in use currently at the Stillwater Mining Company (Stillwater) mining complex in Montana.

Treatment would be a two-step process. Ammonia would be removed from water through the biological process called nitrification, which converts (oxidizes) ammonia to nitrate. Nitrates are removed through another biological process called denitrification. Microorganisms convert nitrate to inert nitrogen gas that vents from the system. With addition of a carbon energy source, the biological processes are optimized and carbon dioxide is also produced and vented with the nitrogen gas. Based on Stillwater's treatment system, the agencies anticipate the MBBR technology would be capable of meeting existing MPDES permitted effluent limits.

At the current design flow rate of 500 gpm, the MBBR system for nitrification would consist of a concrete tank about 24 feet long, 24 feet wide and up to 13 feet deep. The nitrification concrete tank would be filled about 50 percent with plastic media and supplied with forced air. An MBBR system for denitrification would be a concrete tank about 20 feet long, 24 feet wide and 10 feet deep (plus 2 to 3 feet of freeboard). The denitrification tank would be filled about 40 percent with plastic media. A carbon energy source would be added to the denitrification tank. Both tanks would be on the south side of the existing water treatment building.

The existing Water Treatment Plant uses ultrafiltration to remove metals that are sorbed onto particulates suspended in the water, thereby reducing total metal concentrations. The current system has been successful in treating adit discharges to concentrations less than MPDES permitted effluent limits. MMC samples untreated water monthly for both total and dissolved metals. The Water Treatment Plant also may need to be modified to treat dissolved metals. MMC would continue to monitor influent monthly, and make appropriate modifications to the Water Treatment Plant if necessary to remove dissolved metals. Treatment technologies for dissolved metals could include the addition of chemicals to promote chelation (formation of a larger, filterable compounds) followed by the existing ultrafiltration system, or reverse osmosis.

1.2.4.3.4 Storm Water Control

MMC would design all ditches and sediment ponds that would contain process water or mine drainage for a 100-year/24-hour storm (rather than the 10-year/24-hour storm proposed in Alternative 2). 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 2012a). Sediment and runoff from the tailings facility would be minimized by limiting unreclaimed areas to the active disposal areas. Localized sediment retention structures and BMPs would be used along the downslope perimeter of the impoundment for control, sampling, and recovery of drainage from the impoundment, sediment, and storm water runoff. These structures and collection ditches would act as storm water diversions to channel the water and sediment from the tailings thickener facility into storm water ponds. The ditches would be sized to accommodate a 10-year/24-hour storm event.

Storm water from undisturbed lands above the tailings facility would be diverted around the Impoundment Site into Poorman Creek and Little Cherry Creek during mine operations. Runoff from reclaimed and fully revegetated, stabilized portions of the tailings thickener facility 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 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 drainageways established when mine operations ended when the site was fully reclaimed.

To reduce the potential for adversely affecting water quality in Alternative 3, MMC would use either a chemical stabilization, groundwater, or segregated mine or adit water with nitrate concentrations of 1 mg/L or less and with concentrations of all other parameters below the mine drainage ELG, to control dust on mine access roads.

1.2.4.4 Solid Waste Management

MMC would submit plans and specifications for public water supply wells, as well as plans for construction of a sanitary waste treatment facility to the DEQ for approval. In Alternative 3 during the Evaluation and Construction Phases, MMC would use an on-site sewage treatment and disposal system at the Libby Adit Site. The system consists of the four components: four 1,000-gallon septic tanks; a two-pod treatment unit and combination recirculation tank/drainfield dosing tank; effluent distribution system; and infiltrator trenches. Expected discharge is 585 gallons per day (Geomatrix 2010a). 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. The effluent from the septic tanks would be disinfected before pumping it to the impoundment, and disinfection would be by chlorination, ozonation, or ultraviolet light. This step would disinfect the effluent to reduce the number of microorganisms and eliminate potential hazards due to human exposure of the water in the impoundment. Disinfection would be conducted as the effluent water is pumped from the septic tanks to the impoundment Expected discharge is 6,100 gallons per day; a rate of 7,000 gallons per day was used for design purposes (Geomatrix 2010a).

In Alternative 3, MMC would minimize the amount of wastes underground or at the tailings impoundment. All wastes proposed for disposal underground or at the tailings impoundment would be identified during operations and at closure, and reviewed and approved by the agencies before disposal.

1.2.4.5 Transportation and Access

1.2.4.5.1 Road Management Plan

INFS standard RF-2 requires the development and implementation of a Road Management Plan. In Alternative 3 MMC would develop for the lead agencies' approval, and implement a final Road Management Plan that would describe for all new and reconstructed roads used for the mine and transmission line the following:

- 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 plan would incorporate safety signing such as "Caution Truck Traffic" signs at several locations between U.S. 2 and the Libby Plant Site on both Libby Creek and Bear Creek roads. Other appropriate wording could be used as approved in the Road Management Plan. The plan would describe management of road surface materials during plowing, such as snow and ice. Sidecasting of snow mixed with soil would be avoided. Sidecasting of road material would be prohibited on road segments within or abutting RHCAs in priority watersheds. MMC would install or fund the installation of signage where sidecasting would be avoided.

The following sections describe road use and public access along the main access road (Bear Creek Road (NFS road #278), Libby Creek Road (NFS road #231), and within the proposed permit area. With the exception of the Bear Creek Road, all open roads in the impoundment permit area would be gated and limited to mine traffic only. Non-motorized public access would be restricted within each permit area by signage at the permit area boundary. Table 13 lists those roads with a change in road status in Alternative 3; these roads are shown on. MMC would be responsible for maintaining all existing or new roads and stream crossings used by the mine.

1.2.4.5.2 U.S. 2 and Bear Creek Road Intersection

The Libby Creek Road is a public approach to U.S. 2. MMC would evaluate the approach for an Interstate Truck and Trailer Combination (AASHTO 2011 Greenbook WB-20 (WB-65 and WB-67)). Modifications to the intersection would be required if the approach did not meet the design requirements for a WB-67 design vehicle. The approach would be designed to maintain the transportation system level of service and safety in the analysis area. Any modification to U.S. 2 would require the approval of the MDT. This mitigation also would apply to the intersection of U.S. 2 and the Libby Loadout access road.

1.2.4.5.3 Bear Creek Road (NFS Road #278) and Libby Creek Road (NFS Road #231)

As discussed previously, the agencies incorporated the Libby Adit evaluation program into Alternatives 3. MMC would continue to plow and use the Libby Creek Road (NFS road #231) and the Upper Libby Creek Road (NFS road #2316) year-round during the 2-year evaluation program and the 1-year period during reconstruction of the Bear Creek Road. MMC would install and maintain a gate on the Libby Creek Road and the KNF would seasonally restrict access on the Libby Creek Road (NFS road #231) and the Upper Libby Creek Road (NFS road #2316) as long as MMC used and snowplowed the two roads. Any work in a RHCA along an access road would be completed in compliance with INFS standards and guidelines.

In Alternative 3, MMC would use the Bear Creek Road for main access during operations. About 13 miles of the Bear Creek Road (NFS road #278), from U.S. 2 to the junction of a new road proposed to be constructed in the Poorman Tailings Impoundment Site, 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, may be up to 100 feet wide. The existing Bear Creek bridge, which currently is 14 feet wide, also would be replaced and widened to a width compatible with a 26-foot wide Bear Creek Road. During upgrading of the Bear Creek Road, MMC would use the Libby Creek Road. A travel lane on the Bear Creek Road would be maintained to allow continued motorized public access. During operations, MMC would use a supply staging area in Libby where shipments to the mine site would be consolidated to minimize traffic.

Table 13. **Proposed Change in Road Status during Operations, Alternative 3.**

Road #	Road Name	Location	Existing Status	Length (miles)	Proposed Status
1408	Libby Creek Bottom	Tailings Impoundment	Private, gated	0.8	Gated, mine traffic only
2316	Upper Libby Creek	Libby Adit Site	Open	1.3	Mixed mine haul and public traffic
2316	Upper Libby Creek	Libby Adit Site	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.3	Gated, mine traffic only
2316	Upper Libby Creek	Libby Adit Site	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.7	Trail
2317	Poorman Creek	Up Poorman Creek	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	1.8	Trail
2317B	Poorman Creek B	Up Poorman Creek	Impassable, open to snow vehicles December 1 through March 31	0.8	Trail
4781	Ramsey Creek	Up Ramsey Creek	Open	0.4	Barriered year-long to motor and snow vehicles
4781	Ramsey Creek	Up Ramsey Creek	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	2.2	Trail
5181	L Cherry Loop H Cowpath	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.5	Gated, mine traffic only
5181A	L Cherry Loop H Cowpath A	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.2	Gated, mine traffic only
5184	Bear-Little Cherry	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.2	Gated, mine traffic only
5184A	Bear-Little Cherry A	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.2	Gated, mine traffic only
5185	S Bear-Little Cherry	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.8	Gated, mine traffic only
5185A	S Bear-Little Cherry A	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.3	Gated, mine traffic only
5187	L Cherry Loop L Clearing	Tailings Impoundment	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.2	Gated, mine traffic only
6201	Cherry Ridge	Tailings Impoundment	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	1.3	Gated, mine traffic only
6201A	Cherry Ridge A	Tailings	Barriered year-long to motor	0.9	Gated, mine

Road #	Road Name	Location	Existing Status	Length (miles)	Proposed Status
		Impoundment	vehicles, open to snow vehicles December 1 through March 31		traffic only
6210	Libby Ramsey	Libby Adit Access Road	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	2.95	Gated, mine traffic only
6212	Little Cherry Loop	Tailings Impoundment	Open	2.1	Gated, mine traffic only
6212H	Little Cherry Loop H	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.6	Gated, mine traffic only
6212L	Little Cherry Loop L	Tailings Impoundment	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.4	Gated, mine traffic only
6212M	Little Cherry Loop M	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	1.1	Gated, mine traffic only
6212P	Poorman Pit	Tailings Impoundment	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.3	Gated, mine traffic only
6701	South Ramsey Creek	Upper Ramsey Creek	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.4	Barriered year-long to motor vehicles
6702	South Libby Creek	Upper Ramsey Creek	Gated year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.7	Barriered year-long to motor vehicles
8749	Noranda Mine	Libby Adit Site	Private, gated	0.5	Gated, mine traffic only
8749A	Noranda Mine A	Libby Adit Site	Private, gated	0.2	Gated, mine traffic only
14403	Lower Ramsey	Libby Plant Site	Barriered year-long to motor vehicles, open to snow vehicles December 1 through March 31	0.4	Gated, mine traffic only
14404	Bare Road	Tailings Impoundment	Barriered year-long to motor and snow vehicles	0.6	Gated, mine traffic only

South of Little Cherry Creek, MMC would build 0.7 miles of new road west of and parallel to the Bear Creek Road that would connect Bear Creek Road with Ramsey Creek Road (NFS road #4781) . MMC would construct a new bridge crossing of Poorman Creek just upstream and adjacent to the existing crossing. The road would have a chip-seal surface and constructed to a width to accommodate haul traffic. Mine traffic would use the Libby Plant Access Road and the public would use the existing Bear Creek Road. The crossing of the new mine access road across Poorman Creek would be built to accommodate the 100-year flow event and be constructed in compliance with INFS standards. The crossing width would be consistent with the roadway width. The Bear Creek Road from the junction of the new Libby Plant Access Road to the Libby Creek Road would be surfaced with 6 inches gravel at its existing width (a minimum of 16 feet).

Once oversized haul vehicles were no longer needed between the tailings impoundment and Libby Plant Site, the mine and public traffic would both use the new alignment. When the road was used jointly, the primary road use would be mine traffic (vendors, concentrate haulage, deliveries, and personnel) similar to the use patterns on the lower segment of Bear Creek Road. The segment of the Bear Creek Road parallel to the new access road would be decommissioned, and the culvert crossing Poorman Creek would be removed.

MMC would surface the existing Bear Creek Road (NFS road #278) from just south of Poorman Creek to the Libby Creek Road (NFS road #231) with 6 inches of gravel 16 feet wide. This surfacing would ensure the safe transition from the improved section north of the new Libby Plant Access Road and the unimproved section to the Libby Creek Road.

MMC would use open and closed roads in Alternative 3. Some currently open roads would be gated. As part of the lead agencies' mitigation, MMC would be responsible for installing and maintaining gates at each closure. The gates would have dual-locking devices to allow the KNF fire or administrative access. When accessing areas regulated by the Mine Safety and Health Administration, KNF personnel would check in at the mine office before entering regulated areas.

1.2.4.5.4 Poorman Tailings Impoundment Area

The roads used to haul waste rock from the Libby Adit and the Upper Libby Adit to the Poorman Tailings Impoundment Area are shown on. Except of 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. The Mine Safety and Health Administration (Mine Safety and Health Administration 1999) recommends a road width of 56 feet wide when using a 16-foot haul truck to accommodate joint-use traffic safely. For the Poorman Creek Road (NFS road #2317), joint traffic could be segregated by building a new road parallel to the existing road. A parallel road may have less effect than a 56-foot wide road.

Two segments of the Little Cherry Loop Road (NFS road #6212) would be gated during the construction, operation, and closure phases and used exclusively for mine traffic. Public access would be eliminated. The gates on the Little Cherry Loop Road (NFS road #6212) would be near the tailings impoundment permit area boundary on the north end and near its intersection with the Bear Creek Road south of Poorman Creek on the south end. Depending on timing of project construction, the KNF may need administrative access to NFS road #6212P to allow access to a gravel pit at the road's terminus. The following closed National Forest System roads within the impoundment area would be used in Alternative 3: #1408 to the private land in the NW¼, Section 25, Township 28 North, Range 31 West, #5181, #5181A, #5185, #5185A, #5187, #6212H, #6212L, #6212M, and #6212P.

1.2.4.5.5 Libby Plant Site, Libby Adit and Upper Libby Adit

MMC would use the same roads (NFS road #4781, NFS road #6210 between Ramsey Creek and Libby Creek, and NFS road #2316) for access to the Libby Adit Site and Libby Plant Site . Modifications would occur to a segment of NFS road #2316 west of NFS road #6210. MMC would use a segment of NFS road #2316 west of the Libby Adit Site for access to the Upper Libby Adit Site. MMC would install a gate on NFS road #2316 west of the Libby Adit Site and maintain the existing hiking trail beyond the Upper Libby Adit Site. For the segment on the Upper Libby Creek Road (NFS road #2316) that would have joint use, the agencies anticipate low public traffic use. An alternative to a 56-foot wide road at this location would be the development of administrative procedures to eliminate mine hauling when public use occurred.

MMC would develop a small (4 to 5 vehicle) gravelled recreational parking area at the gate on the Poorman Creek Road (NFS road #2317). The parking area would facilitate non-motorized access to the Poorman Creek drainage via the Poorman Creek Road. MMC also would develop a new hiking trail between Poorman and Ramsey creeks to provide non-motorized access to upper Ramsey Creek.

A new bridge across Ramsey Creek would be needed. The bridge would accommodate the 100-year flow event and be constructed in compliance with INFS standards. Bridge width would be compatible with the roadway width. A segment of closed NFS road #14403 would disturbed by the Plant Site and no longer available for public use.

1.2.4.5.6 Ramsey Creek Drainage

Access and road use on NFS road #4781 up Ramsey Creek and NFS road #6701 would change from gated to barriered to provide grizzly bear mitigation. A short segment of the Ramsey Creek Road would be stored).

1.2.5 Reclamation Phase

Short- and long-term reclamation objectives, as described in previous sections, would be achieved through interim and final reclamation of all disturbed sites, with additional mitigation described below and implementing all erosion- and sediment-control measures previously described.

1.2.5.1 Post-Mining Topography of Project Facilities

In the post-mining topography of project facilities, MMC would develop final re-grading plans for each facility to reduce visual impacts of reclaimed mine facilities. These plans would require the agencies' approval before implementation. At the end of operations, any waste rock not used in construction would be either placed back underground or used in regrading the tailings impoundment. Any waste rock used at the Libby Plant Site could require an MPDES permit modification to include runoff or seepage from the waste rock.

MMC would develop plans to shape slopes of the Libby Plant Site, mine portal areas, and Libby Adit Site to closely resemble the surrounding landscape. Final grading would involve regrading and shaping flat surfaces to blend with the adjacent landscape and have natural dendritic drainages. Additional fill would be used as necessary to create smooth transitions between human-made and natural landforms.

1.2.5.1.1 Poorman Tailings Impoundment

As part of reclamation, all surface facilities would be removed from the site. Inert materials may be buried within the tailings facility before placement of final cover. MMC would provide a list of material and items to be buried and a cover plan for burial to the lead agencies for approval before burial of the items and materials.

Deposition of the tailings at closure would produce a final surface that would drain toward an unnamed tributary of Little Cherry Creek. Once all water from the tailings surface in the northern area of the impoundment had been removed (evaporated, or treated, if necessary, and discharged), and the near surface tailings had 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.

The tailings surface and disturbed areas would be covered as outlined Alternative 2. MMC would survey tailings settlement at closure on a 100-foot by 100-foot grid to document settlement. 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. Rocky borrow and geotextile would be needed for construction equipment to work on the tailings surface. In Alternative 3, MMC would use rocky borrow from within the disturbance area to provide erosion protection. Borrow material volumes would be determined during final design.

Post-operational seepage management would be the same as proposed and described in prevous section. MMC would operate the seepage collection and the pumpback well systems until groundwater adjacent to the reclaimed impoundment met BHES Order limits or nondegradation criteria without additional treatment. Long-term treatment may be required if BHES Order limits or nondegradation criteria were not met. The length of time these closure activities would occur is not known, but may be decades or more. Following removal of the Seepage Collection Dam, the disturbed area would be graded to blend with the original slope. After BHES Order limits or nondegradation criteria were met, seepage from the underdrains and seepage not intercepted by the underdrains would flow to Libby Creek.

MMC would develop a design to recontour faces of the tailings impoundment dams to more closely blend with the surrounding landscape than proposed in Alternative 2. Sand deposition would be varied during final cycloning and placement of sand on the dams. This design would incorporate additional rocky borrow at selected locations on the dam face and use benches in some locations. Islands of trees and shrubs would be planted in the rocky areas. The seed mixture on the dam face would vary to reduce uniformity of the revegetated dam.

1.2.5.1.2 Roads

Reclamation of the Bear Creek Road, new roads, currently open roads, and all new bridges used in Alternative 3 would be the same as described in previous section. The existing Bear Creek Road and the new Bear Creek Road from the Poorman Tailings Impoundment Site to south of Poorman Creek would remain chip-sealed and 26 feet wide. Any segment of the existing Bear Creek Road parallel to the new road that was graveled and not disturbed by the tailings impoundment would be decommissioned. All currently gated or barriered roads used in Alternative 3 would be decommissioned by using a variety of treatment methods to achieve desired conditions for other resources. The Little Cherry Loop Road (NFS road #6212) north of the Bear Creek Road would be decommissioned at closure. The bridge would be removed at closure and the area revegetated.

1.2.5.2 Revegetation

1.2.5.2.1 Revegetation Success/Bond Release Criteria

The following criteria for all reclaimed areas, including the transmission line right-of-way and access roads, would be used to determine revegetation success and bond release. Minimum vegetation cover would be 80 percent of the control site total cover. If the required minimum cover were not obtained, MMC would implement remedial action such as reseeding with a modified seed mixture, mulching, fertilizer, or other changes to address the issue. If after two remedial attempts the particular site still did not meet the minimum vegetative cover standard but met 80 percent of the average of selected control sites, did not exhibit rills or gullies, and met the weed standard, the bond would be released. If the site continued to fall short of meeting the cover requirement, a third remedial effort, approved by the lead agencies, would be applied. If the standard still were not met but the site had 70 percent of the control cover and did not exhibit rills and gullies and met the weed standard, the bond would be released.

MMC and the lead agencies would establish control sites for the project before operation activities. These sites should be similar to the reclaimed areas and be in close proximity to the mine area. MMC would develop a vegetation monitoring plan from these sites and collect vegetation data during the mine life. This information would be used to validate the release criteria numbers with respect to minimum cover requirements, tree/shrub density, weeds, and other provisions preliminarily set in the EIS. The intent is to provide long-term site-specific data to support the release criteria established for the project. The monitoring plan would be approved by the lead agencies and would require the report be submitted annually or as outlined in the plan or as approved by the lead agencies. Monitoring would continue for 20 years after planting or seeding to ensure revegetation requirements were met, or less if the project bond were released by the lead agencies before this period expired.

Noxious weeds would have less than 10 percent cover of species listed as Category 1 (existing infestations) and 0 percent cover of Category 2 and 3 (new invaders and potential invaders, as described in the KNF Noxious Weed Handbook, Spring 2008, Edition 5.0) in reclaimed areas. Data collected by MMC on control sites would be used to update/validate these values based on site-specific data. Noxious weeds would not dominate in any area greater than 400 square feet. No bare areas greater than 200 square feet would be allowed in reclaimed areas.

A minimum of 400 trees and 200 shrubs per acre would be living after 15 years (density would be lower in some areas where no trees or shrubs would be planted such as herbaceous wetlands and meadows).

1.2.5.2.2 Seed Mixture Modifications

MMC would revise all seed mixes so that mixes would be composed of species native to northwestern Montana. MMC would select seed mixes to be compatible with dry and moist forest conditions. On dry south-facing slopes, a seed mix with more aggressive plant species able to establish under harsh conditions would be used, while in moist areas, the aggressive species would be avoided. Native seed mixes would have the ability to be updated in conjunction with ongoing research and as more information becomes available, or as directed by the lead agencies. MMC would include introduced species only with prior approval from the lead agencies.

The interim and permanent seed mixes proposed by MMC contain introduced species (Table 14). In the Alternative 3 seed mixes, MMC would not use the species shown in Table 14, and would replace them with native species, to the extent native species were commercially available. MMC would assess which native species were available commercially, and submit final permanent seed mixes to the lead agencies for approval. In the event native species were not establishing rapidly enough to control invasive plants, MMC would submit an alternative seed mixture to the lead agencies for approval. The alternative mixture could include non-native species that would meet the overall goals and objectives of the reclamation plan. MMC would conduct seeding between August 15 and October 31, or between April 1 and June 15. All areas would be seeded with the permanent seed mix; the interim seed mix proposed in Alternative 2 would not be used. Change in the seeding schedule would be approved by the lead agencies.

Table 14. Introduced Species Eliminated from MMC's Proposed Seed Mixes.

Revegetation Mixture 1	Revegetation Mixture 2
Redtop (*Agrostis gigantea*)	Redtop (*Agrostis gigantea*)
Meadow foxtail (*Alopecurus pratensis*)	Orchardgrass (*Dactylis glomerata*)
Tall fescue (*Festuca arundinacea*)	Canada bluegrass (*Poa compressa*)
Timothy (*Phleum pratense*)	White clover (*Trifolium repens*)
White clover (*Trifolium repens*)	

1.2.5.2.3 Planting

MMC cites recommendations for establishment of seedlings (not planting) ranging from 400 to 680 trees per acre, but plans 435 trees per acre and 200 shrubs per acre. At a success rate of 65 percent, this would yield 283 trees and 130 shrubs per acre, which would be at the low end of the densities recommended by KNF. In Alternative 3, MMC would plant sufficient trees and shrubs to achieve 400 trees and 200 shrubs per acre 15 years after planting.

To help prevent noxious weed establishment, MMC would plant trees and shrubs randomly by hand unless safety issues require machine planting. MMC would mulch around planted trees and shrubs, and control weeds adjacent to trees and shrubs, but apply native seed elsewhere. If noxious weeds colonized planting areas, and weed control with herbicides were necessary, trees would likely be lost. MMC would use an agencies-approved wood-based compost to promote fungi-based communities and tree growth rather than straw or manure based compost that promotes bacteria-based grassland communities.

1.2.5.2.4 Organic Amendments

MMC would amend the top 0 to 4 inches of soil before seeding with an agencies-approved wood-based organic amendment to raise the organic matter level in the soil to a minimum of 1 percent by volume.

1.2.5.2.5 Noxious Weed Mitigation Measures

MMC has a Weed Control Plan approved by Lincoln County Weed Control District. The plan would be modified as described in this section and submitted to the lead agencies during final design for their approval. Following KNF's and DEQ's approval of the final Weed Control Plan, MMC would submit it to the Lincoln County Weed Control District. These measures would be applied to all permit areas, and all currently unopened roads used for transmission line access.

MMC would submit an annual report to the lead agencies describing weed control efforts. The report would provide a map showing areas of weed infestation that were treated in the preceding year. It also would provide a qualitative evaluation of the weed control efforts.

MMC would implement all weed BMPs identified in Appendix A of the KNF Invasive Plant Management Final EIS (KNF 2007a) for all weed-control measures. MMC would focus mitigation on prevention as the most effective and least expensive weed management strategy, and early detection and eradication as the best alternative once a new species had been introduced. For established invaders, treatment and containment of noxious weeds species would be the main objective. MMC would include integrated noxious weed management in the environmental training.

MMC would comply with state and local laws and agencies' guidelines for all noxious weed-control activities. All herbicides used in the project area would be approved for use in the KNF, and 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, site factors (such as soil types and distance to water), and with the objective to minimize impacts to non-target species. MMC would coordinate with the KNF Weed Specialist for use of biocontrol agents as they become available.

To the extent possible, MMC would survey all proposed ground disturbance areas for noxious weeds before initiating disturbance. Where noxious weeds were found, MMC would treat infestation the season before the activity was planned. For example, if timber clearing were planned to being in the spring, the survey and control would be implemented the previous fall. Areas surveyed would include roads, borrow areas, tailings impoundment, transmission line, and any other areas designated for timber removal. MMC would describe in final design plans the extent of which surveys and pretreatment would not be feasible. The proposed survey and treatment approach would be a part of the final Weed Control Plan, to be reviewed and approved by the lead agencies.

MMC would include road-related weed mitigation in any road access that was approved for the project (including access routes to the transmission line). MMC would treat noxious weeds along all haul and access roads yearly with the appropriate herbicide mix for the target species. MMC would broadcast treat every other year and spot treat the alternate years.

MMC would minimize soil disturbance and mineral soil exposure during ground-disturbing activities. Ground disturbance should be no more than needed to meet project objectives. MMC would prevent road maintenance machinery from blading or brushing through known populations of new invading noxious weed species. In areas where noxious weeds were established and activities require blading, MMC would brush and blade areas with uninfested segments of road systems to areas with noxious-weed infested areas. MMC would limit brushing and mowing to the minimum distance and height necessary to meet safety objectives in areas of heavy weed infestations.

MMC would pressure wash all off-road equipment including equipment for mining, vegetation clearing, road construction and maintenance, and reclamation before entering the project area to help prevent the introduction of new invader noxious weed species to the area.

MMC would continue to monitor/survey the project area for new invader weed species on a yearly basis. MMC would monitor weed population levels with particular emphasis on haul routes, access routes, borrow areas, soil stockpiles, and the transmission line corridor. MMC would treat weed infestations as needed.

In areas where timber was to be removed (particularly the transmission line corridor), MMC would consider winter vegetation clearing to reduce mineral soil exposure and the chance of spreading existing noxious weeds.

MMC would implement site-specific guidelines to be followed for weed treatments within or adjacent to known sensitive plant populations. MMC would evaluate all future treatment sites for sensitive plant habitat suitability; suitable habitats would be surveyed as necessary before treatment.

1.2.6 Monitoring Plans

Numerous operational and post-operational monitoring programs proposed by MMC are described previously in this document.in Alternative 2. The agencies revised the monitoring plans proposed by MMC; these are presented in Appendix C, SDEIS, and updated in FEIS.

1.2.6.1 Groundwater Dependent Ecosystem Inventory and Monitoring

Groundwater dependent ecosystems (GDE) are ecosystems that depend solely or partially on groundwater for their existence. MMC completed a GDE inventory in the mine area between 2009 and 2012 (Geomatrix 2009a, 2010b, 2011b; NewFields 2013). The area covered by the GDE inventory is shown in **Error! Reference source not found.**. MMC currently is conducting GDE monitoring in upper Libby Creek and upper East Fork Rock Creek and this monitoring would continue during operations. The agencies' GDE monitoring requirements are presented in Appx. C, and would follow Forest Service methods (USDA Forest Service 2012b).

1.2.6.2 Surface Water and Groundwater

The lead agencies modified MMC's proposed surface water and groundwater monitoring plan. The plan is presented in SDEIS Appendix C.

1.2.6.3 Fisheries and Aquatic Life

The lead agencies modified MMC's proposed fisheries and aquatic life monitoring plan. The plan is presented in Appx C.

1.2.7 Mitigation Plans

In Alternative 3, the wetlands, fisheries, and wildlife mitigation plans are discussed below.

1.2.7.1 Wetlands, Waters of the U.S., and Fisheries

MMC submitted a mitigation plan to the Corps, the KNF, and the DEQ in 2013 for the agencies' preferred alternatives (mine alternative 3 and transmission line Alternative D-R). During plan development, MMC coordinated with the MDT on MMC's wetland mitigation plans and MDT's proposed improvements to U.S. 2 adjacent to the Swamp Creek mitigation site. MMC would continue to coordinate with MDT as final plans were developed.

1.2.7.1.1 Wetlands

On-site Mitigation

In Alternative 3, on-site mitigation sites would be 4 acres south of Little Cherry Creek site and 2 acres at a former gravel pit site south of the Poorman impoundment that is degraded with little vegetation. The Little Cherry Creek sites would be on land owned by MMC; the Poorman gravel pit site is National Forest System land. The on-site mitigation sites would be combined with the off-site mitigation site described in the next section as the compensatory mitigation for all unavoidable effects on wetlands. Mitigation for waters of the U.S., such as streams, is also described below. The Corps would be responsible for developing final mitigation requirements for jurisdictional wetlands and other waters of the U.S. In addition to mitigation for jurisdictional wetlands, MMC would mitigate for non-jurisdictional wetlands at a ratio of 1 acre mitigated to 1 acre impacted. The amount of jurisdictional and non-jurisdictional wetlands affected by the mine alternatives are listed in the wetlands mitigation plan. Construction of mitigation sites would occur before any project impacts, providing a temporal gain for wetland losses.

On-site wetlands would be developed through excavation of shallow depressions in locations where surface water would collect and be retained. Where practicable, wetland soil, sod, and shrubs would be excavated from existing wetlands before filling during construction, and placed in the wetland mitigation areas. In 2010, MMC installed shallow piezometers (monitoring wells) in the proposed Little Cherry Creek mitigation sites and measured water levels in June and September. Water levels were also measured in May through September in 2011 and 2012. A piezometer also was installed at the former gravel pit site in 2011 and water levels were measured monthly during the growing season starting in July 2011. Hydrologic support would be provided by direct precipitation or shallow groundwater. Groundwater from beneath the tailings impoundment would not be used to provide hydrologic support as proposed in Alternative 2.

Off-site Mitigation

Proposed on-site mitigation consists of about 4 acres of wetland mitigation at three sites near the Little Cherry Creek drainage and about 2 acres of wetland mitigation at a former gravel pit that is degraded with little vegetation. Construction of mitigation sites would occur before any project impacts, providing a temporal gain for wetland losses.

On-site wetlands would be developed through excavation of shallow depressions in locations where surface water would collect and be retained. In 2010, MMC installed shallow piezometers (monitoring wells) in the proposed Little Cherry Creek mitigation sites and measured water levels in June and September. Before submitting the final mitigation plan, MMC would complete 6 months of monthly monitoring (April through September) of water levels to determine groundwater levels. Monitoring data would be submitted with the final mitigation plan. The shallow wells would be used to verify that groundwater would support wetlands if the mitigation sites were excavated to near the groundwater surface. Hydrologic support would be provided by direct precipitation or shallow groundwater. Where feasible, wetland soil, sod, and shrubs would be excavated from existing wetlands before filling during construction and placed in the wetland mitigation areas.

The proposed Swamp Creek off-site wetland mitigation area encompasses 67 acres and consists of uplands and meadows. The meadows cover an area of about 30 acres. According to the landowner, the property supported a dense stand of shrubs on land too wet for hay production. In the early 1950s, a new channel of Swamp Creek was excavated across the property, enhancing surface water drainage and lowering the shallow groundwater surface. Other side ditches were excavated to channel water from several natural springs on the property. As a result of the ditching effort, productive hayfields were developed on the property.

Implementation of mitigation would occur before any project impacts, providing a temporal gain for wetland losses. MMC completed a wetland delineation in 2011 and an area of 20 acres of the existing meadow at the Swamp Creek site is a degraded wetland that could be subject to restoration (re-establishment).

Supportive wetland hydrology would be re-established for the restoration area either through re-aligning the channel, grading, or diversions of surface water. With surface diversion of water to the meadow, growing conditions would become favorable for the recolonization by native species of sedges, forbs, and shrubs. The agronomic grass species would be replaced because growing conditions would be unfavorable for plants adapted to less hydric moisture regimes. To enhance the recolonization of native species, the dense litter mat created by the highly productive agronomic grasses could be burned.

The water right associated with this Swamp Creek allows for flood irrigation of 26 acres of hay meadow. MMC would file for a change of use and change of location for this water right for use on the 20-acre wetland mitigation site. If the anticipated amount of water consumed from Swamp Creek would increase, MMC would apply for a new water right for beneficial use.

According to oral history and consultation, there are known Native American Traditional Use Areas on the uplands adjacent to the proposed Swamp Creek wetlands mitigation site and within the private land boundary. These upland sites adjacent to the wetlands were used traditionally for camping by the Kootenai Tribe as they traveled through what is now the U.S. 2 corridor on a seasonal basis for hunting and gathering purposes. If wetland mitigation sites on private land were protected by a conservation easement, or conveyed to the Forest Service, the upland areas would be managed to protect and provide for future traditional cultural uses. Developed recreational use would not be encouraged.

1.2.7.1.2 Non-wetland Waters of the U.S. and Fisheries

MMC would use the Montana Stream Mitigation Procedure developed by the Montana Corps office to evaluate effects on non-wetland waters of the U.S (Corps 2013). The method uses debits and credits to determine adequate compensatory mitigation for impacts to non-wetland channels. Twelve possible stream enhancement or restoration projects and riparian planting along seven streams or channels would replace the functions of the channels directly or indirectly affected by the Poorman tailings impoundment. Implementation of stream mitigation would occur before any project impacts, providing a temporal gain for stream losses. Three mitigation projects, which would be finalized in the final mitigation plan, are proposed.

MMC completed 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 the largest area of which was on the north side of Little Cherry Creek, about 2,300 feet upstream of Libby Creek.

Replace 2 Little Cherry Cr culverts

1. Two culverts would be replaced on Little Cherry Creek. An increase in the watershed of Little Cherry Creek after reclamation of the Tailings Storage Facility may necessitate replacement of the FSR 6212 culvert if Option 1 is selected for drainage from the reclaimed Tailings Storage Facility. Regardless of the selected option, 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.

The mainstem of Swamp Creek at the wetland mitigation site and the channels from springs 3 and 4 would be transformed from their current straight and deeply entrenched condition to a shallower and possibly meandering condition that would be based on reference reaches for streams in similar settings. The channel from spring 1 to Swamp Creek is degraded due to human and livestock activity and a culvert. This channel has a slightly steeper gradient than the other Swamp Creek channels and would be restored based on appropriate reference reach data. Specific stream improvement methods have not yet been identified for the Swamp Creek property. Livestock would be excluded from the Swamp Creek property. 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.

Details of wetland mitigation are contained within the MMC Conceptual Wetland Mitigation Plan which would be approved by U.S. Army Corp. of Engineers. *Potential* approved measures *may* include the following:

- Create channel from reclaimed Poorman tailings impoundment to Little Cherry Creek
- Increase discharge in Little Cherry Creek
- Reconfigure Poorman tailings impoundment channel remnants
- Evaluate potential for habitat restoration or enhancement in Poorman Creek
- Replace culvert where NFS road #278 crosses Poorman Creek
- Remove bridge where NFS road #6212 crosses Poorman Creek
- Replace culvert where NFS roads #6212 and #278 crosses Little Cherry Creek
- Stabilize Little Cherry Creek sediment sources
- Construct formidable wood structures in Libby Creek floodplain
- Modify flow in tributary channels to Swamp Creek
- Exclude livestock from Swamp Creek property
- Plant riparian vegetation where beneficial along streams and channels in project area, including Swamp Creek site

During the Evaluation Phase, MMC would implement the BMPs shown in Table 15, such as installing, replacing, or upgrading culverts, to bring the proposed access roads (NFS roads #231 and #2316) up to INFS standards. All ditches on NFS roads #231 and #2316 would be cleaned out to enhance drainage and reduce sedimentation. In RHCAs, MMC would not sidecast snow or surface materials.

1.2.7.1.3 Performance Standards

Detailed performance standards or criteria for wetland and non-wetland mitigation sites would be established in a final mitigation plan for the project once the mitigation sites and types of mitigation were approved by the Corps. Examples of specific performance criteria for wetland mitigation sites include: size of wetland area; percent herbaceous cover; wetland plant species diversity; percent cover of invasive species; and wetland hydrology.

Wetland functional assessments would be conducted using the same methods used to estimate required levels of compensatory mitigation as part of the monitoring. Successful reclamation would be achieved once functional capacity of created, restored, and/or enhanced wetlands equaled the loss and degradation of wetland functions and values that would result from implementation of the project. Boundaries of successful wetland restoration, creation, or enhancement areas would be established periodically to determine if the total mitigation area attains the intended design area.

Table 15. Proposed Road Improvements on NFS roads #231 and #2316.

Milepost from Junction with NFS Road #4778	Required Activity
MP 0.05	Install 24-inch ditch-relief culvert.
MP 0.10	Replace existing 18-inch corrugated metal pipe (CMP) with 24-inch CMP.
MP 0.13	Install 24-inch CMP. Scoured channel enters ditch; no pipe present to allow water to cross road.
MP 0.30	Install surface drainage. Drain to the east side of road.
MP 0.40	Surface drainage needed. Drain to the east.
MP 0.50	Lower existing 18-inch CMP and replace if necessary.
MP 0.60	Clean out existing CMP.
MP 0.70	Replace CMP and armor outlet.
MP 0.84	Replace existing CMP with a 24-inch CMP.
MP 0.90	Provide surface drainage needed; drain to south.
MP 0.91	Repair or replace existing 18-inch CMP inlet.
MP 1.03	Provide road surface drainage. Drain to the south.
MP 1.20	Provide road surface drainage. Drain to the south.
MP 1.30	Armor inlet of existing 24-inch CMP inlet.
MP 1.41	Install 24-inch CMP. Install a drainage ditch on MMC's Libby Adit road on private property.
MP 1.43	Provide road surface drainage. Drain to the south.

Examples of specific performance criteria for non-wetland channel mitigation sites include: channel and bank stability; eroded areas; reduction in sediment load; percent riparian vegetation cover; height and percent cover of planted woody vegetation; percent cover of invasive species; and hydrologic conditions.

1.2.7.1.4 Monitoring

The Corps would use wetlands monitoring to determine if the compensatory mitigation was meeting the performance standards established in any 404 permit issued for the project. The monitoring described in this section may be modified in a 404 permit.

Monitoring would follow the Corps' Regulatory Guidance Letter (RGL 06-3) (Corps 2008a) that addresses monitoring requirements for compensatory mitigation projects. Performance standards for the three wetlands parameters: hydrophytic vegetation, hydric soil, and appropriate hydrology would be established in the 404 permit. Additional performance standards based on functional assessment methods may be incorporated into the performance standard evaluations to determine if the site was achieving the desired functional capacity.

Vegetation data would be collected at established quadrat sampling points along established transects to determine vegetation composition. Hydrology data from shallow groundwater wells or piezometers in each mitigation site would be collected in spring and fall. Soil conditions also would be investigated for evidence of saturation. Wetland functional assessments would be conducted using the same methodology used to estimate required levels of compensatory mitigation as part of the monitoring. Boundaries of successful wetland establishment areas would be established annually to determine if the total mitigation area attains the intended design area. Monitoring would also be performed for the non-wetland channel mitigation sites. Specific monitoring requirements and methods would be included in the Final Compensatory Mitigation Plan for the Montanore Project.

The monitoring period for wetland and non-wetland mitigation would be sufficient to demonstrate that the compensatory mitigation project met performance standards, but not less than 5 years. Some compensatory mitigation projects may require inspections more frequently than annually during the early stages of development to identify and address problems that may develop. Monitoring of the wetland and non-wetland mitigation sites would be performed semi-annually during the first 5 years of mitigation.

1.2.7.2 Bull Trout

(See USFS Fisheries BA, 2013)

1.2.7.3 Wildlife

Alternative 3 include additional measures to avoid, minimize, and mitigate impacts to wildlife. The agencies' alternatives would include implementation of a wildlife awareness program which was prepared by MMC. The objectives of the wildlife awareness plan are to: reduce the risk of human-caused mortality of threatened and endangered species, identify other wildlife issues of concern for the Montanore Project, establish company procedures and protocols that address these issues, and develop employee and contractor awareness of wildlife issues. The wildlife awareness program includes the education of employees about bear awareness and safety, refuse management, company policies regarding wildlife, and other wildlife concerns. The following sections describe Alternative 3.

1.2.7.3.1 Grizzly Bear (*See also USFS Terrestrial BA – Mitigation Plan)*

The lead agencies' grizzly bear mitigation plan would have components including: measures to reduce mortality risks, maintain habitat effectiveness and core habitat, and for mitigation plan management. A number of roads proposed for access changes originally proposed are no longer available for mitigation. The following mitigation plan completely replaces MMC's proposed grizzly bear mitigation plan.

This plan includes requirements for MMC to provide funding for a number of conservation measures that are needed long-term. Should a permitted project be implemented or a future project be proposed that have adverse effects on the grizzly bear in the Cabinet-Yaak Ecosystem, funding for some of these measures could be required of those projects, potentially changing the funding required by MMC. The measures that may be jointly funded are marked with an asterisk (*).

PLEASE Refer to the most current Terrestrial Wildlife Mitigation Plan, Appendix B of the Montanore Mine Project Biological Assessment 06 SEPTEMBER, All errata and revisions to mitigation plan as requested by USFWS incorporated

1.2.7.3.1 Gray Wolf

If a wolf den or rendezvous site was located in or near the project facilities by FWP wolf monitoring personnel, MMC would provide funding for FWP personnel to implement adverse conditioning techniques before wolves concentrate their activity around the den site (in early to mid-March) to discourage use of the den. This would occur in the spring before the expected start-up of construction activities. Discouraging use before denning starts would give wolves time to excavate an alternate den site at a safer, more secluded location.

1.2.7.3.2 Key Habitats

Mitigation common to both the mine and transmission line alternatives is discussed in the following sections. Wildlife mitigation specific to the transmission line is discussed in section.

Old Growth

The KNF would designate effective or replacement old growth on National Forest System lands within the affected PSUs (first priority) or adjacent PSUs (second priority) at a 2:1 ratio for old growth within the disturbance area of the mine Alternatives 3 or 4, or the clearing width of transmission line Alternatives C-R, D-R, or E-R (Table 24). Similarly, the KNF would designate effective or replacement old growth on National Forest System lands at a 1:1 ratio for old growth affected by "edge effect" or designated old growth within areas newly designated MA 31 not already accounted for by edge effect. Specifically, this would consist of old growth between the proposed mine facilities disturbance and permit area boundaries. Any private land acquisition for grizzly bear habitat mitigation could also be used to offset habitat loss, if old growth habitat characteristics were present on the acquired parcels.

Table 16. Old Growth Designation Requirements by Mine and Transmission Line Alternative Combination in the Crazy and Silverfish PSUs.

Highlighted is Alternative 3D-R Agency Preferred Alternative

Old Growth Impact	Agencies' Alternative					
	3C-R	3D-R	3E-R	4C-R	4D-R	4E-R
Physical Acres[†]	484	480	472	440	436	428
Edge Acres	294	281	282	231	218	219
Acres Changed to MA 31[‡]	48	48	48	186	186	186
Total Designation	826	809	802	857	840	833

[†]Physical acreage shown equals twice the acres that would be removed.

[‡]Designated old growth reallocated to MA 31 but not included in disturbance area or edge effect. No physical changes would occur to old growth in these areas.

MMC would be restricted in timing of removal of old growth habitat (effective or replacement). No vegetation clearing requiring tree removal would occur between April 1 and July 15 to avoid direct mortality to active nest sites for bird species using old growth habitat, such as pileated woodpecker. This restriction would be incorporated into the Vegetation Removal and Disposition Plan (section 1.2.3.2.1, *Vegetation Removal and Disposition*).

Snags (Cavity Habitat)

MMC would leave snags within the disturbance area of the mine Alternative 3. . unless required to be removed for safety or operational reasons. This mitigation would be incorporated into the Vegetation Removal and Disposition Plan (section 1.2.3.2.1, *Vegetation Removal and Disposition*).

1.2.7.3.3 Indicator Species

Big Game

The KNF would change the access of five roads year-long by earthen barrier to mitigate for the loss of big game security (see Table 22 in the previous discussion on grizzly bear mitigation) The roads would be either placed in intermittent stored status or decommissioned.

Mountain Goat

MMC would fund surveys to monitor mountain goats to examine response to mine-related impacts. The surveys would be integrated into the current monitoring effort of the FWP. Aerial surveys would be conducted three times annually (winter-late spring-fall) by the FWP along the east front of the Cabinet Mountains from the Bear Creek drainage south to the West Fisher drainage. Surveys would be conducted for 2 consecutive years before construction, and every year during construction activities. Survey results would be analyzed by the KNF, in cooperation with the FWP, at the end of the construction period to determine the appropriate level and type of survey work needed during the Operations Phase. If the agencies determined that construction disturbance were significantly affecting goat populations, mitigation measures would be developed and implemented to reduce the impacts of mine disturbance. Surveys would be conducted using the current protocol of the FWP. Currently, the FWP conducts one aerial survey of the east Cabinet Mountains every other year. This additional level of monitoring would provide information on the status of mountain goat use adjacent to the project area, and potential effects of the project.

MMC would not conduct any blasting at the entrance to any adit portals during May 15 to June 15 to avoid disturbance to the potential goat kidding area on Shaw Mountain.

1.2.7.3.4 Forest Sensitive Birds and State Bird Species of Concern

MMC would implement the following measures to reduce the effects on Forest Service sensitive species and State species of concern, such as the flammulated owl, black-backed woodpecker, and northern goshawk. One of two options would be used in migratory bird habitat before vegetation clearing. In Option 1, MMC would not remove vegetation during the nesting season to avoid direct mortality at active nest sites. In Option 2, MMC would complete surveys to locate active nests in appropriate habitat. Surveys would be conducted one nesting season immediately before construction activities on National Forest System lands. These measures would also be applied to private land to satisfy the requirements of the MFSA to minimize adverse environmental impacts. If an active nest were found, an area surrounding the nest would be delineated and not disturbed until after the young fledged. Survey protocols and avoidance areas for specific species are described in Table 25.

Table 17. Forest Service Sensitive Birds and State Bird Species of Concern Survey Protocols, Alternative 3 D-R.

Species	Avoidance Period (Option 1)	Option 2		
		Survey Period	Protocol Reference	Avoidance Area† (acres)
Flammulated Owl	May 15 to July 15	May 15 to July 15	Bull *et al*. (1990)	40
Black-backed	April 15 to July 15	April 15 to July 15	Bull *et al*. (1990)	175

Woodpecker				
Northern Goshawk	May 15 to July 15	May 15 to July 15	Woodbridge and Hargis (2006)	500-600

†For flammulated owl, based on Hayward and Verner 1994; for black-backed woodpecker, based on Cherry 1997; for northern goshawk, based on Reynolds *et al*. 1992.

1.2.7.3.5 Migratory Birds

MMC would either fund or conduct monitoring of landbird populations annually on two, standard Region One monitoring transects within the Crazy and Silverfish PSUs. The Poorman Transect (480-811-533) is located in the Poorman Creek drainage southwest of the Poorman Tailings Impoundment Site, and the Miller Creek Transect (480-411-527) is located slightly southeast of transmission line Alternative D-R. Currently, the KNF conducts monitoring every other year on these two transects as part of the Region One Landbird Monitoring Program. Monitoring has been conducted since 1994, and would be continued using the standard Region One Landbird Monitoring Protocol (USDA Forest Service 1998). This effort could be integrated into the current Region One monitoring program, or could be contracted by MMC. This monitoring effort would continue to provide data on bird species composition along with population trend data in the two PSUs where project activities are proposed.

1.2.7.4 Cultural Resources

All mine and transmission line alternatives would require additional cultural resource inventory to satisfy requirements of Section 106 under the NHPA and 22-3, MCA. Additional survey would be conducted in all previously undisturbed areas where surface disturbance would occur in the alternative selected in the ROD. Such areas would include any surface disturbance required in mitigation plans described in Alternative 3. The number of cultural resources that would require mitigation may increase pending the result of these additional inventory efforts. The appropriate type of mitigation would depend on the nature of the cultural resource involved and would ultimately be determined during consultation between MMC, the KNF, and Montana SHPO. Any mitigation plan would be developed by MMC and approved by the KNF in consultation with the Montana SHPO under the project-specific Programmatic Agreement, and would include consulting Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho, if affected cultural resources were prehistoric or of recent cultural significance.

Mitigation could include data recovery (excavation) of prehistoric archaeological sites, a Historic American Building Survey (HABS) for standing structures, or Historic American Engineering Record (HAER) for built resources such as mines, roads, and trails. For landscape-level resources such as the Libby Mining District, the USDI National Park Service's (NPS) Cultural Landscapes Program would be implemented. Mitigation also would include monitoring during ground disturbing activities when the subsurface spatial extent of the resource is unknown or because of the fragility of the resource and its proximity to the activity.

1.3 Alternative D-R—Preferred Alternative

Miller Creek Transmission Line Alternative – General Project Description

Table 18. Characteristics of Transmission Line Alignment Alternative D-R.

Characteristic	Alternative D-R – Miller Creek
Length (miles)[)†] Steel Monopole Wooden monopole Wooden H-frame Total	 0.0 0.0 13.7 13.7
Number of structures[‡]	91
Approximate average span length (ft.)	793
Structure placement	16 structures, primarily in Miller Creek and Howard Creek drainages
Vegetation clearing	2.5 miles at selected locations
Line stringing	Yes, entire line
Annual inspection	Yes
Construction	$5.4
Mitigation	$10.4

[†]Length is based on line termination at the Ramsey Plant Site in Alternative B and the Libby Plant Site in the other three alternatives.
[‡]Number and location of structures based on preliminary design and may change during final design. The lead agencies' analysis of MMC's preliminary design and structure locations indicates additional structures and access may be needed to avoid long spans.
[§]Estimated cost used reasonable assumptions regarding costs of construction materials, clearing, land acquisition, and engineering. Final cost could vary from those shown. Estimated construction cost by HDR Engineering, Inc. 2012; estimated mitigation cost by KNF.

Table 19. Mitigation in Transmission Line Alternative D-R.

Feature/Resource	Alternative D-R – Miller Creek
New roads on National Forest System Lands	Placed in intermittent stored service after construction; used as necessary for maintenance; decommissioned at closure
New roads on Plum Creek lands	Soiled and reseeded after construction; gated and used as necessary for maintenance Soiled and reseeded after construction; gated and used as necessary for maintenance
New roads on other private land	Soiled and reseeded after construction; gated and used as necessary for maintenance
Right of Way (ROW) Width	ROW width of 150 feet; danger trees outside the ROW would be removed as necessary; analysis assumed 200-

Feature/Resource	Alternative D-R – Miller Creek
	foot clearing width
Vegetation Clearing	Prepare and implement Vegetation Clearing and Removal Plan; heavy equipment use in RHCAs minimized
Helicopter Use for Vegetation Clearing	Prepare and implement Vegetation Clearing and Removal Plan; heavy equipment use in RHCAs minimized in areas adjacent to core grizzly bear habitat (4.8 mi.) In areas adjacent to core grizzly bear habitat (2.5 miles)
Seed Mixes	Permanent seed mix with native species only, if commercially available
Old Growth	Designate 12 acres of effective or replacement old growth on National Forest System lands
Snags (Cavity Habitat)	Leave snags in clearing area, unless required to be removed for safety reasons
Down Wood Habitat	Leave up to 30 tons per acre of coarse woody debris within clearing area
Big Game Security	See proposed road access changes in Table 1. No transmission line construction in elk, white-tailed deer, or moose winter range between December 1 and April 30 unless approved by the agencies.
Bald Eagle	Either not clear vegetation or conduct construction activities during breeding season in bald eagle habitat or fund or conduct surveys to locate active nests in appropriate habitat. Follow timing restrictions in the Montana Bald Eagle Management Plan for any identified active nests. Construct transmission line according to recommendations outlined in Mitigating Bird Collisions with Power Lines (APLIC 1994) and Suggested Practices for Raptor Protection on Power Lines (APLIC 2006)
Forest Sensitive Birds and State Bird Species of Concern	Complete surveys to locate active nests in appropriate habitat or not remove vegetation in the nesting season
Western Toad	Retain shrub habitat in wetlands and riparian areas
Migratory Birds	Fund or conduct monitoring of landbird populations annually on two, standard Region One monitoring transects within the Crazy and Silverfish PSUs. Construct transmission line according to recommendations outlined in Mitigating Bird Collisions with Power Lines (APLIC 1994) and Suggested Practices for Raptor Protection on Power Lines (APLIC 2006)
Road and Trail Access changes	See proposed road access changes in Table 1
Land Acquisition for Physical Disturbance	Secure or protect replacement grizzly bear habitat of 40 acres of private lands in the Cabinet-Yaak Ecosystem

The substation sites would be fenced. The area surrounding the substation would be graveled and kept free of vegetation. No water would be required at the Sedlak Park Substation site, and toilet facilities would be self-contained. The Sedlak Park Substation would be designed to exclusively serve the mine. No additional lines have been proposed to enter or leave the Sedlak Park Substation.

1.3.1 Line and Road Construction Methods

The construction of the proposed transmission line would follow the sequence of: 1) centerline surveyed and staked; 2) ROW cleared and access roads built; 3) work areas cleared and leveled as needed; 4) foundations installed, and transmission line structures erected and installed; 5) ground wire, conductors, and ground rods installed, and 6) the site would be cleaned up and reclaimed.

1.3.2 Surveying

Construction survey work would consist of establishing a centerline location, specific pole locations, ROW boundaries, work area boundaries, and access roads to work areas. The specified right-of-way boundaries, work areas, access roads, and other features would be marked with painted laths or flags. Markers would be maintained until final cleanup and/or reclamation was completed, after which they would be removed.

1.3.3 Access Road Construction and Use

Where possible, roads currently open year-round would be used for construction access. Roads currently closed either seasonally or year-round would only be opened for construction access where necessary. Where seasonally closed roads would be used, efforts would be made to minimize their use during the periods when these roads would otherwise be closed.

Roads opened or constructed for transmission line access on National Forest System lands would be closed after the transmission line was built. The road surface would be reseeded as an interim reclamation activity designed to stabilize the surface. Where soil had been salvaged from new roads, the road surface would be covered with soil and then reseeded. The prism of new roads would remain during mine operations. For purposes of analysis, and as part of the Alternative D-R preferred alternative, the lead agencies assumed newly constructed roads on Plum Creek land would be gated after line construction to allow Plum Creek access.

Existing roads would be used for construction access where possible and new roads or spurs would be built only where necessary. New roads would be 12 feet wide and cleared of all trees and shrubs. In the agencies' analysis in Chapter 3, SDEIS total roadway width, including cuts and fills, was assumed to be 25 feet. Wood refuse and cleared shrubs would be placed on the downhill edge of the road for erosion control. A road within the right-of-way would be required for line stringing operations across side slopes greater than 10 percent. MMC anticipates that no drainage would be provided for the new roads, but would follow the agencies' guidance if installation of culverts were required. No motorized activity associated with transmission line construction would occur from April 1 to June 15 within bear habitat in the Miller Creek and Midas Creek drainages. Construction would not occur during the winter in big-game winter range areas. Estimated access road lengths required for are shown in Table 28.

Table 20. Miles of Open, Closed, and New Access Roads Required for Transmission Line Construction for Alternative D-R, Preferred Alternative.

Road Type	Alternative D-R – Miller Creek
Open road	17.8
Closed road	8.6
Extensive upgrade required	0.0
Other closed roads	8.6
New road	5.1
Total	31.5

Source: GIS analysis by ERO Resources Corp. using MMC and HDR Engineering data.

Improvement of existing roads would be required in some areas to allow access of construction equipment into the transmission line corridor. Upgrades could include widening, lengthening of culverts, placing fill on or near stream banks, clearing, and regrading. Final design plans detailing the location of work areas and new and existing access roads would be submitted to the lead agencies for approval before construction.

MMC identified four possible stream crossing methods in constructing and upgrading roads: fords, culverts, arches, and bridges. MMC anticipates that culverts would be the most commonly used crossing method. BMPs outlined in "Water Quality BMPs for Montana Forests" (Logan 2001) would be followed. Erosion-control BMPs, such as the installation of water bars and dips would be implemented during construction and improvement of access roads. Special considerations could occur in the design and installation of culverts in waters that contain fish or support fisheries habitat. Based on a preliminary design, MMC anticipates requiring new stream crossings of new access roads at six locations: five in an unnamed tributary of Miller Creek, and one in Ramsey Creek. MMC estimated that additional stream crossings may be needed during timber clearing, and line stringing, if a helicopter were not used, however Alternative D-R Preferred Alternative does include helicopter use. Disturbance on active floodplains would be minimized to reduce sedimentation of streams during annual runoff. Construction activities would be restricted or curtailed during heavy rains or high winds to prevent erosion and soil loss. All transmission line alternatives would need to comply with proposed Environmental Specifications for the 230-kV transmission line.

1.3.3.1 Vegetation Clearing for Transmission Line

The BPA would clear all trees at the Sedlak Park Substation Site, which would include the 2-acre substation and short access road from U.S. 2 to the substation. Trees within the up to 300-foot right-of-way of the loop line also would be cleared. The BPA would conduct a noxious weed survey at the proposed Sedlak Park Substation Site before and after construction of the substation. It also would revegetate all disturbed areas outside of the access road prism and substation yard.

For the new 230-kV transmission line to the mine, most construction activity would be contained in the 100-foot right-of-way for steel monopole structures) with major exceptions being access road construction and conductor pulling and stringing. General right-of-way clearing would be governed by safety, reliability, environmental, and cost considerations. A 100-foot right-of-way would be cleared as necessary and additional tree clearing outside the 100-foot right-of-way would be necessary to prevent trees from falling into the line, or fires from flashovers where trees were too close to the conductor. For analysis purposes, the lead agencies have assumed the proposed line would require a maximum of 150 feet of clearing along the entire alignment) Some areas within the 150-foot clearing area would not require clearing, such high spans across valleys. Actual acreage cleared would be less and would depend on tree height, slope and line clearance above the ground. Clearing would produce a "feathered" edge on the right-of-way clearing, with the width of right-of-way clearing varying along the line. Trees within the right-of-way would be removed to provide a minimum of 18 feet clearance between the vegetation and the conductor. Trees that would extend within 18 feet of the conductors within 5 years also would be removed. Other trees on or off the right-of-way that could fall into the line would be removed. In some areas, such as steep drainages, trees beneath the line would not be cleared if there were sufficient clearance between the line and the tree. Merchantable timber would be measured, purchased from the KNF, and then salvaged from the right-of-way; cleared smaller trees and brush would be burned or chipped. Non-merchantable trees and slash would be piled into windrows (using a brush blade to minimize soil accumulation) and burned. MMC did not specify the type of vegetation clearing that would be used. For analysis purposes, the lead agencies assumed all vegetation clearing would be completed conventionally without the use of a helicopter.

1.3.3.2 Foundation Installation

Excavations for foundations would be made with power auger equipment. Where the soil permits, a vehicle-mounted power auger would be used. The foundation excavation and installation requires equipment access to the foundation sites. If rocky areas were encountered, foundations may require blasting. The foundation excavation and installation would require access to the site by a power auger or drill, a crane, material trucks, and ready-mix trucks. Concrete for use in constructing foundations would be obtained from commercial sources or from a remote batch plant on private land, depending on contractor needs.

Foundation holes left open or unguarded would be covered and/or fenced where practical to protect the public and wildlife. Soil removed from foundation holes would be stockpiled on the work area and used to backfill holes. All remaining soil not needed for backfilling would be spread on the work area. Concrete trucks would wash their chute debris into a depression in the permanent disturbance area at the pole site and soil from the foundation excavation would be used to cover the chute debris.

Where bedrock was encountered while excavating structure holes, a rock drill and compressor would be used to drill the rock. A hole would be blasted using explosives. Blasting would not expand the area needed for operations around the hole, but would increase the amount and duration of associated construction activity. It also would slightly affect the sequence and schedule of operations around those holes, extending the amount of time that the structures remain at the site before they can be set.

1.3.3.3 Structure Installation

MMC would use steel monopole structures a maximum of 95 feet high along the 100-foot right-of-way distance between structures would vary from less than 200 feet to more than 2,000 feet, depending on the alignment selected and terrain crossed (Table 29). The lead agencies' analysis of MMC's preliminary design and structure locations indicates additional structures and access may be needed to avoid long spans and to achieve the proposed structure height. The cor-ten steel structures would be built to provide low reflectivity and long life. Cor-ten steel develops a stable rust-like appearance if exposed to the weather for several years. Tree clearing also would vary depending on span length and tree and structure height. MMC would work with the lead agencies to optimize structure height and span length to minimize concerns over tree clearing and visual considerations along any approved alignment and centerline. Alternative D-R Preferred Alternative includes use of shorter wooden H-Pole structures.

Ground disturbance necessary for some pulling and tensioning sites may extend up to 100 feet beyond the right-of-way boundary where the line makes an angle. These sites usually require an area up to 40 feet by 150 feet. The proposed alignment would require 11 of these sites.

Table 21. Comparison of H-frame and Monopole Structures.

Design Element	H-Frame	Monopole
Right-of-Way Width (ft)	150	100
Estimated Clearing Width (ft)	200	150
Peak current loading (amps)	125	125
Nominal Voltage (volts)	230,000 (230-kV)	230,000 (230-kV)
Conductor Size	795 kcmil Drake	795 kcmil Drake
Conductor Type	ACSR	ACSR
Overhead Ground Wire (Approximate)	1 3/8-inch-dia galv and 1 Optical ground wire	Optical ground wire (diameter of <0.433 inches)
Electric field at edge of right-of-way at 3 ft above ground level (kV/m)	0.52	0.62
Magnetic field at edge of right-of-way (mG)	3.2	1-conductor side: 4.0 2-conductor side: 4.2
Typical Structure Height above Ground (ft)	74.5	83.5[†]
Minimum Ground Clearance of Conductor (ft at 212º F)[‡]	25	25
Typical Structure Base Dimensions	2 poles, 2 foot x 2 foot	1 pole, 17.33 inch diameter
Total land temporarily disturbed for conductor reel and pole storage yards (acres)	Similar to monopole	Up to 3.5

[†]Additional structures and access may be needed to avoid long spans and to achieve the proposed structure height.
[‡]Minimum ground clearance used in developing preliminary plan and profiles; actual ground clearance would vary.
ACSR = aluminum core steel reinforced; Kcmil = 1,000 circular mils; kV = Kilovolts;
kV/m = kilovolts per meter; mG = milligauss
Source: MMI 2005b; Power Engineers 2005; HDR Engineering, Inc. 2007.

Structure construction activity is expected to occur within 30 feet of the holes where the structures were installed. Activities conducted outside the 30-foot radius would include pole assembly, framing conductor supports and establishing an operating location for the crane. The optimal crane operating conditions require that the crane be as close to the hole as possible but because of uneven terrain at certain sites, cribbing with timbers under the crane outriggers would be necessary to level the crane. The need for the crane to be outside of the 30-foot radius would probably be the exception. Temporary construction yards may be necessary and would be located on existing disturbed areas or other areas on private lands along the line alignment.

Line Stringing

Once structures were in place, a pilot line would be pulled (strung) from structure to structure and threaded through the stringing sheaves on each structure. A larger diameter, stronger line would then be attached to the pilot line. This is called the pulling line, and one pulling line is connected to a conductor or overhead ground wire. Each conductor or ground wire is then pulled through the sheaves in succession and held under tension until connected to the insulators. This process would be repeated until all the ground wires and conductors were pulled through all sheaves. Conductor splicing would be required at the end of a conductor spool or if a conductor were damaged during stringing. The work would occur on work areas for the structures or pulling/tensioning sites. Conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end. For public protection during wire installation, guard structures would be erected over roadways, transmission lines, structures, and other obstacles. Guard structures consist of temporary H-frame structures placed on either side of an obstacle.

MMC proposed that helicopters may be necessary to assist in the construction of the line where ground access was not possible or where the contractor decided it would be cost effective. In such cases, helicopters would be used to bring equipment to structure sites, place transmission structures, and string the conductor. This method of construction would replace the need for small portions of access roads in these locations, and would eliminate vehicle access to the structures to perform maintenance activities. Maintenance in these structure locations would be limited to helicopter access and maintenance or pedestrian access. Ground disturbance associated with the use of helicopter construction would include work areas for each structure site measuring about 15 feet by 15 feet, depending on the topography of the site. All necessary equipment would be lowered from a helicopter to allow foundation installation and structure setting. Vegetation would be removed and the work area would be graded by hand to flatten as needed for the safe operation of equipment and access by work crews. Helicopter use was assumed for line stringing as helicopter use is expected to be less expensive than conventional ground stringing. Helicopter use for line stringing would take about 10 days. Alternative D-R Agency Preferred Alternative includes the use of helicopters for removing timber, and for structure construction in some locations.

Three conductors with a horizontal spacing of about 20 feet and a vertical spacing of 6.5 feet are proposed. A fiber optic static wire for protection against lightning strikes and communication would be located at the top of each structure 17 feet above the top conductor.

1.3.4 Operation, Maintenance, and Reclamation

The line would be designed and operated to comply with applicable standards. MMC would be governed by the Environmental Specifications for the 230-kV transmission line to guide line construction, operation, maintenance, and decommissioning activities. To minimize the potential for bird collisions or electrocution, the line would be constructed according to recommendations outlined in Mitigating Bird Collisions with Power Lines (APLIC 1994) and Suggested Practices for Raptor Protection on Power Lines (APLIC 2006).

Following construction, land within the right-of-way and other disturbed areas outside of the right-of-way, such as tensioning sites, that had been rutted, compacted, or disturbed would be reclaimed. Access roads would be re-graded, scarified, and seeded. All permanent cut-and-fill slopes on maintenance roads would be seeded, fertilized, and stabilized with hydromulch, netting, or other methods. Drive-through dips, open-top box culverts, waterbars, or crossdrains would be installed on maintenance roads to prevent erosion. Unauthorized traffic would be blocked with appropriate structures.

Monitoring at monthly intervals during the growing season would be conducted along the right-of-way and access roads to detect the invasion of spotted knapweed or other noxious weeds. Spotted knapweed plants found on areas disturbed by the project would be treated by spot spraying individual plants. Herbicides would be carried in tanks mounted on vehicles or in backpack tanks. Herbicide spray would be applied only when wind velocity was less than 8 miles per hour to prevent wind drift. No herbicides would be applied within 25 feet of water bodies. All herbicide applications would comply with all applicable state and federal regulations.

Inspection and repair of the line would be conducted by helicopter. Line inspections would be conducted annually to assess structural integrity and to identify maintenance needs; additional inspections may be needed after a fire or ice storm. MMC estimates a line crew would access the line about 5 days per year for maintenance of hardware and removal of trees. MMC would rely on the BPA followed by Flathead Electrical Cooperative and then MMC's own resources for installation, maintenance, repairs, and inspections.

Hazard trees that would interfere with or fall into the transmission line or associated facilities would be identified during routine maintenance inspections. Targeted trees and tall shrubs would be removed through manual or mechanical means. Clearing of danger trees and tall shrubs would continue until the line was decommissioned. Slash would be lopped and scattered evenly throughout the surrounding terrain. Stumps would be cut to less than 1 foot tall, and lopped slash would be left as close to the ground as possible.

Land use in the right-of-way normally would not be restricted except for those activities that interfere with the line operation and maintenance. Line operation would not require any permanent employees, although MMC would have a trained fire crew and would cooperate with the KNF and local fire departments in controlling forest fires in the area.

It is anticipated that the transmission line facilities would be the last facilities reclaimed following mine closure. Newly constructed roads needed for construction of the transmission line would be soiled and reseeded immediately after construction was completed. Because the access roads would rarely be used following construction, these roads would have stabilized naturally or by MMC through interim reclamation. The substation at the plant site would be removed. MMC would remove all other transmission line equipment at closure, such as structures, insulators, line, and other hardware from the right-of-way. All concrete foundations/footers would be broken up and buried in place, as approved by the lead agencies. Poles and other structures would be dismantled and sold, scraped, and/or disposed of off-site. After the transmission line was removed, all newly constructed roads on National Forest System lands would be bladed and re-contoured to match existing topography, obliterating the road prism. Management of newly constructed roads on Plum Creek land after the transmission line was removed would depend on the easement agreement between Plum Creek and MMC. Where culverts were removed, stream banks would be recontoured and reseeded. Native shrubs, such as alder or willow, would be planted on stream banks to reduce bank erosion during high streamflow.

The BPA would dismantle the substation and remove the loop line following mine closure, assuming it had no need for the facilities. The substation and access road would be revegetated after materials had been removed from the site.

Table 22. Response of Alternative D-R Modifications and Mitigations to Issues.

Key Issue	Alignment	Structure Type	Construction Techniques
Issue 1-Acid Rock Drainage and Metal Leaching			
Issue 2-Water Quality and Quantity	✓	✓	✓
Issue 3-Aquatic Life	✓	✓	✓
Issue 4-Visual Resources	✓	✓	✓
Issue 5-Threatened or Endangered Species	✓	✓	✓
Issue 6-Wildlife	✓	✓	✓
Issue 7-Wetlands and Non-wetland Waters of the U.S.			

1.3.6 Alignment and Structure Type

The substation would be at Sedlak Park. From the substation, the alignment would cross the ridge between West Fisher Creek and Miller Creek. The preferred alternative Alternative D-R would follow NFS road #4724 (South Fork Miller Creek Road) to a ridge separating Miller Creek from the Standard Creek drainage. The alignment would traverse the ridge into the Howard Creek drainage. The centerline would be about 500 feet east of the northeast corner of a private land parcel about 0.5 mile south of Howard Lake. North of the private land, the alignment would generally parallel Howard Creek (and follow the alternative C-R Modified North Miller Creek route.)

The lead agencies selected wooden H-frame structures to reduce structure height. H-frame structures also provide for longer span lengths and consequently fewer structures and access roads (Table 26). Using H-frame structures would require more right-of-way and tree clearing. To eliminate the need to use or construct roads that may affect core grizzly bear habitat, a helicopter would be used for structure construction at 16 locations in the Miller Creek and Howard Creek drainages.

The centerline of the alignment for Alternative D-R would be near existing residences at three locations: near the Fisher River and U.S. 2 crossing north of Hunter Creek (Section 32, Township 27 North, R. 29 West), in the Standard Creek drainage (Section 29, Township 27 North, R. 30 West) and southeast of Howard Lake (Section 19, Township 27 North, R. 30 West). Montana regulations allow the final centerline to vary by up to 250 feet of the centerline (ARM 17.20.301 (21)) unless there is a compelling reason to increase or decrease this distance. During final design, MMC would minimize effects on private land by keeping the centerline at least 200 feet from these residences and implementing the measures for sensitive areas described in the Environmental Specifications for the 230-kV transmission line.

After a more detailed topographic survey was completed, MMC would complete a detailed visual assessment of the alignment at these locations, plus at the locations east and southeast of Howard Lake. Based on the assessment, MMC would locate the transmission line through existing open areas in the forest, where feasible, and incorporate into the Vegetation Removal and Disposition Plan measures to minimize vegetation clearing and clearing and transmission line visibility from residences and Howard Lake through modification of pole height, span length, and vegetation growth factor. The quantity and location of poles to be installed by helicopter would be modified as necessary to minimize access roads visible from private property and Howard Lake.

Based on a preliminary design, six structures would be in a RHCA on National Forest System lands and three structures would be in a riparian area on private lands. During final design, MMC would locate these structures outside of riparian areas if the agencies determined alternative locations were technically and economically feasible.

1.3.7 Line and Road Construction Methods

1.3.7.1 Access Road Construction and Use

New roads would be constructed, and currently gated roads would be upgraded, similar to what was proposed by MMC. Estimated access road requirements are shown on Table 41 below. MMC would develop and implement a final Road Management Plan. Newly constructed roads on Plum Creek lands would be gated after construction and managed as proposed by MMC in Alternative B. MMC would be able to use roads on Plum Creek lands for inspections and maintenance. Alternative D-R would not require roads or structures on any other private land other than Plum Creek. Road management would depend on the easement agreement between the landowner and MMC. For purposes of analysis, the lead agencies assumed these two roads would be managed in the same manner as roads on Plum Creek lands.

Preferred Alternative D-R would require the use of roads currently barriered with no administrative use. Table 31 lists those roads with a change in road status in Alternative D-R. This road is on Plum Creek land just west of U.S. 2 and is currently closed to public access. Consequently, it is not shown on any figure.

Table 23. Proposed Change in Road Status, Alternative D-R.

Road #	Road Name	Location	Existing Status	Length (miles)	Proposed Status
99830	West Fisher 99830	On Plum Creek land 1 mile west of U.S. 2	Barriered	0.7	Gated, MMC and Plum Creek traffic only

1.3.7.2 Vegetation Clearing

Under alternative 3-DR helicopter would be used to remove timber from 2.4 miles of line in core grizzly bear habitat. A helicopter also may be used to remove timber from steep area, such as north of West Fisher Creek. BPA's plans for the Sedlak Park Substation Site would be followed as proposed. 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.

Appendix C.

Terrestrial Threatened and Endangered Species Mitigation Plan for the Proposed Montanore Minerals Corporation Montanore Mine Project

Project Overview

Mines Management, Inc. (MMI) proposes evaluation drilling at the Libby Adit and to construct a copper and silver underground mine consisting of an ore processing plant, a tailings impoundment, a transmission line, and other associated facilities. Montanore Minerals Corporation (MMC), a wholly owned subsidiary of MMI, will be the project operator. MMI has requested the Kootenai National Forest (KNF) to approve a Plan of Operations for the Montanore Project.

Two "lead" agencies have been designated for this project: the U.S. Forest Service (hereafter FS) and the DEQ, with other cooperating agencies consisting of the Bonneville Power Administration, Army Corps of Engineers, and Lincoln County, Montana. The majority of the Montanore Mine Project will occur on National Forest System (NFS) lands, but MMC owned lands and other corporate and private lands will also be affected.

The FS preferred mine alternative is Alternative 3, Agency Mitigated Poorman Impoundment alternative and the KNF and DEQ preferred transmission line alternative is Alternative D-R, Miller Creek Transmission Line Alternative (SDEIS 2011). The Terrestrial Biological Assessment and this Terrestrial Threatened and Endangered Species Mitigation Plan address the combined mine and transmission line effects of Alternative 3D-R.

Beginning with issuance of a Forest Service Record of Decision, the project will occur in four phases: Resource Evaluation (estimated at two years), Construction (three to four years), Operations (from 16 to 20 years), and mine Closure and Reclamation phases (up to 20 years or longer) (FS and DEQ 2011).

The FS and MMC are proposing this Terrestrial Threatened and Endangered Species Mitigation Plan (Plan) as an integral part of the proposed action under consideration in the "Biological Assessment (BA) for Threatened, Endangered, and Proposed Terrestrial Species on the Montanore Minerals Corp. Montanore Project" (August 2013).

Potential Impacts to Grizzly Bears and Lynx

Effects of the Proposed Action on grizzly bears and lynx are described in detail in the Biological Assessment which is incorporated by reference, and will not be repeated here

Proposed Grizzly Bear and Lynx Mitigation

The objectives of mitigation measures are to establish conservation actions that in the long-term will fully offset projected impacts from the mine project to grizzly bear or lynx populations and their habitat. This mitigation plan (Plan) displays the specific items identified that will be required to reduce, eliminate, or compensate for environmental consequences to grizzly bear and Canada lynx federally listed as threatened or endangered or proposed for listing. It applies to the implementation of Alternative 3 D-R as displayed in the final environmental impact statement for the Montanore Mine Project. This Plan will be implemented by MMC, or equivalent and appropriate federal and state agencies (FS, FWS, and Montana Fish, Wildlife and Parks (hereafter FWP). This Plan requires MMC to provide funding for planning, coordination, implementation, monitoring, and evaluation of mitigation measure effects of a number of mitigations that are required to offset projected potential adverse effects to grizzly bear and lynx. The Plan provides administrative review/approval mechanisms to assure timely implementation and compliance, and accommodates adaptive management changes to the Plan, if necessary. Should a permitted project be implemented or a project proposed that will have adverse effects on the grizzly bear in the Cabinet-Yaak Ecosystem, funding for some of these measures could be required of those projects, potentially changing the funding required by MMC. The measures that may be jointly funded are marked with an asterisk (*).

Timing of completion of this Plan is tied to four phases of mine activity; evaluation adit (estimated at two years), construction (estimated at 3 to 4 years), operations (estimated at 16 to 20 years), and mine closure and reclamation phases (up to 20 years or longer),**.**The Record of Decision will select an alternative for the combined mine and transmission line for the entire mine project. The Record of Decision will require that prior to FS authorizing MMC to proceed with certain phases of activities, MMC must implement the applicable terms and conditions required by the BO, and all applicable mitigation, monitoring and modifications as outlined for that particular phase in the selected alternative. The FS will issue a letter to proceed to MMC for the implementation of various activities when all requirements, as stipulated in Record of the Decision, have been met.

The following sections describe Alternative 3D-R threatened, endangered and proposed terrestrial species mitigation measures in detail. Mitigation measures are summarized by phase in the Implementation Schedule (see attached).

Grizzly Bear Mitigation Plan

The FS grizzly bear mitigation plan includes measures to reduce mortality risks to grizzly bears, maintain and enhance core habitat, reduce fragmentation, increase the distance between existing and proposed activities across the Cabinet Divide and decreasing an area of habitat constriction within the north south movement corridor, reducing displacement effects, and reducing potential for mortality and displacement from occupied grizzly bear habitat outside of the Recovery Zone within the Cabinet Face BORZ.

A. Measures to Reduce Mortality Risks of Grizzly Bears

A. 1. Prior to FS authorization to initiate the Libby Adit Evaluation Phase, to reduce mortality risk to the grizzly bear, **MMC**, <u>under direction of the FS,</u> **will commit to and implement the following**:

A.1. a) Install and maintain fencing surrounding the Libby adit site for the life of the mine.

A.1. b) Develop a transportation plan for life of the mine to be approved by the Forest Service prior to operations and designed to minimize mine-related vehicular traffic traveling between U.S. 2 and the plant site, and minimize parking availability at the plant site. Busing employees to the plant site, requiring managers to car pool to the extent practicable, and establishing a supply staging area in Libby to consolidate shipments to the mine site will be a part of the plan. The transportation plan will specify that exceptions to staging and consolidation of supplies will include full load shipments, expedited shipments to repair equipment and other emergencies as specified in the transportation plan. .

A.1. c) In coordination with the FS,FWP, and FWS MMC will fund, develop, and implement aenhanced public outreach information & education (I&E) program to build support and understanding for the conservation of the Cabinet-Yaak grizzly population that will increase to full funding and implementation prior to the construction phase, for life of the mine. This public outreach plan will be developed and managed by information specialists within the agencies or a professional outreach firm. This will involve preparing educational materials, public service announcements, newspaper ads, and billboards supporting grizzly conservation and will include close coordination and cooperation with both programs employed by the FS, FWP and FWP grizzly bear personnel. Examples include installing signs at all entrance roads in grizzly habitats on the KNF, providing education programs for schools and civic clubs, and offering a reward leading to arrest and conviction of people illegally killing grizzly bears in the Cabinet-Yaak Ecosystem. (*)

A.1. d) Prohibit use of salt during winter plowing operations for life of the mine. Salt can attract big game, which may result in mortality from vehicles. The presence of carcasses in turn could attract grizzly bears (or lynx) to the road corridor and increase mortality risk.

A.1. e) Remove big game animals killed by any vehicles daily from road rights-of-way within the permit area and along roadways used for access or hauling ore (NFS roads #231, #278, #4781, and #2316 and new roads built for the project) for life of mine. Road-killed animals will be moved at least 50 feet beyond the right-of-way clearing or as far as necessary to be out of sight from the road.

A.1. f) Beginning prior to the evaluation phase and continuing through construction and the first 3 years of mill operations, MMC will monitor the number of big game animals killed by vehicle collisions on these roads and report findings annually. The numbers of animals killed by vehicle collisions will be reviewed by the FS, in cooperation with the FWP, and if necessary, mitigation measures will be developed and implemented to reduce mortality risks.

A.1. g) Monitor and report (within 24 hours) all grizzly bear, lynx, wolf, and black bear mortalities within the permit area and along the access roads for life of the mine. If a T&E species mortality occurred, MMC will be required to haul future road-killed animals to a disposal location approved by FWP (thus modifying A.1.e), if deemed necessary by the grizzly bear specialists or law enforcement officer to avoid additional grizzly bear or other T&E species mortality,.

A.1. h) Fund a local FWP Law Enforcement Officer 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 FWS. This position will be new and based in Libby. Funding will be in five year increments, beginning prior to FS authorization to begin the evaluation phase. The position description and an initial list of work items will be developed by FWP, the FS, and MMC representatives. The Forest Service will request review and advice from the FWS on the position description and list of work items.

A.1. i.) IF both Montanore and Rock Creek are concurrent, fund a local FWP Habitat Conservation Specialist, to address grizzly bear/land use issues, coordinate and account for implementation of the mitigation plan, and coordinate all land acquisition and/or conservation easements for required grizzly bear mitigation (see mitigation items B, C, and D). The position will identify, evaluate, prioritize, and coordinate conservation of grizzly bear and other wildlife habitats for species affected by development and operation of large-scale mining projects in the Cabinet portion of the Cabinet-Yaak Ecosystem, with a primary emphasis on grizzly bears. This will be a new position stationed in a location that serves Lincoln and Sanders counties. Funding will be provided prior to initiation of the evaluation phase and implementation of MMC's land acquisition program described in item C, and then 5-year increments for the life of the mine through the reclamation phase, including shut-down periods, or until the Oversight Committee (see item F(2)) determines that the position(s) are no longer needed. The Habitat Conservation Specialist will work with Lincoln and Sanders counties' planning staff to provide county land use planners with current, accurate and adequate information on grizzly bear and other wildlife to use in their decision making process. The position description and an initial list of work items will be developed jointly by the agencies (including, but not limited to, FS, FWP, and Lincoln and Sanders Counties) and MMC representatives. The FS will request review and advice from the FWS on the position description and list of work items. This habitat conservation specialist position is required only if both Rock Creek and MMC are concurrent.

A.1.j) Fund a local FWP Grizzly Bear Specialist in Libby for the life of the mine in five year increments, beginning prior to FS authorization to initiate the evaluation phase. This Grizzly Bear Specialist will aid in grizzly bear conservation, with a focus on public outreach, assistance and education. Funding will be in five year increments, beginning prior to FS authorization to begin the evaluation phase. The position description and an initial list of work items will be developed by FWP, the FS, and MMC representatives. The Forest Service will request review and advice from the FWS on the position description and list of work items. The Montanore Mine Project must have its own grizzly bear specialist, regardless of the status of the Rock Creek Mine Project.

In summary, <u>prior to the evaluation phase</u> for items A.1.h, A.1.i., and A.1.j,

a. MMC (Montanore Mine project) is required to hire 1 law enforcement officer and 1 grizzly bear specialist regardless of the status of the Rock Creek Project.

b. If MMC (Montanore Mine Project) is concurrent with the Rock Creek Project, MMC is required to hire/fund 1 law enforcement office (A.1.h), 1 grizzly bear specialist (A.1.j), and 1 habitat conservation specialist A.1.i).

A. 1.k) Provide funding for purchase and maintenance of up to 35 bear-resistant refuse containers for use at Montanore Project mine facilities and for personal use by mine employees that live in or near grizzly bear habitat, and fund replacements as needed for life of the mine. The portion of these 35 containers to be placed at the mine facilities will be coordinated with bear specialists, with timely (minimum weekly unless a problem develops or grizzly bear personnel recommend a more frequent schedule) removal of contents. One of these containers will be placed at the Libby Adit, if one is not already in place. Bear-resistant containers to hold attractants will be in place at each mine facility site prior to starting any work. In coordination with the bear specialist, if the 35 refuse containers were more than what was needed for employees, the remaining containers could be used for non-mine personnel living in grizzly habitat near the project area. Providing bear-resistant containers to the community at large is specified under Part A.2. (c).

A.1. l) Provide funding for fencing and electrification and maintenance of garbage transfer stations within grizzly bear habitat adjacent to and throughout the Cabinet-Yaak Recovery Zone. Coordinate with bear specialists, FWS, and Lincoln County to prioritize sites (*)

A.1. m) Provide funding for an initial 10 electric fencing kits that can be installed by FWP bear specialists at additional bear problem sites within grizzly bear habitat adjacent to and throughout the Cabinet-Yaak Recovery Zone. In addition, MMC will fund 2 replacements electric fencing kits per year that can be installed by FWP bear specialists at bear problem sites.

A.1. n) Implement a wildlife awareness program for employees and contractors prepared by MMC. The objectives of the wildlife awareness plan are to: reduce the risk of human-caused mortality of threatened and endangered species, identify other wildlife issues of concern for the Montanore Mine Project, establish company procedures and protocols that address these issues, and develop employee and contractor awareness of wildlife issues. The wildlife awareness program includes the education of employees about bear awareness and safety, refuse management, company policies regarding wildlife, and other wildlife concerns. The MMC Wildlife Awareness Plan for Employees and Contractors is attached as a separate document. As part of the wildlife awareness program, MMC will require mine employees (including all management staff) to attend training related to living and working in grizzly bear habitat prior to starting work and at least once a year hereafter for the life of the mine. <u>MMC will prohibit MMC employees, contractors, and subcontractors from the following while on duty:</u>

- carrying firearms within the permit area boundary or along the Libby Creek access road, except for security officers and other designated personnel. This will not include controlling Libby Creek Road use by the general public.
- feeding wildlife (including dropping food stuffs from lunches, etc.) within the permit area to avoid attracting bears or other wildlife and to discourage habituation
- from using private vehicles to travel to and from the work site, or for work purposes, except as approved in the transportation plan described in section 1a above.
- hunting within the permit area

MMC will identify consequences for violations in an employment contract so employees will be aware of consequences prior to beginning their employment.

A.1.o) Agree that all mortality reduction measures will be subject to modification based on adaptive management, where new information supports changes. Modifications will be reviewed and approved by the Oversight Committee which will be established prior to the evaluation phase (See item F.1 and F.2).

A. 2. Prior to FS authorization to initiate the construction phase, to reduce mortality risk to the grizzly bear, **MMC**, <u>under the direction of the FS,</u> **will implement** the following:

A.2. a) MMC is required to fund a second local FWP Grizzly Bear Specialist in Libby for the life of the mine in five year increments, beginning prior to FS authorization to initiate the evaluation phase. This Grizzly Bear Specialist will aid in grizzly bear conservation, with a focus on public outreach, assistance and education. Initial funding to cover the first 5 years of the position will be provided by MMC prior to the construction phase (*). However if Rock Creek has already hired a second specialist, then a third or fourth is not necessary and costs can be shared (see A.2.a.i below).

A.2.a. i) EXCEPTION If the Rock Creek Project is operating prior to or concurrent with the Montanore Mine Project, two grizzly bear specialists will be adequate for the Cabinet Mountains portion of the CYE. Therefore, MMC will assume funding for a second Grizzly Bear Specialist position, and the Rock Creek Project will be relieved of that funding. In the event that the Rock Creek Project has already funded a second grizzly bear specialist as required in the in the Rock Creek Mine mitigation plan, then MMC will assume responsibility for funding the second position. The second position may be new or existing (**the goal is two grizzly bear specialists, whether there is one mine or two mines operating, with one in Libby and one in Sanders County**). Conversely , if Rock Creek Mine became active after the Montanore Mine Project Rock Creek will assume funding of one of the grizzly bear specialist positions.

A.2.b. MMC will provide funding to implement a long-term public attitude and input survey so public outreach and information and education program described in item A.1.c, can respond to current public perceptions and attitudes and adapt I&E program appropriately.

A.2. c) Provide funding for an additional 100 bear-resistant garbage containers, plus an additional 20 per year after the first year of construction phase, for distribution to new mine employees and the community at large under the direction of grizzly bear management specialists.

A.2. d) Fund the acquisition of bear resistant garbage containers to be placed in all developed campgrounds within Bear Management Units, 1, 2, 3, 4, 5, 6, 7, 8, and 9 (pack in/pack out sites will not require garbage containers) first within the Cabinet Mountain portion of the Cabinet-Yaak Recovery Zone, then within the entire Cabinet-Yaak Recovery Zone but all prior to the construction phase. This measure applies more broadly to the recovery zone to reduce the potential for grizzly bear conflict and mortality to off-set any potential of mortality associated with the mine, and over time contribute to an improved population status. If Rock Creek Project has already acquired containers in BMUs 4, 5, 6, 7 and 8 then MMC will be required to fund replacement and maintenance of the containers in these BMUs.

A.2. e) Avoid the use of clovers or other plants attractive to black or grizzly bears in the seed mix used on open roadways or any facility associated with the Montanore Mine, except as rehabilitation on closed roads, on mitigation habitat where attracting bears will be encouraged, or for closure activities as it relates to habitat.

A. 3. **Prior to FS authorization to MMC to initiate the construction phase**, to reduce mortality risk to the grizzly bear, the **Forest Service** will implement the following:

A.3 a) Ensure that the law enforcement and grizzly bear specialists and the grizzly bear habitat conservation specialist (hereafter grizzly bear personnel) (See item A.1.j, A.2.a for description of when 2 grizzly bear specialists and the grizzly bear habitat conservation specialist position are required) required in the mitigation plan comply with the following:

i. Location of the grizzly bear habitat conservation specialist position (A.1.i.) within the ecosystem will be determined in coordination with the Oversight Committee (see item F.2), while the locations of the grizzly bear specialists are specified in A.1.j and A.2.a, and A.2.a.i).

ii. Grizzly bear personnel will be existing or new positions with FWP as determined by FWP and FWS. And explained as in A.1.h, A.1.i, A.1.j, and A.2.a, A.2.a.i.

iii. Funding intended for the grizzly bear specialist positions will not be used to support already existing positions with FWP that are not performing duties of a grizzly bear specialist in the CYE.

iv. Duties for the law enforcement position will be designed at a State pay band determined by FWP (recommend at least a pay band 05) and will be primarily directed at wildlife issues in the Cabinet Mountains portion of the Cabinet-Yaak Ecosystem.

v. Duties for the bear specialist and habitat conservation specialist positions will be designed as a grizzly bear management specialist at a State pay band determined by FWP (recommend at least a pay band 06) and will be specifically tied to bear activities in the Cabinet Mountains portion of the Cabinet-Yaak Ecosystem.

vi. Grizzly bear personnel will be fully funded for the life of the mine in 5-year increments through the reclamation period, including shut-down periods, or until the Oversight Committee determines that the position(s) are no longer needed. This provision is needed to provide for long-term consistency, the establishment of relationships with the resident public, familiarity with issues and potential problems in the area, and to address the large number of people who may remain in the area even if the mine is temporarily shut-down.

vii. Grizzly bear personnel will be employed, with all supportive equipment, vehicles and gear, prior to the evaluation phase or prior to the construction phase, depending on when hiring is specified within the Plan.

viii. A mandatory reporting system will be established and maintained , (through coordination with the grizzly bear personnel described in items A.1.h, A.1.i,A.j.j and A.2.a above) to ensure that MMC and Forest Service employees are required to immediately report any black bear or grizzly bear incidents, observations or mortalities to grizzly bear personnel to ensure that preemptive management, hazing, or removal of food attractants will occur to avoid risks of habituation, mortality or displacement of grizzly bears. The reporting system will be coordinated with the FWP grizzly bear specialists and will provide a mechanism to collect reliable information from the public on such incidents, although such reporting could not be required.

A.3. b) The Forest Service will ensure that MMC provides bear resistant garbage receptacles (see item A.2.d above) for all Forest Service campgrounds and sites where garbage facilities are normally provided within the Cabinet portion of the Cabinet-Yaak Ecosystem recovery zone (in BMUs 1-9). This includes those in MS-3 habitat, which often are most likely to contribute to habituation of bears and increase the risk of bear removal through defense of life or property incidents or management action. (*) If Rock Creek already completed most of this work, MMC will replace or maintain receptacles where needed. See also item A.2.d above. Measure A.2.d applies more broadly to the CYRZ while A.3.b specifies Forest Service sites within the Cabinet Mountain portion of the CYE.

A. 4. During the construction phase and reclamation phase activities, to reduce mortality risk to grizzly bears, **MMC** will implement the following:

a) All activities for both transmission line construction seasons and during reclamation and removal of the transmission line located within the Cabinet-Yaak Recovery Zone and Cabinet Face BORZ will occur between June 16 and October 14. This timing restriction eliminates disturbance associated with transmission line construction or reclamation activities, including helicopter disturbance within the 1 mile zone of influence from either side of the transmission line during grizzly bear use of spring range and denning habitat within the CYRZ and Cabinet Face BORZ on federal land.

B. Measures to Maintain and enhance Grizzly Bear Core Habitat, mitigate for cumulative effects, reduce displacement and mortality risk.

The analysis of impacts to core grizzly bear habitat within BMU 2, 5, and 6 and impacts to the north south movement corridor are described in greater detail in the Biological Assessment. Figure 7 within the BA displays which road access changes specified in Table 2 and Table 3 of this Mitigation Plan create core habitat. Core habitat effects and required habitat compensation are shown in Table 1. To maintain core habitat and reduce mortality risk and the likelihood of adverse effects on the grizzly bear due to cumulative effects the following mitigation measures will be implemented:

B. 1.a. Prior to FS authorization to initiate the Evaluation Phase, MMC, under direction of the FS, **will commit to and implement the following**:

B. 1.a. Under the direction of the FS, MMC will implement or fund access changes on roads **specified in Table 2**. All roads specified in Table 2 are displayed in Figure C-1. In addition MMC will implement or fund monitoring of the effectiveness of closure devices at least twice annually; and complete any necessary repairs immediately. Roads shown in Table 2 that will be seasonally gated will improve conditions on an estimated 808 acres of spring grizzly bear habitat but because these roads will not be gated for the entire active bear season, habitat improved through these seasonal road access changes will not contribute to core or for habitat compensation for core.

As noted in Table 2, if the Rock Creek Mine mitigation restricting the Upper Bear Creek road #4784 with a barrier has not been implemented prior to FS authorization to initiate the Montanore Evaluation phase, then MMC will implement or fund this mitigation. MMC will only implement this mitigation if Rock Creek has not yet done so. Monitoring the effectiveness of the closure device at least twice annually and completing any necessary repairs immediately will also be required of MMC until the Rock Creek Mine initiated activity (*for Upper Bear Creek Road only).

B.1.b. Prior to FS authorization to initiate the Construction Phase, to create core habitat and additional security for grizzly bears, MMC, under direction of the FS, **will commit to and implement the following** :

B.1.b Under the direction of the FS, MMC will implement or fund access changes on roads **specified in Table 3**. All roads specified in Table 3 are displayed in Figure C-1. MMC will implement or fund monitoring of the effectiveness of closure devices at least twice annually; and complete any necessary repairs immediately. Responsibilities of MMC remain the same as described under B.1.a.

Summary of B.1.a., and B.1.b. The requirement for MMC to maintain effective closures as described under B.1.a and B.1.b, including barriers which are creating core, will remain in effect thru the reclamation phase of the mine. This will maintain core habitat created and reduce mortality risk and the likelihood of adverse effects on the grizzly bear. The acres of core created provided by road access changes described above will be effective due to installation of barriers, road decommissioning, or long-term storage. Please see the Biological Assessment, Figure 7 for which road access changes specifically create core.

B. 2. Prior to KNF authorization to initiate the Operations Phase, to reduce grizzly bear habitat displacement, unless monitoring or new information demonstrated need for additional mitigation, **MMC** will ensure sounds emitted from facilities and adits during the estimated 16 to 20 year operations phase will comply with the following:

B.2. a. Surface and mill equipment operated will not exceed 55 dBA measured at 250 feet from the mill site for periods exceeding one hour. Intake and exhaust fans will generate less than 83 dBA measured at 50 feet down wind of portals, or ventilation adits. If necessary low-noise fan blades or noise suppression equipment will be installed to reduce fan noise to about 16 dBA, which will not be audible over ambient noise levels.

Table 1. Impacts to core habitat and acres of core habitat created by phase.

Proposed Action Alternative 3D-R	Reduction In Core Acres		Core Acres created due to Access changes prior to Evaluation Phase (Item B.1)			Core Acres created due to Access changes prior to Construction Phase (Item B.2)			Total Core Acre
	BMU 5	BMU 6	BMU 2	BMU 5	BMU 6	BMU 2	BMU 5	BMU 6	
Core habitat lost during construction phase	248	18							266
Within north south movement corridor									
A. Core habitat created to reduce constriction									
Access change trail #935 (1,065 acres created)							1,070		1,070
Rock lake meadows (about 5 acres created)									
B. Core habitat created for loss of core and cumulative effects				849	1,092		1,882		3,823
Outside North South Movement Corridor A. Core habitat created in BMU 2, 5, or 6 outside of the north south corridor for loss of core or mitigation for cumulative effects			274	769				1,094	2,137
Total core created			274	1,618	1,092		2,952	1,094	**7,030**
Summary									
Total core created for loss of core [1]									**532**
Total core created to reduce constriction in north south corridor[2]									**1,070**
Total core created for mitigation of remaining effects									**5,428**

[1]Core habitat lost (acres) mitigation required at 2:1 ratio, so with 266 acres lost there will be 532 acres created as mitigation

[2]See mitigation items D.1 and D.2 below for planned measures to address constriction within the north south corridor.

Core acres created by the Rock Creek Mine mitigation on the Upper Bear Creek Road #4784 considered in baseline condition for the Montanore Mine Project analysis, and is not reflected in Table 1 displaying Montanore Mine Project core created by access changes prior to evaluation phase. If Rock Creek has not yet implemented this mitigation prior to the Montanore Mine Project evaluation phase, then Montanore will implement the Road #4784 access change. Please see the Biological Assessment, Figure 7 core created, and Figure 8, Core reduced.

Table 2. KNF's Proposed Road Access Changes for Grizzly Bear Mitigation Prior to Evaluation Phase.

NFS Road	Road Name	Miles in BMU/BORZ	Total Miles	Current Access Status	Proposed Access Status	Period	Notes
231 **2316**	**Libby Creek Road; Upper Libby Creek**	**2.0/0** **1.5/ 0**	**2.0** **1.5**	**Open**[1]	**Gated seasonally**[2]	**April 1 to May 15**	**Mine traffic only during closure period. Implemented November 2008.**
4778 **4778E** **5192** **5192A**	**Midas-Howard Creek** **Midas-Howard Creek E** **Midas Bowl** **Midas Bowl A**	**5.8/ 0.9** **0.8/0** **1.6/0** **0.2/0**	**6.7** **0.8** **1.6** **0.2**	**Open**[1]	**Gated seasonally**[2]	**April 1 to June 15**	**Restricted to all motorized vehicles, including over-snow vehicles, during the closure period** ***Road 4778E is impassible. Implemented fall 2006**
4776A **4778C**	**Horse Mtn Lookout A** **Midas Howard Creek C**	**1.5/ 1.2** **1.8/ 0.1**	**2.7** **1.9**	**Open**	**Barriered**	**Year-long**	**Open to over-snow vehicles Dec. 1 to March 31.**
14458	**Midasize**	**0.6/0**	**0.6**	**Open**	**Barriered**	**Year-long**	**Restricted to all motorized vehicles, including over-snow vehicles, during the closure period**
4776C **4776F** **4778C** **6200** **6200D** **6200E** **6200F** **6214** **6214F**	**Horse Mtn Lookout C** **Horse Mtn Lookout F** **Midas Howard Creek C** **Granite-Bear Creek** **Granite-Bear Creek D** **Granite-Bear Creek E** **Granite-Bear Creek F** **Cable-Poorman Creek** **Cable-Poorman Creek F**	**0/ 0.9** **0.7/ 0.4** **1.5/0** **1.8/0** **0.9/0** **0.3/0** **0.4/0** **3.6/0** **0.6/0**	**0.9** **1.1** **1.5** **1.8** **0.9** **0.3** **0.4** **3.6** **0.6**	**Gated**	**Barriered**	**Year-long**	**Open to over snow vehicles Dec. 1 to March 31.**
6745	**Standard Creek**	**3.9/0**	**3.9**	**Gated**	**Barriered**	**Year-long**	**Convert to trail; restrict all motorized vehicles, including over-snow during the closure period**
4784[3]	**Upper Bear Creek**	**2.7/0**	**2.7**	**Gated seasonally**	**Barriered**	**Year-long**	**MMC will only implement if Rock Creek Mine has not yet done so. Convert to trail; restrict all motorized vehicles, including over-snow during the closure period.**
	Total access change	**32.3/3.4**					**Without the #4784 Access change, miles 29.6/3.4**

[1]Seasonal closures implemented with the KNF's authorization in 2008 to MMC for snow plowing authorization of NFS roads #231 and #2316, and 2006 for 4778E [2]The seasonal access changes, which minimize potential for displacement and reduce mortality risk for grizzly bears on spring range, do not change the status of these existing open roads during the active bear year, and thus do not change OMRD or TMRD within the BMU or open or total linear miles within the BORZ.

[3]Road 4784 is open July 01 to October 14 to motorized vehicles in existing condition. **MMC will only implement if Rock Creek Mine has not yet done so.** This mitigation was considered as part of the baseline for the Montanore Mine Project analysis. The 518 acres of core created was considered part of the baseline for the Montanore Mine Analysis due to Rock Creek BO concurrence and the access change being required mitigation for Rock Creek.

Please see the Biological Assessment, Figure 7 for which road access changes create core.

Table 3. KNF's Proposed Road Access Changes **Prior to the Construction Phase** which benefit Grizzly Bears

NFS Road Number	Road Name or Drainage	Miles in BMU/BORZ	Miles	Current Access Status	Proposed Access Status	Period	Notes
2316 2317 4781 150A	Upper Libby Creek Poorman Creek Ramsey Creek Rock Lake Trail # 935	0.7/0 1.8/0 2.8/0 2.9/0	0.7 1.8 2.8 2.9	Gated[1]	Barriered	Year-long	Convert to a trail where necessary; restricted to all motorized vehicles, including over-snow vehicles.
6701 6702	South Ramsey Creek Upper Libby Creek	0.4/0 0.4/0	0.4 0.4	Gated[1]	Barriered	Year-long	Restricted year-long to all motorized vehicles, including over-snow vehicles
4725	North Fork Miller Creek	4.2/0	4.2	Gated[2]	Barriered	Year-long	Restricted year-long to all motorized vehicles including over-snow-vehicles.
14442[3] 6205D 6787B 6209E 4776B	Lampton Pond/Cherry Cr Big Hoodoo/Getner Cr Big Hoodoo Bear/Crazyman Crazyman Creek Horse Mtn/Libby Creek	0/0.6 0/4.0 0/1.6 0/1.1 0/2.9	0.6 4.0 1.6 1.1 2.9	Gated seasonally Open Open Open Open	Barriered[4] Barriered[4] Barriered[4] Barriered[4] Barriered[4]	Year-long	Restricted year-long to motorized vehicles, including over-snow-vehicles
	Total	13.0/10.2					

[1]Roads 2316, 2317, 4781, 150A, 6701, 6702 are currently restricted yearlong to motor vehicles, Open to snow vehicles December 1 through April 30

[2]Road 4725 is currently restricted year-long to motorized vehicles, including over snow vehicles

[3]Road 14442 –is currently restricted to motor vehicles October 15 thru June 30, open to snow vehicles Dec 1 thru April 30

[4]Road access changes implemented for big game mitigation, but which also benefit grizzly bears in the Cabinet Face BORZ.

Please see the Biological Assessment, Figure 7 for which road access changes create core.

C. Measures to compensate for displacement effects and the loss of grizzly bear habitat and reduce mortality risk of the grizzly bear

The analysis of impacts and displacement effects on grizzly bears are described in detail in the Biological Assessment. Methods used to evaluate displacement effects from the Montanore Project and corresponding habitat compensation are described in the *Revised Analysis of Grizzly Bear Displacement Effects* (ERO Resources Corp, 2014). Required habitat replacement for displacement effects and habitat physically lost are shown in Table 4.

To mitigate for both displacement effects and physical loss of grizzly bear habitat**, MMC will, under the direction of the Forest Service, commit to and implement the following**:

C. 1. **MMC will** secure or protect (through conservation easement or acquisition in fee with conveyance of fee or perpetual conservation easement to the Forest Service) from development (including but not limited to housing and motorized access) and use (timber harvest, grazing, and mining) replacement habitat to compensate for acres lost by physical alterations or displacement (Table 4). **All replacement habitats for either displacement or habitat physically lost will be committed by MMC prior to the associated phase of the mine and accepted by the UFSF (i.e. mitigation habitat review, acquisition, conservation easements, recordation, and transfer to USFS complete prior to the evaluation phase or construction phase as required for the phase specific mitigation (Table 4).** FS, in coordination with FWP and review by FWS, will establish and maintain priorities for potential mitigation lands within and outside the recovery zone. Following the priority list is required **(**The priority list process requires the operator to try and purchase the 1st priority and then try to purchase the 2nd, 3rd parcel's etcetera, as outlined in Kasworm et al 2013a parcel description, rank and priority list and associated Figures C-2 and C-3) which replaces **USDA, FS 2008 and Kasworm and Johnson 2012b) (see references). A fair market offer must be made on the higher priority parcel first.** If necessary, MMC will coordinate with KNF, FWP and FWS to modify replacement habitat lands priorities as needed.

C.2. The **Forest Service will** ensure that the specified acres of mitigation properties were managed for grizzly bear habitat in perpetuity. It is anticipated that the following mechanisms could be used to manage properties to include transfer of fee title or Conservation Easements: to the USFS; to another public entity, or to a conservation organization totally separate from and not dependent on MMC. Properties not transferred to the USFS must be protected through appropriate and permanent conservation easements. Costs of processing fee lands or preparing and accepting conservation easement by the Forest Service for these acres will be funded by MMC. First choice for replacement habitat required for habitat physically lost (3,112 acres) will be within the disturbed BMUs (5,6, or 2 in order of priority)) and within the north south movement corridor. If adequate replacement acres were not available in those BMUs or north south movement corridor, then lands may be located in other BMUs (4, 7, and 8) within the Cabinet Yaak Recovery Zone. The first 500 acres of replacement habitat required for displacement (3,073 acres) will be within the north south corridor within impacted BMUs (5, 6 or 2) due to evaluation adit displacement. The remaining 2,573 acres required for displacement could be in or outside the north south corridor within the CYRZ (see Table 4, priority for 771 acres to be located in north south corridor) with up to one-half of this 2,573 acres (1,286 acres) may be located in the identified linkage area (Figure C.2), however this will only occur if other higher priority lands within the Recovery Zone are not available. This process is described and identified in C.1., C.2, C.2 a-d) . The specified acres of mitigation properties must meet the requirements below.

Table 4. Grizzly Bear Habitat Physically Lost and Grizzly Bear Habitat with Increased and/or new Displacement and Required Replacement habitat compensation acreage, Montanore Mine Project, Alternative 3D-R.**

Habitat Physically lost[1]		Displacement Effects on grizzly bears[2]							
Grizzly bear habitat physically lost (acre)	Required habitat replacement Prior to construction phase (acre)[1]	Displacement Effects Evaluation Phase (acre)			Displacement Effects Construction Phase (acre)			Total Required habitat replacement for mitigation of displacement (acre)[2]	Total Required habitat replacement for both habitat physically lost and displacement effects on grizzly bears (acre)
BMU 5/6		BMU 2	BMU 5	BMU 6	BMU 2	BMU 5	BMU 6		
1,556	3,112	0	500[3]	0	561	2,012[4]	0	3,073[5]	6,185

[1]Requires conservation easement or acquisition; mitigation requirement for habitat physically lost is shown at 2 to 1 ratio.

[2] Requires conservation easement or acquisition; mitigation requirement for habitat affected by displacement is shown at 1 to 1 ratio.

[3]Priority is 500 acres of replacement habitat within the north south corridor, all though displacement actually occurs on 468 acres within north south corridor (includes 5 acre Rock Lake meadow parcel) and 32 acres outside of N-S corridor.

[4]Of the 2,012 acres total within BMU 5, priority is for 773 acres within north south corridor, and the remaining 1,239 acres following the priority list developed by the FS/FWS/FWP.

[5]Does not include displacement due to helicopter use as that impact is mitigated with timing restriction.

See Appendix J for displacement and Cumulative Effects Model (CEM) habitat compensation analysis).

a) The Forest Service will have final approval of mitigation lands prior to closing and recording. In coordination with the FWP and FWS, the Forest Service will prioritize lands for conservation easement or acquisition in the identified linkage areas, or identified by research and/or monitoring, that extend east between the Cabinet-Yaak Ecosystem and the Northern Continental Divide Ecosystem. Up to 1,286 acres of the replacement acres required for displacement may be in the linkage area as identified in Figure C-2**.** FS in coordination with FWP, and review by FWS, has established and will maintain priorities for potential mitigation lands located within this Linkage area. Lands with existing conservation easements (such as those included within the Thompson-Fisher River Conservation Easement) will be excluded from potential mitigation lands within the Linkage Area. Priorities for potential mitigation lands within the CYRZ have already been established and will be modified as needed. The size and location of land related to grizzly bear habitat improvement (corridors etc.) is included in the priority listing developed by the agencies. Because not all properties are equal in habitat value to grizzly bears, the agencies have established a "grizzly bear credit unit" approach. Because some parcels appear to have greater biological importance the USFWS and the US Forest Service believe that it is appropriate to give additional mitigation incentive to acquire those lands in order to improve baseline grizzly bear habitat conditions prior to a second active mining operation in the Cabinet Mountains portion of the Cabinet-Yaak Ecosystem Recovery Zone. A scoring process to determine additional mitigation value is described and then applied to the corridor mitigation lands priority listings (Kasworm et al 2013b and associated detailed Figure C-4)). The credits will create a cost/benefit incentive. The priority list must still be followed. The priority list process requires the operator to try and purchase the 1st priority and then try to purchase the 2nd , 3rd parcel's etcetera, as outlined in Kasworm et al 2013a parcel description, rank and priority list and associated Figures C-2 and C-3)which replaces USDA, FS 2008 and Kasworm and Johnson 2012b) (see references). A fair market offer must be made on the higher priority parcel first even though lower prioritized parcels may have a higher mitigation credit.

Due to their sensitive nature, details, including Kasworm et al 2013a, Figure C-2 (Potential Mitigation lands by Parcel ID number, Figure C-3 Potential Mitigation lands by Priority Ranking, mitigation credit process paper (Kasworm et al 2013b and associated detailed map Figure C-4)), and locations and owners of properties considered for mitigation will be withheld from public disclosure until acquisitions are finalized, and until determined releasable by lead agencies

b) At an early stage in the acquisition negotiations, the FWS will be consulted with and asked advice on the mitigation lands as they relate to the requirements included in the Biological Opinion on the Montanore Project. The FWS will be requested to advise the Forest Service if it believed the proposed mitigation properties met one or more of the following:

i. restores or improves bear security habitat (core) in the Cabinet Mountains, particularly in the constricted north-south grizzly bear movement corridor;

ii. improves habitat conditions related to established access standards in BMUs 2, 5, and 6;

iii. reduces existing threats of development, food attractants or mortality risks in the Cabinets;

iv. reduces potential threats of development, food attractants or mortality risks in the Cabinets;

v. protect seasonally important habitats, with an primary emphasis on spring, and secondary emphasis on fall habitats; and/or

vi) will maintain or increase MS-1 habitat (including the potential of acquiring and converting MS-3 properties or lands adjacent to the Cabinet-Yaak Ecosystem recovery zone that have high mortality risks to MS-1 if those risks could be eliminated under federal ownership);

c) Fee-title properties must meet standards, requirements, and legal processes for federal acquisition, including, but not limited to:

i. approval by the Office of General Counsel;

ii. be a Warranty Deed conveyance;

iii. comply with Department of Justice standards;

iv. be free of hazardous materials, or develop an agreement among MOU signers as to appropriate remedy prior to acquisition;

v. include all surface and sub-surface rights including rights-of-way, mineral claims, and/or other easements, unless otherwise advised by the FWS;

vi. be acquired in priority order. Lower priority acquisitions may be allowed, after approval of the Forest Service and when consistent with advice from the FWS to ensure that such a property will contribute to meeting the requirements of the Biological Opinion;

vii. meet fair market appraised value, according to Forest Service appraisal processes, as approved by the Comprehensive Grizzly Bear Management Plan (see F.1-2) . Advance approval by the Forest Service, after consultation with the FWS regarding the ability of the proposed lands to meet the requirements of the Biological Opinion, is required; and

viii. be acquired, recorded and transferred prior to agency authorization to proceed with the associated phase of the mine, with total acquisitions completed prior to the construction phase of the mine.

ix. any habitat enhancement activities needed to improve the mitigation properties, such as the trail conversion, road access changes or removal of buildings and debris, would be planned and funded prior to construction. Implementation would occur as soon as feasible.

d) Conservation easements must include language approved in the Comprehensive Grizzly Bear Management Plan (see F. 1-2) and meet standards, requirements and legal processes for federal acquisition including, but not limited to:

i. approval by the Office of General Counsel;

ii. attachment of the conservation easement to the Warranty Deed;

iii. comply with Department of Justice standards;

v. include all surface and sub-surface rights including rights-of-ways, mineral claims, and/or other easements, unless otherwise advised by the FWS;

vi. the objective of land acquisition will be based on consultation, current priority ratings (including grizzly bear credit units as described by Kasworm et al 2013a, b) and other criteria as established by this plan.;

vii. meet fair market appraised value, according to Forest Service appraisal processes, as approved by the Comprehensive Grizzly Bear Management Plan (see F.1-2), if the affected parcels were consistent with advice from the FWS as being important; and

viii. be acquired and recorded prior to agency authorization to proceed with the associated phase of the mine, with all mitigation habitat acquired and recorded prior to the construction phase of the mine, except for the mitigation habitat associated with the effects of the Rock Lake ventilation adit (about 1 acre). Mitigation habitat for the ventilation adit will be acquired prior to agency authorization to proceed with development of the Rock Lake ventilation adit, should it be necessary.

ix. any habitat enhancement activities needed to improve the mitigation properties, such as the trail conversion or removal of buildings and debris, (or road access changes where applicable), would be planned and funded prior to agency authorization to proceed with construction. Implementation would occur as soon as feasible.

e) The Forest Service will implement access management improvements on mitigation lands. The FWS agrees to work with the Forest Service in determining how road management associated with that property can improve access management for bears, with the goal of managing BMUs 2, 5, and 6 at or better than the standards established by the Access Amendment (USDA 2011), which were based on the benchmarks identified by Wakkinen and Kasworm 1997. The FWS believes the disturbances expected with the Montanore Mine necessitates access management at a conservative level while the disturbance is ongoing. The acquisition of mitigation habitat may provide opportunities to manage access management at these levels in BMUs 2, 5, and/or 6. Should mitigation property be acquired that will enable access management at or above these levels, the FWS expects that the Forest Service will provide the bears using BMUs 2, 5, and 6 the optimum level of access management to reduce displacement and mortality risks during the life of the mine.

D. Measures to Address Habitat Constriction and Fragmentation within the North South Movement Corridor that Reduce the Potential to Achieve Cabinet-Yaak Ecosystem Grizzly Bear Recovery Goals

D. 1. Prior to **FS authorization to initiate the Evaluation Phase, MMC**, under direction of the FS, **will commit to and implement the following**:

D. 1. All acres of replacement habitat required for the evaluation phase impact will be secured prior to the evaluation phase. To specifically reduce fragmentation, displacement and mortality risk and improve the north south connectivity in the Cabinet Mountains movement corridor:

D.1.a) MMC will secure or protect through conservation easement, including motorized route access changes, or acquisition in fee with conveyance of fee or perpetual conservation easement to the Forest Service or private conservation organization independent of MMC from development (including but not limited to housing, motorized access) and use (timber harvest, grazing, and mining) about 5 acres of replacement habitat near Rock Lake Meadows (NW ¼ Section 6, Township 26 North, Range 31 West) that will enhance the north to south habitat corridor in the Cabinet Mountains. The property is located in the East Fork Rock Creek drainage and is accessed by motorized trail #935. These 5 acres contribute towards the 500 acres replacement acres required for displacement.

D. 2. Prior to FS authorization to initiate the Construction phase, to reduce fragmentation, displacement and mortality risk and improve the north south connectivity in the Cabinet Mountains movement corridor**, MMC, under direction of the FS, will commit to and implement the following:**

D. 2.a) MMC will provide funding for the Forest Service to create core habitat for grizzly bear along trail #935 (Table 2). This will include but is not limited to: replacement of the gate at the trailhead with a barrier, and conversion of motorized trail tread to foot traffic tread conditions where necessary. This measure has a net result of creating 1,065 acres of core habitat. In addition, 288 acres of core created prior to the evaluation phase through access changes in roads 2316 and 6702 (Table 1) contribute to this measure. The net result is widening of the main constriction area from approximately 0.9 miles to 3.4 miles.

All acres of replacement habitat required for evaluation phase impacts will be secured prior to FS authorization of the evaluation phase and all acres of replacement habitat required for construction phase impacts will be secured prior to FS authorization of the construction phase.

See Items C. 1. C. 2 and Table 4 for replacement habitat requirements by phase and specific details on land acquisition and conservation easement requirements. All land interest or conservation easements conveyed to the Forest Service must comply with items C.1 and C.2. a) through d).

D. 2. **Prior to FS authorization to initiate the Construction Phase**, MMC will provide funding for bear monitoring in the area south of Libby between the Cabinet-Yaak Ecosystem and Northern Continental Divide Ecosystem as identified by FWS. The linkage identification work along U.S. 2 will involve 3 years of monitoring movements of grizzly and black bears along the highway to identify movement patterns and key movement sites. Funding will cover aerial flights for 2 hours per week, 30 weeks per year for 3 years, salary for two seasonal worker for 6 months per year for 3 years, and 15 GPS collars and collar rebuilds each year for 3 years. (*). Funding will supplement ongoing research and monitoring activities in the Cabinet-Yaak Ecosystem, will be conducted or coordinated by the FWS' grizzly bear researcher in Libby or the equivalent, and will focus on grizzly bears in the Cabinet Mountains. Other monitoring methods may be considered if approved by the Oversight Committee (see item F.2).

E. Measures to Reduce the Potential for Mortality and Displacement of Grizzly Bears from Occupied Habitat in Grizzly Bear Outside the Recovery Zone (BORZ) Reoccurring Use Areas

E. 1. **Prior to initiating the evaluation phase**, **MMC will** fund and the KNF will implement road access changes in the Cabinet Face BORZ, as described in item E.1.a below.

E. 1. a) The KNF will implement year-long road access changes to three roads (4776A, 4776C, and 4776F) that will reduce open and total road miles within the Cabinet Face BORZ (see Table 2, and Figure C-1). As a result of these changes, open roads within the BORZ will be reduced by 1.2 miles, and total roads will be reduced by 2.5 miles.

E. 2. **Prior to initiating the construction phase**, **MMC will** fund and the KNF will implement road access changes in the Cabinet Face BORZ, as described in item E.2.a below.

E. 2. a) The KNF will implement year-long road access changes to reduce effects to big game. Some of these road access changes will occur within the Cabinet Face BORZ and will improve grizzly bear habitat. Access changes associated with big game mitigation that will improve grizzly bear habitat in the BORZ are shown in Table 3 and Figure C-1 (4776B, 6205D, 6209E, 6787B and 14442).

Total road access changes shown in Table 2 and Table 3 within the BORZ will be permanent and will decrease open and total road miles in the BORZ by 10.2 miles. Baseline road miles in the Cabinet Face BORZ will not be exceeded during the construction phase.

E.3. **Prior to the operations phase**, **MMC will implement the following:**

E. 3.a) MMC will remove temporary roads built for transmission line installation on NFS lands

E. 4 Impacts from the Montanore Project on grizzly bears in the BORZ and on private and state land will also be mitigated through measures described above in item A, such as funding for grizzly bear personnel described in items A.1.h, A.1.i, A.1.j, and A.2 a funding for education and outreach, providing bear-resistant garbage containers, fencing and electrification of garbage transfer stations, and grizzly bear monitoring.

F. Measures to Ensure Compliance with the Montanore Grizzly Bear Mitigation Plan and Effectiveness of the Comprehensive Grizzly Bear Management Plan

Prior to initiating the Evaluation phase:

F.1. **the Forest Service, Department of Environmental Quality (DEQ), FWP and MMC** will participate in the development of a Memorandum of Understanding (MOU), while only the **Forest Service, DEQ and FWP** will be signers on the MOU:

The Forest Service and DEQ will develop an MOU with FWP, MMC, and other parties deemed appropriate by the Forest Service. The FWS will be an advisor in the development of the MOU. The MOU must be completed prior to the Forest Service issuing MMC the letter to proceed with the construction phase. The MOU will establish roles, responsibilities, and time lines of an Oversight Committee comprised of members of the Forest Service, FWP, and other parties deemed appropriate by the parties named. The FWS will be an ex-officio, non-voting member of the Oversight Committee, with only advisory responsibilities.

The MOU will be completed **prior to MMC** proceeding on **the evaluation** phase and will require the Forest Service to:

a. Ensure the Comprehensive Grizzly Bear Management Plan is completed prior to the **evaluation** phase of the mine. No further evaluation phase activity will continue until the plan is complete

b. Establish time frames for mitigation specified in the Grizzly Bear Management Plan and implementation of other management to occur prior initiation of the phase of the mine associated with that mitigation or management activity.

c. Ensure adequate funding, from MMC, to implement the Grizzly Bear mitigation plan according to the time frames.

d. Comply with legal guidelines or processes in as timely manner as possible in order to meet the Grizzly Bear mitigation plan and/or Comprehensive Grizzly Bear Management Plan implementation schedule.

e. Ensure that the FWS is consulted on the mitigation properties and the Comprehensive Grizzly Bear Management Plan and the FWS is requested to advise the Forest Service if the properties and the Comprehensive Grizzly Bear Plan meet the requirements in the Biological Opinion. All mitigation properties not specifically mentioned will have undergone all necessary procedures for procurement including recordation, prior to the agencies' letter to proceed on the associated phase of the mine.

f. Establish language and legal procedures to ensure that mitigation properties acquired through fee title, land transfer, or conservation easement:

   i. will be perpetual;
   ii. will meet federal policies and regulations regarding such realty actions (will be reviewed by the FWS who will advise whether they will meet the Biological Opinion requirements;
   iii. will be secured and recorded in advance of the phase of the mine with which they are associated ;
   iv. will increase or at least maintain a no net loss of MS-1 Cabinet-Yaak Ecosystem habitat;
   v. will be adequately funded such that enforcement of easement terms is assured;
   vi. will be selected on a priority basis with biologically justifiable rationale and based on the FWS advice that they meet the requirements included in the Biological Opinion; and
   vii. will be managed in support of grizzly bear survival and recovery if in public ownership.

F.2. The Oversight Committee will be responsible for the development of a Comprehensive Grizzly Bear Management Plan and its implementation. MMC will have a participating role on the Oversight Committee. The Comprehensive Grizzly Bear Management Plan will focus on the Cabinet portion of the Cabinet-Yaak Ecosystem and will fully include all provisions of the mitigation plan for grizzly bears, except where superseded by the FWS' Biological Opinion. It also will include provisions for adaptive management. The plan will be developed in detail by the parties to ensure that human access to grizzly bear habitat, grizzly bear mortality, and habitat fragmentation will be minimized and that grizzly bear habitat quality will be maintained or improved. Advice and comments on the plan from the FWS will be requested and fully considered, including advice on whether the plan will meet the requirements of the Biological Opinion.

The Oversight Committee, led by the Forest Service, and established prior to the evaluation phase as part of MOU; will over the life of the mine:

F.2. a) assume responsibility for coordinating various aspects of the Comprehensive Grizzly Bear Management Plan/Grizzly Bear Mitigation Plan;

F.2.b) assume responsibility for maintaining effective communication among all Committee members, stake holders, and interested public; and

F.2.c) integrate the principles of adaptive management by collecting, disseminating where needed, and reviewing new information on grizzly bears, the results of implementation of the Comprehensive Grizzly Bear Management Plan over time, and other information related to Cabinet-Yaak Ecosystem grizzly bears.

Based on new information, if appropriate to ensure that the objectives of the mitigation plan and conditions of the Biological Opinion are met, conduct additional analyses or develop recommendations for modifications of the mitigation plan to be implemented during the life of the mine. The FWS will be asked to review proposed revisions to the Comprehensive Grizzly Bear Management Plan under appropriate section 7 provisions, if required.

F.3. **Prior to FS authorization to initiate the evaluation phase**,

F.3.a**)** **MMC will** establish a trust fund and/or post a bond, to adequately fund the mitigation plan implementation costs. The amount in the fund or posted in a bond will be commensurate with projected work and associated required mitigation items by phase The Oversight Committee (see item F.2) will determine the amount of trust fund deposits, to be made in 5-year increments over the life of the mine. If implementation costs prior/or during either evaluation or construction phases exceed the amount deposited in the trust fund/and or bond, then MMC will contribute additional funds to fully implement those actions in a timely manner (as determined by the KNF in consultation with the FWS). The amount in the fund or posted in a bond will be commensurate with projected work and associated required mitigation items by phase.

F.3. b) Forest Service will lead a stakeholders information annual meeting. Stakeholders may include, but will not be limited to state and federal agencies, county commissioners, mining company, local citizen, and non-governmental organizations representatives. The objectives of the meetings will be to review a) management objectives, b) implementation of mitigation measures, c) monitoring and research results; d) and to hear concerns from the public

F.3. c) Forest Service will agree to adopt management actions in response to new information from monitoring to assure that ongoing management meets the objectives for grizzly bears in the Cabinet-Yaak Ecosystem.

F. 4. The Comprehensive Grizzly Bear Management Plan will include the measures in the Grizzly Bear mitigation plan, except where the mitigation plan has been superseded by the FWS' Biological Opinion. In addition, processes will be established to ensure that access management, prevention of habituation, educational opportunities, reporting and monitoring, enforcement of easements, and management actions are being adequately implemented. Further, the Comprehensive Grizzly Bear Management Plan will establish processes to revise management, access, education, or habitat enhancement strategies as new research or policies, such as revised IGBC guidelines, become available.

Prior to FS authorization to initiate the construction phase:

F. 5. **MMC will** contribute funding to support monitoring of bear movements and population status in the Cabinet Mountains to confirm the effectiveness of mitigation measures. The Forest Service will ensure that adequate funding, provided by MMC, is available to monitor bear movements and use of the Cabinet Mountains to confirm the effective implementation of mitigation measures. Information gained will be useful in determining whether the mitigation plan was working as intended. If not, the information will help in developing new management strategies that will be addressed through appropriate amendments and consultation under ESA section 7. Funding will supplement ongoing research and monitoring activities in the Cabinet-Yaak Ecosystem, will be conducted or directed by the FWS', and will focus on grizzly bears in the Cabinet Mountains. Funding will include money for the following (but not limited to): trapping, hair sampling and analysis, radio collars, flight time, monitoring native and augmented grizzly bears, and data analysis, including all equipment and support materials needed for such monitoring. The Forest Service will ensure that funding, provided by MMC, is available on an annual basis, 2 months in advance of the fiscal year (October) of the year it is to be used for the life of the mine. Details of the monitoring activities and budget will be outlined in the Management Plan. Funding will be provided prior to starting the construction phase and will continue throughout the life of the mine through the reclamation phase.,(*)

Canada Lynx Mitigation Plan

Prior to FS authorization to initiate the construction phase:

A. **MMC will** fund habitat enhancement on lynx stem exclusion habitat to mitigate for the physical loss of suitable lynx habitat due to the construction of project facilities and transmission line. Enhancement will be at a 2:1 ratio (2 acres treated for every acre lost). Impacts to lynx habitat and required habitat enhancement are shown in Table 5.

Table 5. Impacts to Lynx Habitat and Habitat Enhancement Requirements, Alternative 3D-R.

Lynx Habitat Impacted (acre)	Required Habitat Enhancement (acre)
276	552

Selected stands with poorly-developed understories that do not currently provide winter snowshoe hare habitat will be thinned to allow sun to reach understory vegetation and accelerate development of the dense, horizontal vegetation favored by snowshoe hare. Habitat enhancement work will be done by Forest Service personnel or by others under the direction of the Forest Service.

B. Remote monitoring is difficult and impractical, and new off-road use can easily be monitored from the access roads. To address Northern Rockies Lynx Management guideline HU G4, Forest Service personnel will monitor new snow compaction activities (such as snowmobiling) in the project area and take appropriate action if compaction monitoring identifies increased predator access to new areas.

FOIA EXEMPT Documents Referenced

2013a. Kasworm, W., W. Johnson and J. Holifield. Replacement habitat assessment for the Montanore mine project. 13 pp. (unpublished xcell spread sheet and Mitigation Plan Figure C-2 and Figure C-3) FOIA EXEMPT. Results of meetings held 6/19/2013, 6/21/2013, and 8/15/2013 and **revised November 2013**. This document replaces USDA, FS 2008 (potential replacement habitat assessment for Montanore Mine Project, 9/30/2008) and Kasworm and Johnson 2012b (Corridor Replacement Habitat Assessment for Montanore Mine Project 11/28/2012)

2013b. Kasworm, Johnson and Holifield. **December 09, 2013**. Mitigation Biological Credit Process Paper and detailed map, Mitigation Plan Figure C-4, Revision of Kasworm and Johnson, September 2013. Unpublished white paper 4 pages FOIA EXEMPT

2012a. Kasworm, W., and W. Johnson. November 9, 2012 meeting notes: Montanore project mitigation replacement habitat priorities. Libby,MT. 11/9/2012. 2 pp (unpublished) FOIA EXEMPT

2012b. Kasworm, Wayne and W. Johnson. Corridor replacement Habitat Assessment for Montanore Mine. USFWS, Libby, MT. 8 pp and map. Meeting notes 11/28/2012 (unpublished) FOIA EXEMPT

2008. USDA Forest Service. Potential Replacement Habitat Assessment for Montanore Mine Project. Kootenai National Forest. Libby, MT. 9/30/2008, 26pp and map (unpublished) FOIA EXEMPT

LOM: Life of Mine consists of 2 year evaluation phase, construction phase approximately 3, Operations 16 to 20, and estimated the first 5 years of mine closure and reclamation (Phase 1 and first 2 to 3 years of phase 2 as described in the terrestrial Biological Assessment).

Table. 1. Mitigation required prior to FS authorization/letter to proceed to MMC to initiate evaluation phase

Mitigation required prior to initiation of the Evaluation Phase			
Mitigation Purpose	**Item**	**Mitigation Required**	**Responsible Parties**
Minimize displacement and reduce mortality risk during spring season	B.1.a Table 2	Restrict public motorized access on existing open NFS roads 231 and 2316 from April 1 to May 15 for as long as MMC uses and snowplows the two roads – expected thru 2 yr evaluation phase and the 1-year reconstruction of bear Creek Road #278 during the Construction phase. Total 3.5 miles in RZ	KNF[1]
Minimize displacement and reduce mortality risk during spring season	B.1.a Table 2	Restrict public motorized access on existing open NFS roads 4778, 4778E, 5192 and 5192A from April 1 to June 15. Total of 9.3 miles (8.4 mi RZ/ 0.9 mi BORZ)	KNF[2] MMC[3] LOM
Minimize displacement, increase core habitat, and reduce mortality risk during the bear year in within RZ and minimize displacement, reduce mortality risk during spring season within BORZ	B.1.a Table 2 E.1	Reduce motorized access on existing open roads 4776A, 4778C, and 14458; on currently gated roads 4776C, 4776F, 4778C, 6200, 6200D, 6200E, 6200F, 6214, and 6214F, convert gated road (6745) or seasonally open road (4784, if necessary) to a non-motorized trail. Total of 20.2 miles (17.7 mi in RZ/2.5 mi in BORZ)	KNF MMC[3] LOM
Minimize displacement and reduce mortality risk, increase core habitat and mitigate for cumulative effects	B.1.b Table 2	If Rock Creek Mine mitigation has not yet restricted motorized traffic with a berm on the Upper Bear Creek road #4784, then MMC would implement &fund this work at this time (Total 3.1 miles in BMU). **MMC will only implement this change if Rock Creek has not yet done so.**	KNF MMC[3] LOM
Reduce Mortality Risk	A.1.a	Install/maintain fencing surrounding the Libby adit	MMC, LOM
Reduce Mortality Risk	A.1.b	Develop a transportation plan designed to minimize mine related vehicular traffic	MMC, KNF LOM
Reduce Mortality Risk by building public support and understanding of grizzly conservation in CYRZ	A.1.c	Fund/develop information & public relations educational program to begin implementation in evaluation phase & continue through life of mine.	MMC, KNF FWP, FWS LOM
Reduce Mortality Risk	A.1.d	Prohibit use of salt during winter plowing operations	MMC LOM
Reduce Mortality Risk	A.1.e	Remove road killed animals daily	MMC LOM
Reduce Mortality Risk	A.1.f	Monitor frequency of vehicle killed animals & review with KNF & FWP to determine if additional mitigation measures necessary	MMC Pre-Eval thru 1st 3 years of ops.
Reduce Mortality Risk	A.1.g	Report all grizzly bear, lynx, wolf and black bear mortalities within 24 hours	MMC, LOM
Reduce Mortality Risk	A.1.h	Fund local FWP Law Enforcement Officer, 1st 5 year funded, then fund in 5 year increments for LOM	MMC, FWP LOM
Reduce Mortality Risk	A.1.i.	Prior to evaluation phase, MMC would fund Habitat Conservation Specialist.	MMC, FWP LOM

Mitigation Implementation Table by Phase

February 2014

Mitigation required prior to initiation of the Evaluation Phase			
Mitigation Purpose	**Item**	**Mitigation Required**	**Responsible Parties**
Reduce Mortality Risk	A.1.j.	Prior to evaluation phase, if Rock Creek Mine not yet operating, MMC would fund FWP grizzly bear specialist	MMC, FWP LOM
Reduce Mortality Risk	A.1.k	Fund and maintain up to 35 bear-resistant refuse containers for employees and mine facilities	MMC LOM
Reduce Mortality Risk	A.1.l	Fund and or maintain electrification of garbage transfer stations adjacent and throughout CYRZ	MMC LOM
Reduce Mortality Risk	A.1.m	Fund initial 10 electric fencing kits then fund 2 more annually as needed	MMC LOM
Reduce Mortality Risk	A.1.n	Require all employees to attend grizzly bear & wildlife awareness training upon hire and annually thereafter (See MMC Wildlife Awareness Plan, Appendix C).	MMC LOM
Reduce Mortality Risk	A.1.o	Agree all mortality reduction measures would be subject to modification based on adaptive management for life of mine	MMC, KNF FWP LOM
Assure compliance with Mitigation Plan requirements	A.3a-b	Ensure MMC complies with prior to evaluation phase mitigation plan requirements prior to FS authorization of construction phase	KNF
Assure compliance with mitigation plan requirements	F.1 F.2 F.3 F.4	Develop MOU with MMC and MFWP to establish Oversight Committee, & establish roles, responsibilities & time lines. Committee to develop comprehensive grizzly bear management plan for Cabinet Mtn. portion of CYRZ. Oversight Committee to be operational in pre-eval phase	KNF LOM
Ensure compliance with grizzly bear mitigation plan and requirements	F.3.a	MMC post bond or establish trust fund to cover cost of projected mitigation measures, by phase funding deposits made in 5 year increments	MMC, KNF Oversight Committee LOM
Ensure compliance with GB mitigation plan	F.3.b.	Establish and lead annual stakeholders informational meeting	KNF LOM
Ensure compliance with grizzly bear mitigation plan	F.3.c	KNF agree to adopt adaptive management. actions in response to new information from monitoring	KNF LOM
Reduce displacement & mortality risk by improving north south movement corridor connectivity – specifically mitigates for effects of the Libby Adit effects in the north south corridor.	C.1 C.2.a-e D.1.a Table 4	Transfer fee title or conservation easement in perpetuity of MMC owned 5 acre parcel in East Fork Rock Creek. In addition, **acquisition or conservation easement required** on additional 495 acres, for a total of **500 acres of habitat replacement prior to evaluation for Libby Adit displacement effects**.	MMC, KNF

1 - Seasonal Restriction on 231 and 2316 implemented when KNF authorized w/MMC snow plowing permit Nov 2007

2 - Seasonal Restriction on 4778, 4778E, 5192 and 5192A implemented when KNF authorized w/MMC snow plowing permit Nov 2007

*3- MMC would fund the cost of installing and maintaining all access restrictions throughout the life of the project.

KNF: Kootenai National Forest; MMC: Mines Management Corporation; FWP: Montana Fish Wildlife & Parks; FWS: US Fish and Wildlife Service; LOM: Life of Mine; RZ or CYRZ: Cabinet-Yaak Recovery Zone; BORZ: Cabinet Face BORZ

Table 2. Mitigation required prior to FS authorization/letter to proceed to MMC to initiate construction phase

Mitigation required prior to initiation of the Construction Phase			
Mitigation Purpose	**Item**	**Mitigation Required**	**Responsible Parties**
Reduce constricted area within north south movement corridor, Reduce fragmentation, displacement & mortality risk, increase core habitat and mitigate cumulative effects of 2 mines	B.1.b Table 1 Table 3 D.2a	Restrict motorized traffic year-round by converting gated NFS roads 150A (trail #935) (Total 2.9 mi in RZ) (creates 1,065 acres core). Results in decrease in the main constriction (.9 air miles to approximately 3.6 air miles) area.	MMC[3] KNF
Reduce fragmentation, displacement & mortality risk by improving north south corridor connectivity in Cabinet Mtn. movement corridor – and cumulative effects of 2 mines. Core habitat created	B.1.b Table 3	Restrict motorized traffic year-round by converting gated NFS roads, 2317, 4781 and 6701, or portions thereof to a trail and barrier (Total 5 mi in RZ); ; Restrict motorized traffic year-round by converting gated roads 2316 and 6702 to berm (1.1 mi). Total of 4.2 miles in RZ.	MMC[3] KNF
Mitigate for displacement and mortality risk, and cumulative effect of 2 mines. Core habitat created.	B.1.b Table 3	Restrict motorized traffic year round by converting existing gated NFS roads 4725 to barrier. Total of 4.2 miles in RZ.	MMC[3] KNF
Big game mitigation to increase security and reduce open road densities which also reduce displacement and mortality risk in BORZ recurring use area	E.2 Table 3	Restrict motorized traffic year-round on seasonally restricted road 14442 with a berm, and restrict motorized access on currently open roads 6205D, 6787B, 6209E, 4776B with a berm. Total of 10.2 mi in BORZ.	MMC[3] KNF
Habitat replacement for displacement effects on 3,073 acres affected by increased disturbance associated with haul route, tailings impoundment and facilities. Replace at 1:1 ratio	C.1, C.2a-e Table 4	Purchase or acquire conservation easements in perpetuity on 3,073 acres within the Cabinet portion of the CYRZ (and other lands as described & identified on the priority list, and Mitigation credit process paper (Kasworm et al 2013a, Kasworm et al 2013b) . If necessary, MMC would coordinate with KNF, FWP and FWS to modify priorities as needed.	MMC KNF
Habitat replacement for direct physical loss of 1,567 acres from facilities, roads, tailings impoundment, and other features. Replacement at 2:1 ratio.	C.1, C.2a-e Table 4	Purchase or acquire conservation easement in perpetuity on 3,112 acres within Cabinet portion of CYRZ, or other lands as identified on the priority list, and mitigation credit process paper (Kasworm et al 2013a, Kasworm et al 2013b). MMC would coordinate with KNF, FWP and FWS to modify priorities as needed.	MMC KNF
Confirm effectiveness of mitigation measures	F.5	Fund ongoing research & monitoring of bear movements in Cabinet Mountains conducted/directed by FWS	MMC FWS, LOM
Confirm connectivity between south Cabinet Mountains and NCDE	D.3	Fund 3 years of bear monitoring along US Hwy 2 south of Libby conducted by FWS	MMC FWP
Reduce Mortality Risk by building public support and	A.1.c	Continue to fund & develop information & public relations educational program started prior to evaluation phase.	MMC, KNF

Mitigation required prior to initiation of the Construction Phase			
Mitigation Purpose	**Item**	**Mitigation Required**	**Responsible Parties**
understanding of grizzly conservation in CYRZ		Full funding and implementation prior to construction phase	FWP, FWS LOM
Reduce mortality risk	A.2.a	See item A.1.j. to determine if additional grizzly bear specialist needed at this time, positions may have been filled prior to evaluation phase. If Rock Creek has not funded second grizzly bear specialist position, then MMC fund	KNF, MMC, FWP LOM
Reduce mortality risk	A.2.c	Fund initial 100 bear resistant garbage containers plus additional 20 per year for distribution to general public, and maintain and replace for life of mine	MMC FWP
Reduce mortality risk	A.2.d	Coordinate with KNF to fund acquisition and maintenance of bear resistant garbage containers for all developed campgrounds in the entire Cabinet Yaak Recovery Zone	MMC KNF LOM
Reduce mortality risk	A.2.e	Appropriate use of clover in planting roadsides, no use on open roads	MMC KNF
Reduce mortality risk by monitoring public attitude Adaptive management	A.2.b.2	MMC will fund and implement a long-term public attitude and input survey so I&E program described in itesm A.1.c can respond	MMC FWP
Assure compliance with Mitigation Plan requirements	A.3a-b	FSnsure MMC complies with prior to construction phase mitigation plan requirements	KNF
Assure compliance with mitigation requirements	F.3.a	Trust or bond established prior to evaluation phase with payments made in 5-year increments (F.3.a)- MMC post bond or make payment to trust fund to cover cost of construction phase mitigation.	MMC Oversight Committee LOM
Assure compliance with mitigation requirements	F.4	Continue development and revising of Grizzly bear Management Plan and processes contained within as necessary	KNF, Oversight Committee LOM
Habitat replacement for direct physical habitat loss of 276 ac. of lynx habitat from facilities, roads, tailing impoundment and other features. Improve availability of lynx habitat successional stages	Lynx A.	Fund habitat enhancement on 552 acres of lynx stem exclusion habitat	MMC KNF
Reduce mortality risk and address NRLMD HU G-4	Lynx B.	Monitor new snow compaction in project area from access roads for life of mine	KNF MMC LOM

[3] MMC would fund the cost of installing and maintaining all access restrictions throughout the life of the project.

KNF: Kootenai National Forest; MMC: Mines Management Corporation; FWP: Montana Fish Wildlife & Parks; FWS: US Fish and Wildlife Service; LOM: Life of Mine; RZ or CYRZ: Cabinet-Yaak Recovery Zone; BORZ: Cabinet Face BORZ

Table. 3. Mitigation required during the construction phase

Mitigation required during the Construction Phase			
Mitigation Purpose	**Item**	**Mitigation Required**	**Primary Party**
Reduce mortality risk, displacement Eliminates transmission line construction activity during the spring and denning seasons	A.4	All activities for transmission line construction within the CYRZ and Cabinet Face BORZ, including use of the helicopter, will occur between June 16 and October 14 on federal lands	MMC KNF

KNF: Kootenai National Forest; MMC: Mines Management Corporation; LOM: Life of Mine; RZ or CYRZ: Cabinet-Yaak Recovery Zone; BORZ: Cabinet Face BORZ

Table 4. Mitigation required prior to FS letter to proceed/authorization for MMC to initiate Operations Phase

Mitigation required prior to initiation of the Operations Phase			
Mitigation Purpose	**Item**	**Mitigation Required**	**Responsible Party**
Reduce mortality risk in RZ & BORZ	E.3.a	Remove temporary roads built for transmission line installation on NFS lands	MMC KNF
Reduce displacement within the RZ	B.2.a.	Surface and mill equipment operated would not exceed 55 dBA measured at 250 feet from mill site for periods exceeding one hour. Intake and exhaust fans would generate less than 83 dBA measured at 50 feet down wind of portals, or ventilation adits. If necessary low-noise fan blades or noise suppression equipment would be installed to reduce fan noise to about 16 dBA, which would not be audible over ambient noise levels (Big Sky Acoustics 2006). Some of these MMC actions could be implemented as early as the construction phase.	MMC KNF

KNF: Kootenai National Forest; MMC: Mines Management Corporation; LOM: Life of Mine; RZ or CYRZ: Cabinet-Yaak Recovery Zone; BORZ: Cabinet Face BORZ

Table 5. Mitigation required during the Reclamation and Closure Phase

Mitigation required during Phase 1 of the Reclamation Phase			
Mitigation Purpose	**Item**	**Mitigation Required**	**Responsible Party**
Reduce mortality risk Eliminates transmission line removal activity during the spring and denning seasons	A.4	All activities for transmission line removal within the CYRZ and Cabinet Face BORZ will occur between June 16 and October 14 on federal lands	MMC KNF

KNF: Kootenai National Forest; MMC: Mines Management Corporation; LOM: Life of Mine; RZ or CYRZ: Cabinet-Yaak Recovery Zone; BORZ: Cabinet Face BORZ

APPENDIX D: How Mitigation Acres Were Derived

The mitigation plan requires a total of 6,207 acres of private land within the action area be purchased or secured through perpetual conservation easements, and managed to conserve grizzly bears. The 3,073 acres of replacement habitat acreage required to offset displacement on 7,848 acres was determined by using the Cumulative Effects Model (CEM) (USFS et al. 1998) (BA 2013). Areas impacted by disturbance were assigned "compensation levels." Compensation levels assigned the amount of replacement or mitigation habitat required for each acre of disturbed habitat and influence zones. Physically disturbed areas (Table D1) were assigned a compensation level of 100 percent. A compensation level of 100 percent means that the ability of the area to support bears has been reduced to 0 percent of its potential to support bears without the mine or existing disturbance feature. A compensation level of 100 percent requires a minimum of a 1:1 disturbed to replacement acre mitigation. All physically disturbed sites (1,567 acres) will be compensated at 200 percent (2:1) for each acre lost to development (Table D1).

Table D1. Approximate acres of surface feature disturbances, influence zones, Cumulative Effects Model compensation levels and required replacement habitat associated with the proposed Montanore Mine (data from BA 2013).

Impact Areas	**Acres disturbed by site development or influence zone**	**Compensation factor (level)**	**Total Replacement Habitat Required (rounded acres)**
Physical Habitat Loss Includes: *Existing Libby adit *Upper Libby Adit *Plant Site *Tailings Impoundment *LAD & waste sites *New Roads *Ventilation Adit	1,567	x 1 (100%) x 2	3,134 acres
Influence Zones Includes: *Physically disturbed IZ *New roads IZ *Existing roads IZ *Ventilation Adit IZ	7,848	Variable ** x .2 (20%) x .4 (40%) x 1 (100%)	3,073 acres
Transmission Line	331 Acres *	n/a*	0 acres *
Influence zone	17,133 Acres *	n/a*	0 acres *
Total New and Existing Features			**6,207 acres**

* Effects of transmission line are mitigated by implementing a timing restriction. All activities associated with the transmission line would take place outside the grizzly bear spring and den seasons. Transmission line clearing creates potential spring forage areas that would all be within 600 feet or less from cover and thus are not considered lost habitat. Of the 17,133 acres disturbed, 10,900 acres have existing disturbances.
** Influence zones had various compensation levels depending on existing disturbance level. Compensation levels ranged from 0.2 to 1.0.

Each of these developed sites or features was then buffered by either a 0.25 or 0.05 mile influence zone, depending upon the level of the expected disturbance. The areas within each influence zone were then assigned compensation levels of between 70 to 90 percent, depending upon the intensity of the disturbance. For instance, a compensation level of 90 percent means that the effects of the mine would reduce the ability of the influence zone to support grizzly bears to 10 percent of its potential, and therefore the replacement acres required were 90 percent of the acres in the influence zone itself.

Note that the difference between the required 3,073 acres of replacement habitat and the 7,848 acres where displacement is expected to occur results primarily from the replacement acres required for the displacement area around *existing roads*. These roads already exist and already have a displacement effect on grizzly bears within the influence zones surrounding them. According to the CEM, the influence zone extends 0.25 miles from roads characterized as having “low linear motorized use.” Most existing roads in the action area were characterized this way. The significant increase (255%) in daily traffic on Forest road 278 resulted in additional displacement effects so that influence zone becomes only 10% “effective”.

In the CEM analysis, the mining company was not held accountable for existing effects from existing roads or the influence zone because this disturbance was already in the baseline and not caused by the mine. Further, the Forest had already accounted for this displacement and moderated its effect on grizzly bears by adhering to its road density limits (standards) within the affected BMUs. Therefore, of the approximately 7,848 acre disturbance zone that would be affected by the proposed action 6,288 acres are already impacted by existing roads and use on those roads. The ability of the influence zone near existing roads to support grizzly bears has already been reduced by about 70 percent. As noted above, where significant increases in vehicle traffic occurs, both in numbers and time (24 hour activity) additional reduction in grizzly bear use was expected and corresponding replacement habitat was required.

The mine would cause a significant increase in traffic on these existing roads. Some roads were already at high use levels; however the mine would add additional traffic and traffic would become a 24 hour activity. Thus, in accordance with the CEM, the categorization of existing roads was changed from “high motorized linear use” (a 0.3 disturbance coefficient) to using the “motorized point 24 hour disturbance coefficient (0.1). According to the CEM, the increase in road use from “high linear motorized use” to “motorized 24 hour” was expected to decrease the ability of the influence zone to support grizzly bears from the existing 70 percent by another 20 percent, or by a total of 90 percent. In other words, with the effects of the proposed action, the ability of the influence zone to support grizzly bears would be reduced to about 10 percent of its potential. Although the mining company was not required to offset the *existing* impacts within the influence zone, the mitigation plan requires offsetting the impacts of *increased* levels of disturbance associated with higher road use. The plan requires acquisition or easement on 20 to 40 percent (depending on existing disturbance levels) of existing road influence zone acres to compensate for the increased use of existing roads (see Table D1).

This replacement habitat strategy accounted for the following:

- Although bears may still use influence zones, the effects of the project would substantially diminish the frequency or probability of their using the zones.

- Displacement effects attributable to the mine itself were identified and then added to existing displacement effects from roads already in the environmental baseline.

- The amount of replacement habitat required to adequately mitigate for displacement of grizzly bears was determined through an objective process based on the best information regarding levels of grizzly bear displacement caused by disturbance.

Additional features and effects of the mitigation plan related to replacement habitat:

- The revised mitigation plan would further require acquisition of fee title or perpetual easement on *an additional 500* acres of mitigation habitat (for a total of 3,073 acres) to specifically address habitat fragmentation within a north to south habitat corridor east of the mine site, near and along the divide. Any acres acquired through fee title would be eventually transferred to Forest ownership, as would conservation easements. The mitigation plan specifies: "Secure or protect (through conservation easement including road closures, or acquisition in fee) from development (including but not limited to housing, motorized access) and use (timber harvest, adverse grazing, and mining) 500 acres of replacement habitat that will enhance the north to south habitat corridor in the Cabinet Mountains." These parcels are to be acquired *prior* to the beginning of the evaluation adit.

- The mitigation plan specifies: "Secure or protect (through conservation easement including road closures or acquisition in fee) from development (including but not limited to housing, motorized access) and use (timber harvest, adverse grazing, mining) replacement habitat to compensate for acres lost by physical alterations, or acres with reduced habitat availability due to disturbance." Of the 3,134 acres of mitigation properties required for physical loss, no acres are required to be acquired *prior* to the development of the evaluation adit phase, all 3,134 acres are to be acquired during the evaluation adit phase *prior* to mine construction. All of the combined replacement acres for physical loss and displacement (including fragmentation) (6,207 acres) are to be acquired prior to start of mine construction.

- Each acquisition (or protection through easement) of privately-owned grizzly bear habitat would not necessarily increase the amount of habitat available to grizzly bears, because some private lands are undeveloped and currently available to bears. However, the mitigation lands were prioritized according to habitat quality *and risk of being developed in the future*, unless acquired by the Forest through fee title or easement. Thus, the long-term management of these lands is important to the conservation of grizzly bears and their habitat. On some private parcels with no existing road access, there was risk that the Forest may be required to provide reasonable private access in the future. Therefore, Forest acquisition of or easement on mitigation habitat that is *at risk* of development would benefit grizzly bears in the southern Cabinets over the long term, by precluding access, development, or other management adverse to bears.

- Some of the potential mitigation properties have existing developments, and several potential parcels already have road access. Removing the developments and road access to these parcels would increase habitat available to bears, decrease future grizzly bear mortality risk due to sanitation issues and illegal mortality, as well as reduce existing displacement risks due to access and human activity. Depending upon the specific property, eliminating existing access (or preventing access to them in the future) would reduce or eliminate the potential for displacement on many acres in addition to the mitigation acres required. The mitigation plan calls for a total of 6,207 acres to compensate for acres lost through physical alterations or acres with reduced habitat availability due to disturbance. Each of the properties is valuable to grizzly bear habitat conservation and would benefit grizzly bears if acquired. The specific location of mitigation properties and the roads on them and/or leading to them are as important as the total acres required. Acquisition or easement of parcels precludes development on any parcels acquired, and also allows elimination of the motorized access across Forest lands that have roads or motorized trails leading to the parcels. Elimination of such access routes could improve conditions on more acres than the mitigation properties alone. Acquisition of certain lands would allow the Forest to reduce or eliminate displacement of bears (or potential future displacement effects) on lands adjacent to them or on lands where access roads lead to them. Each acquisition would be reviewed by the Oversight Committee, and approved by the Forest in coordination with the Service, to ensure its value as grizzly bear habitat over time and to lessen the effects of displacement.

- The mitigation plan requires habitat enhancement on 7,030 acres. Habitat enhancement would be achieved through changes in motorized vehicle access (road closures and access restrictions) that create grizzly bear core habitat.

- The mitigation plan would require that as properties are acquired, management of access in BMUs 2, 5 and 6 would be as or more conservative than that required in the Forest Plan. This would further reduce displacement of grizzly bears from habitat.

- Most mitigation properties required by the mitigation plan have not yet been acquired, and habitat enhancement actions are not yet specified. Therefore, the specific mitigation impact or reduction in potential displacement of grizzly bears that would result after acquiring these properties, implementing access management and implementing habitat enhancement activities cannot be accurately predicted at this time. However, in coordination with the Service, the Forest would assess and approve each of the potential parcels, ensuring that they each contribute to offsetting the impacts of the proposed Montanore Mine. A number of potential lands have been identified. The revised mitigation plan relies on the *"Replacement Habitat Assessment for acceptable lands to consider***"** (not available to the public until replacement habitat mitigation is completed). The Service was involved in the development of the Replacement Habitat Assessment, which identifies many potential mitigation habitat parcels and prioritizes them according to location, development potential, and potential contribution to grizzly bear habitat security and improvement. The plan also states that **the Forest Service would have final approval of mitigation acres** and associated covenants prior to recording. The Forest would approve in writing and describe how the properties to be acquired would meet the habitat assessment requirements.

APPENDIX E:

Historical Access parameters for the Cabinet-Yaak Recovery Zone, 2002-2011, compared to standards

			YEAR									
BMU	**Access Standard Type**	**Standards ***	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
1	OMRD	**15**	12	12	13	14	12	12	14	14	15	15
	TMRD	**15**	10	11	10	8	8	9	9	10	11	8
Cedar	CORE	**80**	83	83	84	85	85	83	83	83	81	83
2	OMRD	**20**	17	17	17	19	20	19	19	20	20	18
Snowshoe	TMRD	**18**	14	14	14	14	15	16	15	16	16	16
	CORE	**75**	77	78	78	77	77	76	76	76	76	77
65,241												
3	OMRD	**33**	27	24	25	26	27	27	27	27	28	30
	TMRD	**26**	26	26	24	24	24	27	27	26	26	26
Spar	CORE	**59**	62	62	63	63	62	60	60	62	62	62
4	OMRD	**36**	36	36	37	37	36	37	37	37	37	38
	TMRD	**26**	26	26	26	26	26	26	26	29	29	29
Bull	CORE	**63**	62	62	63	63	63	62	63	62	62	62
5	OMRD	**30**	26	27	26	27	27	28	28	28	27	29
	TMRD	**23**	21	21	21	23	23	23	24	23	23	33
St. Paul	CORE	**60**	63	60	60	59	60	58	60	58	58	58
6	OMRD	**34**	33	37	33	34	35	32	30	29	33	32
	TMRD	**32**	32	32	31	32	33	33	33	34	34	34
Wanless	CORE	**55**	55	54	56	54	54	53	54	53	53	53
7	OMRD	**26**	23	23	23	24	23	25	27	32	32	24
	TMRD	**23**	20	20	20	20	21	23	23	23	23	23
Silver Butte-Fisher	CORE	**63**	66	66	66	67	67	62	63	62	63	63
8	OMRD	**32**	32	32	32	32	32	33	33	33	33	32
	TMRD	**21**	23	23	23	23	23	22	22	24	24	24
Vermillion	CORE	**55**	56	56	56	56	56	54	55	55	55	55
9	OMRD	**33**	32	26	26	28	28	27	27	27	27	28
	TMRD	**26**	27	26	26	26	26	26	26	26	26	27
Callahan	CORE	**55**	57	59	60	59	58	58	59	59	59	58
10	OMRD	**44**	41	41	41	42	41	44	44	44	45	45
	TMRD	**34**	32	30	31	29	28	28	28	29	30	27
Pulpit	CORE	**52**	50	52	52	51	51	52	52	51	51	54
11	OMRD	**28**	31	30	29	28	28	28	28	28	28	28

BMU	Access Standard Type	Standards *	YEAR 2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Roderick	TMRD	**26**	28	28	29	29	28	29	28	28	28	27
	CORE	**55**	54	53	53	53	52	52	54	54	54	54
77,746												
12	OMRD	**45**	43	41	41	42	42	42	42	42	42	43
	TMRD	**31**	30	31	31	31	30	31	30	29	29	32
Newton	CORE	**55**	57	56	56	56	56	56	57		58	56
13	OMRD	**33**	33	33	33	34	34	34	34	34	33	33
	TMRD	**26**	24	24	23	24	25	25	25	25	25	25
Keno	CORE	**59**	62	61	61	61	59	59	59	59	59	59
14	OMRD	**31**	28	27	28	28	28	28	28	28	28	28
	TMRD	**26**	26	25	26	26	26	26	26	26	26	26
NW Peak	CORE	**55**	56	57	57	56	55	55	56	56	56	56
15	OMRD	**33**	31	31	29	33	30	30	29	29	34	31
	TMRD	**26**	30	29	29	34	33	32	25	25	25	26
Garver	CORE	**55**	50	50	48	46	45	46	54	55	55	54
16	OMRD	**33**	29	28	31	28	28	29	31	29	32	29
	TMRD	**26**	38	30	25	26	26	27	27	27	27	27
E F Yaak	CORE	**55**	45	49	55	54	53	53	54	54	54	54
17	OMRD	**33**	31	31	31	29	31	30	30	30	30	31
	TMRD	**26**	26	25	25	25	20	18	15	16	16	16
Big Creek	CORE	**55**	50	50	50	49	54	55	59	58	58	56
18	OMRD	**33**	29	31	31	29	29	31	31	31	33	34
	TMRD	**29**	35	35	35	35	35	35	35	35	35	35
Boulder	CORE	**55**	49	49	49	49	50	50	50	50	50	49
19	OMRD	**59**	59	59	59	61	60	60	60	60	61	60
	TMRD	**55**	59	59	59	59	59	59	59	59	59	59
Grouse	CORE	**37**	32	32	32	32	32	32	32	32	32	32
20	OMRD	**35**	38	38	39	39	40	37	36	36	38	35
	TMRD	**20**	20	20	20	21	21	19	20	20	20	19
North Lightning	CORE	**61**	61	61	61	61	60	62	62	62	61	64
21	OMRD	**34**	35	35	35	35	35	35	35	35	33	37
	TMRD	**26**	27	27	26	26	26	27	27	27	25	27
Scotch-man	CORE	**62**	63	63	63	63	63	63	63	63	67	68
22	OMRD	**33**	38.7	37.9	38	38	38	38	38	38	38	38

BMU	Access Standard Type	Standards *	YEAR									
			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Mt. Headley	TMRD	**35**	42.0	36.1	37	37	37	37	37	37	37	37
	CORE	**55**	46.8	51.6	51	51	51	51	51	51	51	51

APPENDIX F: Grizzly bear mortality analysis terminology

Wayne Kasworm's 2010 discussion paper "Mortality Trend Discussion" included several analysis terms that were used interchangeably. This appendix shows what terms were used, their definitions, and how they relate to the other terms. Based on the table below, terminology in this biological opinion, section "Detailed Analysis of Grizzly Bear Mortality in the CYE", was simplified but still retain the relevance of the original terms. In this biological opinion "percent rate of annual change" is used once and then called "percent change" thereafter. The term "lambda" is used throughout the document as appropriate. This Appendix and the biological opinion section where it was applied were reviewed and approved by Wayne Kasworm.

TERM	**DEFINITION and RELATED TERMS**
Lambda	Statistical numerical value derived from running a mortality and reproduction model to evaluate a population trend. It shows the rate of increase with 1.0 being a stable population. Values above 1.0 represent an increasing population and values below 1.0 show a declining population.
Percent rate of annual change	Calculated value determined by applying a natural log calculation to Lambda. It is a point value surrounded by 95% confidence intervals for cumulative annual values (i.e. 1998 through 2012). Kasworm states that "the point estimate of the rate of change is a better measure of progress of the population."
Rate of Change	Same as "percent rate of annual change"
Trend	Short for "population trend" determined by comparing annual values of lambda, percent rate of annual change and probability of decline over a period of years.
Rate of change in the population (lambda)	Same as "lambda"
Point estimate of Lambda	Same as "lambda"
Annual rate of change	Same as "percent rate of annual change"
Point estimate rate of change	Same as "percent rate of annual change"
Point estimate of annual rate of change	Same as "percent rate of annual change"
Finite rate of increase (lambda)	Same as "lambda"

Appendix G: Forest Plan Goal, Objectives and Standards from the IPNF, KNF and LNF affecting Grizzly Bears

Idaho Panhandle National Forest
The following goals, objectives, and standards, currently contained in the IPNF's Forest Plan (U.S. Forest Service 1987 as amended), provide some benefits to grizzly bears and their habitat within these areas of mapped grizzly bear residency outside of the recovery zone:

The goals and objectives of the LRMP set the framework for minimizing take:

- Roads will be developed and managed to the minimum standards and miles necessary to meet the objectives of the management area (MA).
- Manage vertebrate wildlife habitat to maintain viable populations of all species.
- Manage big game habitat toward achieving the goals of the Idaho Department of Fish and Game (IDFG).
- Grazing management will protect soil and water resources, riparian areas, and T&E plant and animal species. Grazing is permitted on less than two percent of the Forest with a majority of the forage use occurring on 7,500 acres.
- The needs of Threatened & Endangered (T&E), and sensitive plant and animal species have priority in managing existing range allotments. No new allotments will be established in areas where conflicts can be expected with T&E or sensitive species.
- Riparian resources will be managed to feature dependent resources (fish, water quality, natural channels, certain vegetation, and wildlife communities) while producing other resource outputs at levels compatible for the objective for dependent resources. (Also note, the IPNF amended the Forest Plan to incorporate the INFISH Guidelines that increase protection of riparian resources.)
- Management for elk habitat needs will emphasize road management to maintain adequate security and habitat potential on summer range.

Specific management standards and guidelines in place to achieve the forest goals:

- Forest-wide standard- Management of habitat and security needs for T&E species will be given priority in identified habitat. Results of research regarding habitat of T&E species will be incorporated into management direction as it becomes available.
- IPNF Management Area (MA) 2 & 3- "Road and trail restrictions may be necessary to reduce human/bear conflicts.
- IPNF MA 4 & 5- Within critical habitat components motorized recreation use may be restricted to provide needed wildlife security.
- IPNF MA 6- Special emphasis will be given to the maintenance, protection and enhancement of key habitat components (including security).
- IPNF MA 9- Existing local roads will generally be closed to vehicles over 40" wide. No local road construction is planned.
- IPNF MA10- Parker and Long Canyons are closed to motorized use.
- IPNF MA 11- Salmo-Priest Wilderness is to be managed as non-motorized. Within grizzly bear and caribou habitat, recreation use and access may be restricted to provide

needed wildlife security during use periods. (Includes proposed wilderness i.e., Scotchman Peak and Selkirk Crest areas)

- IPNF MA 11- Proposed Wilderness- Motorized use may be permitted…, except within bounds of Mallard Larkins Pioneer Area, …
- IPNF MA12- Within the Upper Priest Wild River area, uses will be limited to non-motorized except on established roads.
- IPNF MA 16- Maintenance of natural channels and adequate streamside vegetation will have a high priority in range allotment plans and prescriptions. A specific objective for stream bank protection will be included in all allotment management plans where second order or larger streams are involved.
- IPNF MA 19 & 20- Motorized recreation activities will be allowed where they do not conflict with wildlife and other resource needs.
- IPNF has a long history if supporting information and education efforts and supported the IDFG I&E position since 1991.
- IPNF completed a forest-wide food storage order. And the Colville NF has had one in place since 1989.

<u>Kootenai National Forest</u>
The following goals, objectives, and standards, currently contained in the KNF Forest Plan (U.S. Forest Service 2002 as amended), provide some benefits to grizzly bears and their habitat within these areas of mapped grizzly bear residency outside of the this recovery zone:

The goals and objectives of the LRMP set the framework for minimizing take:

- Maintain diverse age classes of vegetation for viable populations of all existing native, vertebrate wildlife species (FP p. II-1 #7) (provides habitat diversity needed by grizzly).
- Protect the wilderness character of designated and recommended wilderness (FP p II-2 # 10) (provides security habitat).
- Maintain a natural appearing landscape adjacent to major travel corridors, around local communities, and around popular destinations such as campgrounds (FP p. II-2 #14) (provides connectivity for movement).
- Attempt to stop the spread and suppress the existing levels of noxious weeds through land management and weed suppression activities. (Maintains and restores native bear foods).
- Grazing management will insure protection of soil and water resources and riparian areas (FP- II-7, Range) (protects potential grizzly use areas – riparian).

Specific management standards and guidelines in place to achieve the forest goals:

- Riparian Area standards (FP II pp. 30-33): In addition to the LRMP standards, the Kootenai amended the FP (1995) to incorporate the "INFISH" guidelines that increased protection of riparian habitat.
- MA 2, 6-9, 13, 18-21, 24, 29 and 30- Livestock grazing is not permitted. This is more than half the MAs on the Forest. MA 5 allows only recreational pack stock. MA 13 allows grazing but, due to limited available forage, use is not anticipated.
- MA 14- Grazing opportunities for domestic livestock will be available unless there is a site-specific conflict with grizzly bear management…

- MA 3- Fencing for domestic livestock control may be allowed to prevent overuse in an area, eliminate competition for forage, or reduce conflicts with grizzly management" (FP p. III-9 – Range #3).
- MA 10-12, and 15-17 - Fencing may be constructed to control livestock unless it interferes with the natural movement patterns of wildlife.
- MA 12 and 14 - Establishes an open road density standard of 0.75 miles/sq.mile
- MA 15 - 18 - Establishes an open road density standard of 3.0 miles/sq.mile
- KNF plan standards and guidelines provide quality big game habitat conditions (including cover/forage ratio requirements, opening size limitations, maintaining movement corridors between openings) and hunting season security by using seasonal road closures.
- MA 23 - Any activity in the MA will be required to leave no trash or other grizzly attractant.

Off-highway vehicle restrictions adopted in 2001 limits OHV use to designated routes or areas, and prohibits motorized cross-country travel on the remainder of the Forest.

<u>Lolo National Forest</u>
The following goals, objectives, and standards, currently contained in the KNF Forest Plan (U.S. Forest Service 2002 as amended), provide some benefits to grizzly bears and their habitat within these areas of mapped grizzly bear residency outside of the this recovery zone:

- Forest wide standard: Motorized vehicles will be limited to system roads and trails which are designated open in the Lolo Forest Travel Plan. (p. II-17 #48)
- Roads will be the minimum number and meet the minimum design standards possible while still meeting safety, user, and resource needs. (p. II-17 #49)
- Manage Forest roads to provide for resource protection, wildlife needs, commodity removal, and a wide range of recreation opportunities. In most areas on the forest, this will involve closing some roads seasonally, and closing other roads on a permanent basis. (p. II-18 # 52)
- Plan (p. II-18 # 52-c) sets an open road density standard of 1.1 miles per square mile on highly productive big game summer range. All new roads, except arterials, will be closed year-round. In addition new roads will be closed to the public year-round in areas of moderate big game summer range.
- Plan (p. II-19 #52-d) in areas with high potential for walk-in hunting or fishing experiences will consider road closures. Open road density during the hunting season will remain the same as that now existing. (1984 Travel Plan)
- MA 20 - Road densities will be minimized using maximum spacing whenever possible. (p. III-97 2-a)
- MA 20a - Existing roads will be managed to minimize human-caused grizzly bear mortality. (p. III-101 C-5)

MA 18 - 19, and 26 - Road densities will be minimized

2013 05 06

FWS Brief for Internal Discussion

Kasworm/Vandehey

DRAFT MONTANORE MINE ISSUE: Libby Creek Road vs Bear Creek Road

The draft EIS prepared by the Kootenai National Forest (KNF) analyzed the use of two road systems to access the Montanore Mine facility from US Highway 2 (Fig. 1). Bear Creek Road (271) was selected over Libby Creek Road (231) as the preferred route largely because of bridges and grade associated with the Libby Creek route. Libby Creek road has been one of the major routes used in the past to support timber harvest activities and has supported large numbers of loaded logging trucks leaving the National Forest. Libby Creek road was also recently upgraded by the KNF through widening through much of the route, new gravel, and grading. There are two major bridges spanning Libby Creek. The upper bridge crosses the creek in an area of private property (Libby Placer Mining). The owners of the property have expressed resistance towards Montanore improving the bridge and the approaches which lie on property owned by Libby Placer Mining (approximately 1,070 acres owned). The Bear Creek Road was paved approximately 30-40 years ago but that pavement has deteriorated extensively. This road crosses several smaller drainages most notably Bear and Poorman Creeks. Libby, Bear, and Poorman Creeks are believed to be occupied by Bull Trout.

The distance from the Montanore Mine site to US Highway 2 varies from 12.1 miles by the Libby Creek road to 18.3 miles by the Bear Creek road (Table 1). US Highway 2 is relatively close to the boundary of the bears outside the recovery zone line (BORZ). Distance from the mine site to the boundary of the grizzly bear recovery zone varies from 4.3 miles by the Libby Creek road to 14.2 miles by the Bear Creek road. Libby Creek road bisects and influences 2 grizzly bear management units (BMUs) and Bear Creek road bisects 3 BMUs. The Libby Creek road is adjacent to or bisects about 10 private property parcels while the Bear Creek road affects about 14. Consideration of impacts should also consider the location and access routes associated with the tails site which is located between the Libby and Bear Creek roads (Fig. 2). Additional miles of road to access the tailings site would appear to be similar between the two routes.

Use of the either route would expect substantial re-contouring, widening, and paving. Bridge construction or use is a consideration with Bear, Poorman, and Ramsey Creeks being crossed by the Bear Creek route and Ramsey, and Libby Creeks crossed by the Libby Creek route with Libby Creek crossed twice. The upper Libby Creek bridge and east side approach appear problematic with steep side hills and a narrow road base. Montanore officials have evaluated an alternative bridge site downstream from the existing bridge that may offer better access to the tailings site and avoid private property issues with Libby Placer Mining at the existing bridge site. Evaluation of costs of each route should consider not only bridge and road construction but miles of road and costs associated with maintaining the road for the life of the mine including winter plowing of snow to allow year round access. The Libby Creek road is currently the more heavily used recreational route to access Howard Lake campground and the Libby gold panning area. Use may continue on this route to access these sites even with the development of the Bear Creek road as mine access. However if the Libby Creek Road is developed as the main access route, traffic on the Bear Creek road may not appreciably change from the current low level. Much of the telemetry associated with collared grizzly bears indicates use of the eastern toes of the mountain slopes and drainages bisected by the Bear Creek Road moving north from Upper Libby Creek to Granite Creek. Route selection should also consider cumulative impacts to the bear population with the development of the Rock Creek mine on the west side of the Cabinet Mountains (Fig.1). Distance between the two mill sites is about 9.1 miles, but distance between adits and associated extraction activities is about 6 miles. Concerns include mortality risk, displacement, and fragmentation of the population.

Conclusions:

1. Use of the Libby Creek road is likely to have fewer impacts to grizzly bear habitat than the Bear Creek road.
2. Use of the Libby Creek road would avoid new and significantly elevated impacts on grizzly bears across the eastern toes of the mountain slopes and drainages bisected by the Bear Creek road.
3. Use of the Libby Creek road would avoid the development of a second high-use road in the action area.
4. Use of the Libby Creek road may have fewer impacts on private property.
5. Use of the Libby Creek road may be more efficient and economical over the life of the mine.

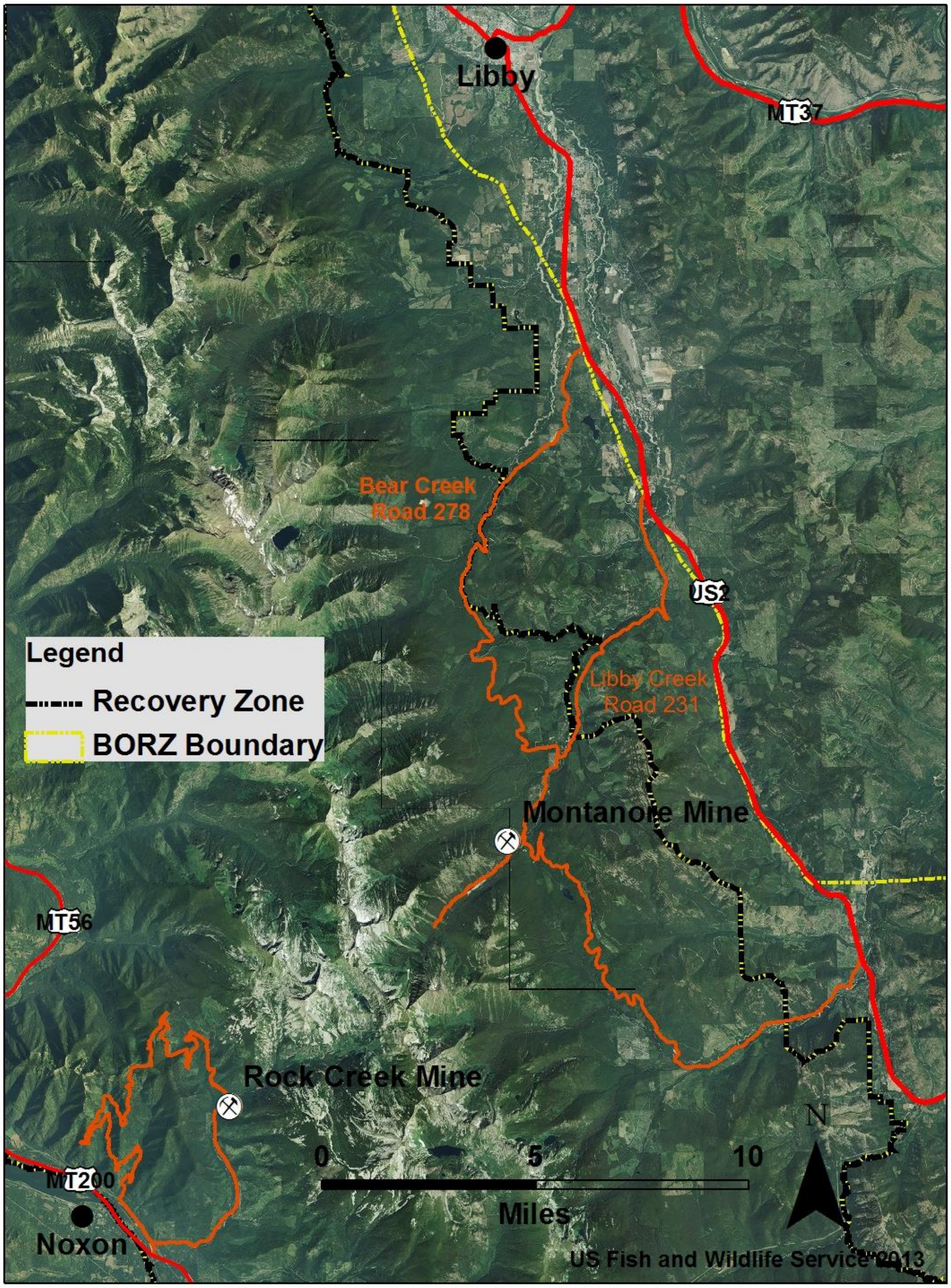
Recommended Action:

Contact the KNF Forest Supervisor to discuss our concerns and potential modify the project to move forward with use of Libby Road.

Table 1. Distances from the Montanore Mine site to Highway 2 and to the grizzly bear recovery zone boundary, and private ownership parcels adjacent to or bisected by the Bear Creek road and the Libby Creek road.

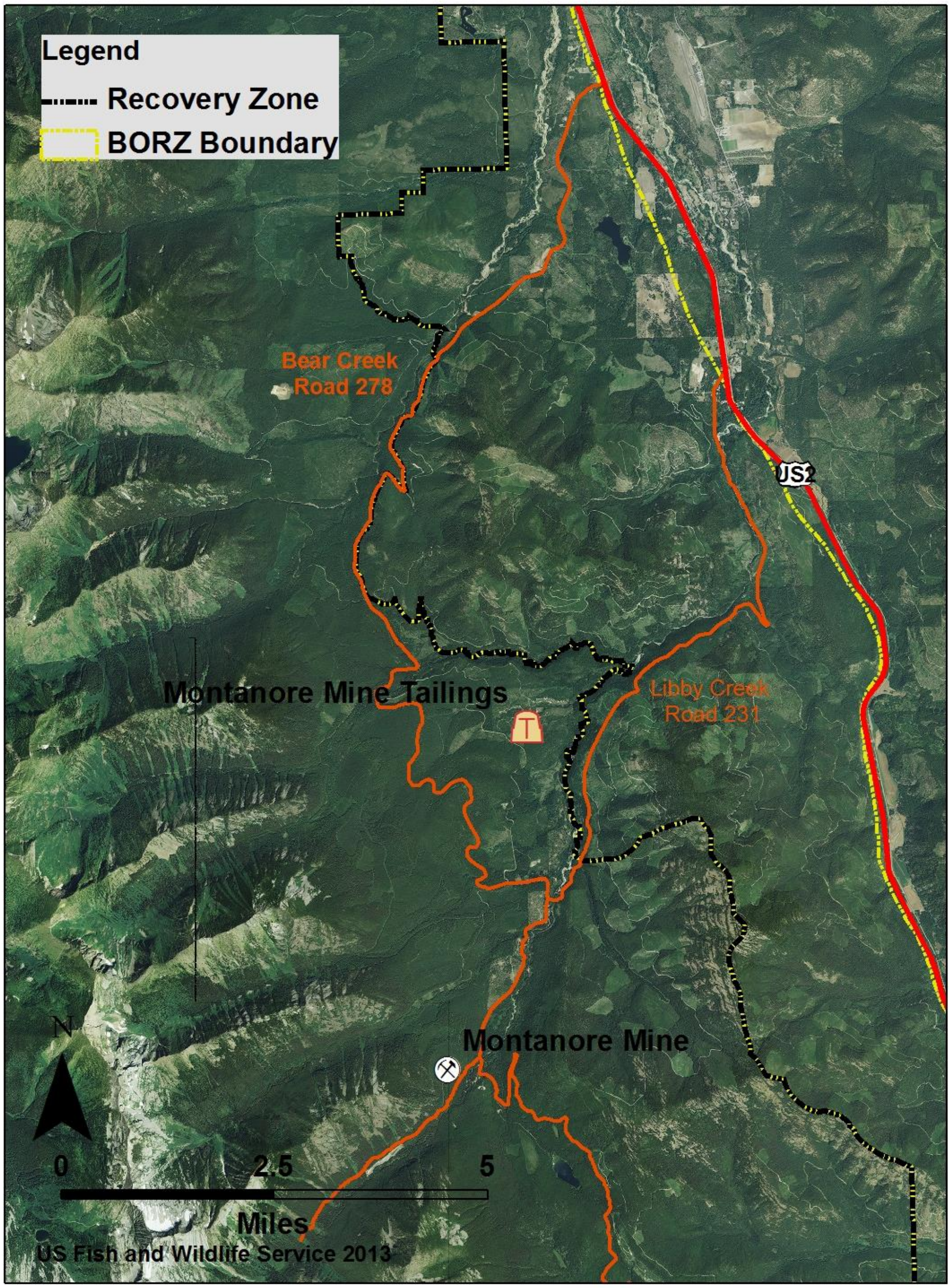
Locations	Bear Creek Road 278	Libby Creek Road 231
Mine site to US Highway 2 (also approx. BORZ boundary)	18.3 miles	12.1 miles
Mine site to Recovery Zone Boundary	14.2 miles	4.3 miles
Bear Management Units bisected	3	2
Private Property parcels directly adjacent or bisected by road near US Highway 2 (not including Industrial Owners)	14 (approx.)	10 (approx..)

Figure 1.



Libby
MT37
Bear Creek
Road 278
US2
Legend
Recovery Zone
BORZ Boundary
Libby Creek
Road 231
Montanore Mine
MT56
Rock Creek Mine
0
5
10
Miles
N
MT200
Noxon
US Fish and Wildlife Service 2013

Figure 2.



Legend
Recovery Zone
BORZ Boundary
Bear Creek
Road 278
Montanore Mine Tailings
Libby Creek
Road 231
US2
Montanore Mine
N
0
2.5
5
Miles
US Fish and Wildlife Service 2013

APPENDIX I: DRAFT PUBLIC OUTREACH PLAN OUTLINE

The mitigation plan (item A.1.c) requires the development of a complete public outreach plan prior to the Forest Service authorization to MMC to initiate the construction phase of the mine. Thus the plan is not needed prior to issuance of the letter to proceed with the evaluation adit. This appendix outlines essential features of the outreach plan.

Plan Development

The plan development team will include the Kootenai National Forest, MMC, MFWP grizzly bear specialist, FWS grizzly bear researchers with advice from the FWS. **The team will be lead by a professional public outreach specialist.** Assistance and input from Lincoln and Sanders County commissioners' office will be invited.

Minimum Plan Components

- A baseline public attitude survey will be conducted, with follow-up surveys, at interval determined by development team, to determine outreach plan effectiveness and need for plan changes.

- A website will be established and maintained that provides at a minimum: 1) all agency contact information regarding grizzly bear issues and questions; 2) current recovery information; 3) grizzly bear life history information; 4) attractant storage tips and stories; 5) links to other useful websites related to grizzly bear issues, and 6) other items deemed useful and necessary by the plan development team.

Additional Components to consider

The following components are provided for consideration by the development team to be added as deemed useful and necessary:

- Focused outreach messages must be communicated frequently and consistently, with emphasis on the importance of: (1) hunting safely in grizzly country, (2) keeping private property (including livestock and domestic pets) bear resistant, (3) appropriate food storage when camping or living in bear country, (4) hiking and camping safely in grizzly country, (5) being able to tell the difference between black bears and grizzly bears, (6) recognizing high-risk situations regarding grizzly bear habitat, (7) knowing grizzly bear biology and behavior.

- Messages for all outreach efforts will be based on bear biology and behavior and be of a positive, non-alarmist nature. Custom messages targeted at specific audiences (e.g., hunters, hikers, recreationists, homeowners, livestock operators, rural communities, commercial entities, loggers, miners, resort operators, outfitters, etc.) should be identified to increase the efficiency of education and outreach efforts.

- Establish or improve the following outreach actions in the CYE:
  - Outreach programs to local schools, businesses and community organizations;
  - Lessons on human safety and conflict prevention while hunting in bear habitat presented to all hunter education classes;
  - Online and in-person training to assist hunters with identification of black versus grizzly bears.
  - News releases and media (TV, radio and newspaper) messages, including information about helpful websites;
  - Agency and partner-produced radio spots and Public Service Announcements;
  - Web pages (on agency and Tribal websites) that are devoted to living and recreating in bear country;
  - Dynamic websites (e.g., www.missoulabears.org) dedicated to reducing grizzly bear-human conflicts by disseminating information on current bear activity and how to keep neighborhood bear attractants minimized;
  - Use of available tools, such as the "Bears and Bees" video to teach beekeepers about how to avoid conflicts with bears;
  - Information and workshops on electric fencing to keep bears out of orchards, garbage, grain storage and bee yards;
  - Meetings with homeowner groups and local communities about keeping bears out of garbage through bear-resistant garbage containers and electric fences;
  - Day-to-day public contacts by agency and partner personnel during conflict situations with bears;
  - Messages sent through online social networks (e.g., Facebook, Twitter, etc.);
  - Bear rangers to talk with members of the public, make presentations, and post signage to proactively inform recreationists about bears and bear activity and reduce the potential for conflicts;
  - Various bear safety brochures available at agency and partner offices, distributed by field personnel and given out at presentations;
  - "Be Bear Aware" children's handout/coloring book;
  - Standardized "Hunters Know Your Bears" and "Food Storage" signs posted at campgrounds, trailheads, popular hunting areas, fishing access sites, etc. Public meetings to encourage citizen participation in land management decisions affecting grizzly bear habitat and management;
  - Education and training of permanent and seasonal agency personnel.