Draft Supplemental Environmental Impact Statement

Montanore Evaluation Project

June 2019

Cabinet Mountains *Photo by M. Holdeman*

United States Department of Agriculture

Forest Service
Northern Region
Kootenai National Forest

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United States Department of Agriculture
Forest Service
Kootenai National Forest
Forest Supervisor's Office
31374 US Highway 2
Libby, MT 59923-3022
406-293-6211

File Code: 1950
Date: June 21, 2019

Dear Interested Party,

The Kootenai National Forest (KNF) has completed the Montanore Evaluation Project Draft Supplemental Environmental Impact Statement (Draft SEIS). The proposed federal action analyzed in the SEIS is approval of a Plan of Operations for the Montanore Evaluation Project (Project or Evaluation Project), consistent with the Organic Administration Act, Locatable Minerals Regulations 36 Code of Federal Regulations (CFR) 228 Subpart A, and the Multiple Use Mining Act. Montanore Minerals Corporation (MMC), a subsidiary of Mines Management, Inc., a subsidiary of Hecla Mining Company, would be the Project operator. The Notice of Intent for the Project was published in the *Federal Register* on December 28, 2017 (82 FR 248).

The Draft SEIS tiers to an environmental analysis completed previously for the proposed Montanore Project. The Evaluation Project has independent utility from the Montanore Project and would allow the project proponent, MMC, to decide whether and how to proceed with the Montanore Project. Although MMC may subsequently seek approval for the Montanore Project, the Evaluation Project is not an interdependent part of a larger action, nor does it depend on any larger action for its justification.

The KNF prepared the Draft SEIS in response to two U.S. District Court opinions issued in May 2017 and a June 2017 order remanding the 2015 Joint Final Environmental Impact Statement, 2016 Record of Decision, and 2014 Biological Opinions for the Montanore Project back to the Kootenai National Forest. The KNF will use the analysis in the Final SEIS to determine whether to issue approvals necessary for the Evaluation Project. Analysis of the Evaluation Project is consistent with the June 2017 order vacating the 2016 decision that stated: "By setting aside the Record of Decision in its entirety, the agency has the opportunity to decide how it would like to proceed, either through issuing a new Record of Decision that approves only the Evaluation Phase or one that once again addresses the entire project."

A No Action Alternative, the Proposed Action, and two action alternatives (Alternatives 3 and 4) are analyzed in the SEIS. During the Evaluation Project, Montanore Minerals Corporation would use an existing evaluation adit on private land in upper Libby Creek to drill into and evaluate a copper and silver ore body; would conduct surface monitoring activities, including some in the Cabinet Mountains Wilderness; and, in Alternatives 3 and 4 only, would complete geotechnical and hydrologic studies on National Forest System lands between Little Cherry Creek and Poorman Creek. Alternative 3 is the KNF's preferred alternative.

The Draft SEIS and other project documents can be downloaded (portable document format (.pdf) format) from the following website: http://www.fs.usda.gov/projects/kootenai/landmanagement/projects. Physical copies of the Draft SEIS (bound paper or compact disc formats) are also available and can be requested from the KNF Geologist (contact info below).

An open house will be held from 6:00 p.m. to 8:00 p.m. on July 23rd, 2019 to allow the public to ask resource specialists questions and to hand deliver written comments. The open house will be held at the Kootenai National Forest Supervisor's Office, 31374 US Highway 2, Libby, Montana (MT).

Your comments will be invaluable to the KNF as it prepares the Final SEIS and Record of Decision. All substantive comments received during the public comment period will be considered. Comments will be accepted for 45 days following the publication of the KNF's Notice of Availability or 45 days after the Environmental Protection Agency's Notice of Availability is published in the *Federal Register*, whichever is later.

Written comment can be submitted to Craig Towery, Geologist, Kootenai National Forest, Supervisor's Office, 31374 US Highway 2, Libby, MT 59923-3022, or by email to: sm.fs.r1monteval@usda.gov. Please include "Montanore Evaluation Project" in the subject line. Electronic comments must be submitted as part of the email message or as an attachment in plain text (.txt), Microsoft Word (.doc), rich text format (.rtf), or portable document format (.pdf). Emails submitted to addresses other than the one listed above, or in formats other than those listed or containing viruses, will be rejected. Comments can also be faxed to (406) 283-7709, hand-delivered to the KNF between the hours of 8:00 a.m. and 4:30 p.m., or given to the KNF Geologist or other KNF staff member at the public meeting.

Comments should be substantive and specific to the proposed activities and area being analyzed. They should include (1) name, address, email address, telephone number, and organization represented, if any; (2) title of the document for which the comment is being submitted; (3) specific facts and supporting reasons for the Responsible Official to consider; and (4) signatures. Although comments submitted anonymously will be accepted and considered, anonymous comments will not provide the reviewer with standing to participate in subsequent administrative or judicial reviews. All comments received are part of the public record and will generally be posted for public viewing without change. All personal identifying information (e.g., name, address, etc.), confidential business information, or otherwise sensitive information submitted voluntarily by the sender will be publicly accessible. The Montanore Evaluation Project is subject to 36 CFR part 218, subparts A and B of the Forest Service's Project-level Pre-decisional Administrative Review Process.

Thank you for taking time to be involved with the Montanore Evaluation Project. For more information please contact the KNF Geologist, Craig Towery, KNF, 31374 US 2, Libby, MT 59923-3022, (406) 293-6211 or e-mail at craig.towery@usda.gov.

Sincerely,

CHERYL F. PROBERT
Forest Supervisor

cc: Craig Towery

Montanore Evaluation Project
Draft Supplemental Environmental Impact Statement
Lincoln County, Montana

Lead Agency: USDA Forest Service, Kootenai National Forest

Cooperating Agencies: U.S. Army Corps of Engineers
Lincoln County, Montana

Responsible Official: Cheryl Probert
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406-293-6211

Abstract: The Draft Supplemental Environmental Impact Statement for the Montanore Evaluation Project describes the land, people, and resources potentially affected by a proposed Plan of Operations for evaluation of an underground copper and silver ore body and an assessment of the hydrogeologic conditions of a possible tailings impoundment site. The Supplemental Environmental Impact Statement tiers to an environmental analysis completed previously for the proposed Montanore Project. The Evaluation Project has independent utility from the Montanore Project and would allow the project proponent, Montanore Minerals Corporation, to decide whether and how to proceed with the Montanore Project. Although Montanore Minerals Corporation may subsequently seek approval for the Montanore Project, the Evaluation Project is not an interdependent part of a larger action, nor does it depend on any larger action for its justification.

The Kootenai National Forest prepared the Supplemental Environmental Impact Statement in response to two U.S. District Court opinions issued in May 2017 and a June 2017 order remanding the 2015 Joint Final Environmental Impact Statement, 2016 Record of Decision, and 2014 Biological Opinions for the Montanore Project back to the Kootenai National Forest. The Kootenai National Forest will use the analysis in the Final Supplemental Environmental Impact Statement to determine whether to issue approvals necessary for the Evaluation Project. Analysis of the Evaluation Project is consistent with the June 2017 order vacating the 2016 decision that stated: "By setting aside the Record of Decision in its entirety, the agency has the opportunity to decide how it would like to proceed, either through issuing a new Record of Decision that approves only the Evaluation Phase or one that once again addresses the entire project."

A No Action Alternative and three action alternatives (Alternatives 2, 3, and 4) are analyzed in the Supplemental Environmental Impact Statement and are described in Chapter 2. During the Evaluation Project, Montanore Minerals Corporation would use an existing evaluation adit on private land in the upper Libby Creek drainage to access, drill into, and evaluate an ore body; would conduct monitoring activities, including some in the Cabinet Mountains Wilderness; and, in Alternatives 3 and 4 only, would complete geotechnical and hydrologic studies on National Forest System lands between Little Cherry Creek and Poorman Creek. The Kootenai National Forest's preferred alternative is Alternative 3.

It is important that reviewers provide their comments at such times and in such a way that they are useful to the Forest Service's preparation of the Final Supplemental Environmental Impact Statement. Comments should be provided before the close of the comment period and should clearly articulate the reviewer's concerns and contentions. The submission of timely and specific comments can affect a reviewer's ability to participate in subsequent administrative or judicial reviews. Although comments submitted anonymously will be accepted and considered, anonymous comments will not provide the reviewer with standing to participate in subsequent administrative or judicial reviews.

Please submit project-specific comments on the Supplemental Environmental Impact Statement by mail to Craig Towery at the above address, by personal delivery between 8:00 a.m. and 4:30 p.m., by fax to (406) 296-6211, or by email to the following address: SM.FS.r1monteval@usda.gov. Comments will be accepted for 45 days following the publication of the Notice of Availability of the Draft Supplemental Environmental Impact Statement in the *Federal Register*. Please include "Montanore Evaluation Project" in the subject line. Comments should be substantive and specific to the proposed activities and area being analyzed. They should include (1) name, address, email address, telephone number, and organization represented, if any; (2) title of the document for which the comment is being submitted; (3) specific facts and supporting reasons for the Responsible Official to consider; and (4) signatures. Legal advertisements will be placed in the *Missoulian* to notify the public of the Draft Supplemental Environmental Impact Statement availability.

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Appendix C—Conceptual Monitoring Plans
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Summary

This section presents a summary of the Supplemental Environmental Impact Statement (SEIS) for the Montanore Evaluation Project. As a summary, it cannot provide all of the detailed information contained in the SEIS. If more detailed information is desired, please refer to subsequent sections of the SEIS and the referenced reports. For any remaining questions or concerns, contact the individuals listed in the last section of this summary, *Where to Obtain More Information.*

Purpose and Need for Action

The proposed federal action analyzed in the SEIS is approval of a Plan of Operations for the Montanore Evaluation Project (Project), consistent with the Organic Administration Act, Locatable Minerals Regulations 36 Code of Federal Regulations (CFR) 228 Subpart A, and the Multiple Use Mining Act. The Project would use an existing evaluation adit on private land in upper Libby Creek to drill into and evaluate a copper and silver ore body; would conduct surface monitoring activities, including some in the Cabinet Mountains Wilderness (CMW); and, in some alternatives, would complete geotechnical and hydrologic studies on National Forest System lands between Little Cherry Creek and Poorman Creek in the Libby Ranger District, Kootenai National Forest (KNF), Lincoln County, Montana. Montanore Minerals Corporation (MMC), a subsidiary of Mines Management, Inc. (MMI), a subsidiary of Hecla Mining Company, would be the Project operator.

As described below, the KNF prepared the Evaluation Project SEIS in response to two U.S. District Court opinions issued in May 2017 and a June 2017 order regarding the 2015 Montanore Project Joint Final Environmental Impact Statement (JFEIS) (USDA Forest Service and DEQ 2015), the 2016 Record of Decision (ROD) for the Montanore Project (USDA Forest Service 2016a), and the 2014 Biological Opinions for the Montanore Project. The Montanore Project is a previously proposed underground copper and silver mine and associated transmission line about 18 miles south of Libby near the Cabinet Mountains in the Libby Ranger District. The Evaluation Project has independent utility from the Montanore Project and would allow MMC to determine whether and how to proceed with the Montanore Project (see discussion below under *Federal Action*). Although MMC may subsequently seek approval for the Montanore Project, the Evaluation Project, an evaluation of an ore body and an assessment of the hydrogeologic conditions of a possible tailings impoundment site, is not an interdependent part of a larger action, nor does it depend on any larger action for its justification. The Evaluation Project would not include development of a mine.

The SEIS tiers to the 2015 environmental analysis for the Montanore Project and has been prepared in compliance with the U.S. Department of Agriculture (USDA) National Environmental Policy Act (NEPA) regulations (7 CFR 1b), the Forest Service's NEPA regulations (36 CFR 220), and the Forest Service's Environmental Policy and Procedures Handbook (Forest Service Handbook 1909.15). In addition to responding to the District Court's opinions and order, the SEIS updates other resource analyses where the KNF identified significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. According to 40 CFR 1502.9(c)(1)(i-ii), a supplemental EIS shall be prepared if (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) there are significant new circumstances or information relevant to environmental

concerns and bearing on the proposed action or its impacts. For the SEIS, the analyses disclosed in the 2015 JFEIS are updated or supplemented for resources that may be significantly affected by changes in circumstances or new information. Only the specific issues associated with supplemental information are addressed in the SEIS.

The KNF is the lead agency for the SEIS. A Draft ROD will be subject to the objection process described in 36 CFR 218. The ROD will document the KNF Supervisor's decision whether to approve the Plan of Operations as submitted or approve the Plan of Operations with changes.

Successful completion of the Evaluation Project is a prerequisite for development of the Montanore Project. If MMC decided to pursue approval to mine the Montanore ore body, it would update the groundwater models described in JFEIS Section 2.5.2.6.5, *Final Groundwater Model Development Process*, and provide any additional information necessary to assess effects of the Montanore Project. The Montanore Project would occur after the Evaluation Project only if (1) MMC decided to pursue Montanore Project development, (2) the KNF approved the Montanore Project after completing additional NEPA analysis and Endangered Species Act compliance, and (3) DEQ permitted the Montanore Project after completing additional Montana Environmental Policy Act analysis. The Montanore Project is described in detail in Chapter 2 in the JFEIS and summarized in Section 3.3, *Reasonably Foreseeable Future Actions or Conditions*. If MMC decided not to pursue development of the Montanore Project, MMC would reclaim all Evaluation Project facilities, including the Libby Adit Site (reclamation requirements differ by alternative and are described below in Chapter 2).

Prior NEPA Analysis and Related Litigation

The USDA, KNF, and Montana Department of Environmental Quality (DEQ), the lead agencies, along with the Bonneville Power Administration (BPA) and the U.S. Army Corps of Engineers (Corps) as cooperating agencies, prepared and issued a JFEIS for the Montanore Project in 2015 identifying Alternative 3 (Agency Mitigated Poorman Alternative) and Transmission Line Alternative D-R (Miller Creek Transmission Line Alternative) as the preferred alternatives. The KNF issued a ROD in 2016.

The KNF ROD documented the KNF Supervisor's decision to approve an amended Plan of Operations for the development of all phases of the Montanore Project consistent with Alternative 3 and Alternative D-R as modified by the ROD (the selected mine and transmission line alternatives). The selected mine and transmission line alternatives included stipulations and mitigation measures, the KNF's December 2015 Terrestrial Threatened and Endangered Species Mitigation Plan and Bull Trout Mitigation Plan, and the terms and conditions from the U.S. Fish and Wildlife Service's (USFWS) 2014 Biological Opinions for the grizzly bear and the bull trout and bull trout critical habitat. The ROD also approved amendments to the 2015 Kootenai Forest Plan (KFP) to suspend six KFP guidelines and two KFP standards to implement the selected mine and transmission line alternatives while still maintaining consistency with the KFP.

The DEQ ROD documented the DEQ Director's decision to conditionally approve amendments to MMC's Hard Rock Operating Permit No. 00150 (an existing DEQ permit for the Montanore Project) pertaining to the first phase (Evaluation) only to make the permit provisions consistent with Alternative 3 as modified by the ROD (the selected alternative). Approval was conditioned on subsequent DEQ approval of the renewal of Montana Pollutant Discharge Elimination System (MPDES) Permit No. MT0030279, which was finalized in 2017. DEQ also conditionally

approved Alternative D-R, the selected transmission line alternative, and issued a Certificate of Compliance, which was conditioned on subsequent approval for the Construction and Operations Phases of the Montanore Project.

Several environmental groups (Save Our Cabinets, Earthworks, Clark Fork Coalition, and Defenders of Wildlife) and the Libby Placer Mining Company challenged the KNF ROD, the December 2015 JFEIS, the March 2015 Final EIS (Objection Review Draft), the July 2015 Response to Objections, and the USFWS Biological Opinions (*Save Our Cabinets v. U.S. Dep't of Agric.*, No. CV-16-53-M-DWM; *Libby Placer Mining Co. v. U.S. Forest Serv.*, No. CV 16-56-M-DWM; and *Save Our Cabinets v. U.S. Fish & Wildlife Serv.*, No. CV 15-69-M-DWM). In a U.S. District Court opinion issued on May 30, 2017, on a consolidated case (*Save Our Cabinets v. U.S. Dep't of Agric.*, No. CV-16-53-M-DWM; and *Libby Placer Mining Co. v. U.S. Forest Serv.*, No. CV 16-56-M-DWM), the U.S. District Court (Court) ruled that the Forest Service had violated the Clean Water Act, the National Forest Management Act, and NEPA by approving the Montanore Project. In a separate opinion in *Save Our Cabinets v. U.S. Fish & Wildlife Serv.*, No. CV 15-69-M-DWM, issued concurrently with the first, the Court ruled that the USFWS had violated the Endangered Species Act (ESA) because its no-jeopardy conclusions as to bull trout and grizzly bears were flawed, and that the Forest Service had violated the ESA by relying on the flawed Biological Opinions. In a June 29, 2017, opinion, the Court vacated the 2016 KNF ROD and remanded the ROD and 2015 JFEIS back to the Forest Service for further action. The Court also remanded to the USFWS its 2014 Biological Opinions.

Previous Permitting and Approvals

The discovery of mineral deposits for the Montanore Project dates back to the early 1980s. MMC's mineral claims, mine and transmission line permitting and approvals (1993), and more recent mine and permitting approvals (2006–2016) are described in detail in the JFEIS and summarized in Chapter 1 of the SEIS. Project background relevant to the current federal action is summarized below.

MMC holds DEQ Hard Rock Operating Permit No. 00150 for the Montanore Project. In 2006, MMC submitted, and DEQ approved, two requests for revisions to DEQ Operating Permit No. 00150 (MR 06-001 and MR 06-002). The revisions involved reopening the Libby Adit and reinitiating the evaluation drilling program that Noranda Minerals Corporation (NMC) began in 1989. The key elements of the revisions include reexcavation 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.

MMC requested a revision to its operating permit that involved the relocation of fuel and oil storage areas at the Libby Adit and the addition of more fuel storage capacity. DEQ approved the revision in 2009 (MR 08-001). MMI also holds an exploration license from DEQ. MMC installed two wells under the license in 2005.

As described above, the KNF and DEQ issued a JFEIS for the Montanore Project in December 2015. The KNF and DEQ each issued a ROD in February 2016. DEQ issued Montana Air Quality Permit (MAQP) #3788-00 to MMC in 2016 and renewed MPDES Permit No. MT0030279 in 2017. Although DEQ conditionally approved amendments to Operating Permit No. 00150 in its 2016 KNF ROD, MMC has not submitted an application to DEQ to amend Operating Permit No.

00150 to be consistent with the DEQ ROD. Operating Permit No. 00150 remains as revised by MR06-001, MR06-002, and MR 08-001.

Federal Action

The KNF's federal action analyzed in the SEIS is approval of a Plan of Operations for the Montanore Evaluation Project consistent with the Organic Administration Act, Locatable Minerals Regulations 36 CFR 228 Subpart A, the Multiple Use Mining Act, and the Wilderness Act. A No Action Alternative and three action alternatives (Alternatives 2, 3, and 4) are analyzed in the SEIS and described in Chapter 2. During the Project, MMC would conduct underground mineral evaluation using the Libby Adit, an existing evaluation adit with a portal on private land in upper Libby Creek that extends for most of its length under National Forest System lands; would conduct certain monitoring activities, including within the CMW; and, in Alternatives 3 and 4, would complete geotechnical and hydrologic studies on National Forest System lands between Little Cherry Creek and Poorman Creek. Before starting the Project in Alternatives 3 and 4, MMC would fund or implement access changes and would transfer fee title to or place a conservation easement on 742.3 acres for wildlife mitigation. The general location of Project activities is shown on Figure 301 (all figures are at the end of the SEIS). All access and surface facilities would be outside of the CMW boundary (Figure 321).

Completion of the Project would be a prerequisite to future Montanore Project development. If MMC decided to pursue approval to mine the Montanore ore body, it would provide the KNF with any additional information necessary to assess effects of the Montanore Project. The Montanore Project would occur after the Evaluation Project only if (1) MMC decided to pursue Montanore Project development, (2) the KNF approved the Montanore Project after completing additional NEPA analysis and ESA compliance, and (3) DEQ permitted the Montanore Project after completing additional Montana Environmental Policy Act (MEPA) analysis. The Montanore Project (mine and transmission line) is described in detail in JFEIS Chapter 2.

Purpose and Need

As discussed in the JFEIS, the Forest Service verified in 1985 and 1993 that valid rights to the mineral deposit based on minerals patented claims HR 133 and HR 134 have been established within the CMW. Those rights are currently held by MMC. The role of the KNF under its primary authorities in the Organic Administration Act, Locatable Regulations 36 CFR 228 Subpart A, the Wilderness Act, and the Multiple Use Mining Act is to ensure that mineral operations are limited to the exercise of valid existing rights, minimize adverse environmental effects on National Forest System lands, and comply with all applicable laws. The KNF has no authority to unreasonably circumscribe or prohibit reasonably necessary activities under the General Mining Law that are otherwise lawful.

From the perspective of the Forest Service, the need is to:

- Address the U.S. District Court opinions issued on May 30, 2017, regarding the 2015 JFEIS, 2016 KNF ROD, and 2014 Biological Opinions for the Montanore Project;
- Ensure measures would be included, where practicable, that provide for reclamation of the surface disturbance;
- Ensure the selected alternative requires compliance with other applicable federal and state laws and regulations; and

- Ensure the selected alternative, where feasible, would minimize adverse environmental impacts on National Forest System surface resources.

MMC's purpose for the Project is (1) to carry out the Libby Adit evaluation program and other activities to obtain more geologic, hydrologic, and other information; and (2) to complete further analysis needed to inform and reach a determination whether and how to proceed with the Montanore Project. MMC's need is to receive all necessary governmental approvals and authorizations for the Project. MMC proposes to conduct Project activities in an environmentally sound manner, subject to reasonable mitigation measures designed to avoid or minimize environmental impacts to the extent practicable.

Decisions

The KNF Supervisor will issue a decision on the proposed federal action, approval of the Montanore Evaluation Project, in a ROD. The decision objective is to select an action that meets the legal rights of MMC while ensuring operations are conducted, where feasible, to minimize adverse environmental impacts on National Forest surface resources in compliance with applicable laws, regulations, and policy. The KNF Supervisor will use the SEIS process to develop the necessary information to make an informed decision as required by 36 CFR 228 Subpart A. Based on the alternatives developed in the JFEIS and the additional analysis presented in the SEIS, the KNF will issue a ROD in which one of the following decisions will be made:

- Approval of the Project, subject to submittal of and KNF approval of an updated Plan of Operations
- Notification to MMC that the KNF Supervisor will not approve a Plan of Operations until a Plan of Operations that meets the mandates of applicable laws and regulations is submitted

The alternative selected by the KNF must meet the purpose of the Forest Service locatable mineral surface management regulations as described in at 36 CFR 228 Subpart A and the Mining and Minerals Policy Act.

The KNF will submit two new Biological Assessments (BAs) to the USFWS, one for terrestrial species and one for aquatic species. The BAs will describe the potential effect of the proposed federal action on threatened and endangered (T&E) species that may be present in the area. After review of the BAs and consultation, the USFWS will issue either concurrence letters or Biological Opinions for the proposed federal action. The USFWS will determine if implementation of the proposed federal action would jeopardize the continued existence of any species listed or proposed as T&E under the ESA, or adversely modify critical or proposed critical habitat, based on the BAs prepared by the KNF. If the USFWS issues a "jeopardy" or "adversely modify" opinion in the Biological Opinions, the USFWS will describe reasonable and prudent alternatives, if available, that would avoid jeopardizing the continued existence of T&E species or adversely modifying critical or proposed critical habitat. If issued, the Biological Opinions will include "conservation recommendations" for discretionary activities to minimize or avoid adverse effects of the federal action on listed species or critical habitat.

Public Involvement

A Notice of Intent to prepare the SEIS was published in the *Federal Register* on December 28, 2017, and a press release was distributed to the KNF's news media list, which includes, among others, the *Missoulian*, *Flathead Beacon*, and *Western News*. The Notice of Intent and press release described KNF's intent to prepare an SEIS for the Evaluation Project. The KNF conducted public scoping for the Montanore Project in 2005; additional scoping for an SEIS is not required and was not conducted (40 CFR 1502.9(c)(4)). Consultation and coordination are discussed in Chapter 4.

Alternatives

Alternatives development for the Montanore Project is described in Section 1.2, *Development of Alternatives*, in the JFEIS. The transmission line described in the JFEIS as part of the Montanore Project would not be constructed or used during the Project. The SEIS uses the Evaluation Phase components of the JFEIS mine alternatives as the basis for the alternatives analyzed for the Evaluation Project. The SEIS also uses source material developed for the Montanore Project JFEIS. In those sources, the Evaluation Project is referred to as the "Evaluation Phase." For clarity and consistency in the SEIS, the terms "Evaluation Project" or "Project" are used, even if the source material used "Evaluation Phase." The following sections summarize the Evaluation Project alternatives, including the No Action Alternative (Alternative 1); the alternatives are described in detail in Chapter 2. Table 303 and Table 304 in Chapter 2 summarize Project components and design features of the action alternatives (Alternatives 2, 3, and 4).

Alternative 1

The existing Libby Adit Site is on private land owned by MMC, which is a patented mining claim in the upper Libby Creek drainage. It is 2.5 miles due west of Howard Lake. MMC maintains the Libby Adit under the authority of DEQ Operating Permit No. 00150 (as revised in revisions 06-001, 06-002, and 08-001). The 219-acre operating permit area for the Libby Adit Site, located in Sections 10, 11, 14, and 15, T27N, R29W, includes an existing 11.6-acre disturbance area. For analysis purposes in the JFEIS, the KNF used an 18-acre disturbance area for the Libby Adit Site to assess effects on surface resources. For maximum flexibility, MMC would have bonded to cover the entire disturbance area even if no activities were then proposed. The JFEIS approach would have allowed MMC to construct temporary and seasonal roads and other facilities within disturbance area boundaries as needed. The Libby Adit Site has an office trailer and a shop building, a Water Treatment Plant, a lined stormwater pond, and a lined waste rock storage area and an associated waste rock sump (Figure 302). Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) provide access to the Libby Adit Site from US 2.

In Alternative 1, the No Action Alternative, the environmental, social, and economic conditions described in JFEIS Chapter 3 would continue, unaffected by Project activities. MMC would not undertake underground activities beneath the CMW, aboveground geotechnical investigations, or habitat protection. DEQ's Operating Permit No. 00150 as revised in revisions 06-001, 06-002, and 08-001 would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Any existing evaluation-related or baseline collection disturbances by MMC would be reclaimed in accordance with Operating Permit No. 00150, with the exception of seed mixtures. MMC intends to use locally sourced seed when possible. MMC may substitute specific species in the final seed mixtures at the Libby Adit Site if approved by DEQ.

The conditions under which the Forest Service could select the No Action Alternative are described in Section 1.6, *Agency Roles, Responsibilities, and Decisions*.

Alternative 2

The Project, as permitted by DEQ, is described as Alternative 2 in the SEIS. Project activities are incorporated into MMC's Hard Rock Operating Permit No. 00150 through two revisions, MR 06-001 and MR 06-002. DEQ approved the 2006 revisions in 2006 (DEQ 2006a, 2006b). Another revision, MR 08-001, allowed relocation of fuel and oil storage areas at the Libby Adit Site and the addition of more fuel storage capacity. MMC conducted rehabilitation work on half of the Libby Adit consistent with DEQ approvals before ceasing in 2009; the work involved dewatering, installation of ground support and utilities, and ventilation.

In Alternative 2, Project activities would occur at the existing Libby Adit Site and underground in the Libby Adit within and outside of MMC's extralateral rights. MMC also would use National Forest System roads for access (Figure 303). Currently, MMC maintains existing infrastructure at the Libby Adit Site, including a Water Treatment Plant with a capacity of 500 gallons per minute (gpm). Other existing supporting surface facilities include an office, a shop, portable generators, a waste rock storage area, and other ancillary facilities. During the Project, MMC would expand the existing waste rock storage area and develop an additional lined waste rock storage area on the main portal pad site. MMC does not anticipate any disturbance outside of the existing DEQ-permitted disturbance area of 11.6 acres. During the Project, MMC would maintain an existing fence surrounding the Libby Adit Site disturbance area. MMC would snowplow Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) in the winter to provide access to the Libby Adit Site from US 2.

The existing Libby Adit (decline) is 14,006 feet in length from the portal entrance and is 18 feet wide and 18 feet high. In 2009, MMC dewatered the adit and installed ground support, utilities, and ventilation in the first 7,200 feet of the adit. Alternative 2 evaluation drilling would consist of dewatering and rehabilitation of the remaining extent of the existing Libby Adit (Figure 305), development of 16 drill stations and 7,100 feet of underground drifts (18 feet by 18 feet) below the ore body (Figure 306), and underground evaluation and drilling within and outside of MMC's extralateral rights. MMC would keep all drifts and drill pads 500 feet from Rock Lake and 100 feet from Rock Lake Fault.

An estimated 545,300 tons of waste rock would be generated from development drifts, muck bays, underground sumps, and underground drill hole stations (Table 307 in Chapter 2). Waste rock would be hauled to the surface and stored at one of two lined waste rock storage areas at the Libby Adit Site (Figure 307). One waste rock storage area currently exists on-site; it has a polyvinyl chloride (PVC) liner. A second waste rock storage area would be constructed. Precipitation that infiltrated the storage areas would be collected and conveyed to an existing stormwater pond that is lined with a 60-mil PVC liner and designed for the 25-year/24-hour storm. Waste rock would remain in the lined storage areas until closure. MMC would backfill 15.5 tons of waste rock into the Libby Adit between the two adit plugs and would regrade, topsoil, and reseed the remainder as part of reclamation activities.

The Libby Adit would be dewatered completely, and water would be treated at the existing Water Treatment Plant, which uses ultrafiltration to remove metals sorbed onto particulates suspended in the water, thereby reducing total suspended sediments and metal concentrations. MMC's MPDES

permit MT0030279 regulates wastewater discharges from the Libby Adit and sets effluent limits for discharges to both surface water and groundwater. Treated adit water would discharge to the distribution box at the percolation pond (Outfall 001). MMC has never used two other permitted outfalls at the Libby Adit Site.

During dewatering, power would be provided by three existing Tier 3 225 kW electrical generators. During drift development, power would be provided by three (only two would operate at a time) portable Tier 2 generators under a Montana Air Quality Permit held by Cummins, USA (MAQP #4063-00).

DEQ currently holds a bond to cover reclamation of 11.6 acres at the Libby Adit Site, including plugging the existing adit with two plugs, associated with its approval of revision 06-002. MMC would reclaim facilities associated with the Project consistent with its operating permit, except for seed mixtures. MMC intends to use locally sourced seed when possible. MMC may substitute specific species in the final seed mixtures at the Libby Adit Site if approved by DEQ.

Project activities are anticipated to last 18 to 24 months; the duration of the Project, including closure, may be up to 5 years. During dewatering and adit rehabilitation, MMC would employ 6 to 10 people at the Libby Adit Site, working two 10-hour shifts 7 days per week. During drift development and drilling, MMC would employ 30 to 35 people at the Libby Site, working 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.

Alternative 3

Alternative 3 would incorporate modifications and design features proposed by the KNF to avoid or minimize adverse environmental impacts. These measures are in addition to or instead of the mitigations proposed by MMC as part of Alternative 2. The KNF's modifications and design features were developed based on anticipated Project effects on the issues identified during the JFEIS scoping process.

Before and during the Project, Alternative 3 activities would occur at the existing Libby Adit Site, underground in the Libby Adit and within MMC's extralateral rights, at certain monitoring locations in the CMW, between Poorman Creek and Little Cherry Creek, along National Forest System roads used for access (Figure 309), and on roads where access changes would occur for grizzly bear mitigation (Table 309 in Chapter 2). Activity, including access changes, also may occur on 742.3 acres to be protected for grizzly bear habitat. The location of the Libby Adit Site and permit area and disturbance boundaries permitted by DEQ would be the same as described for Alternative 2. MMC does not anticipate any additional disturbance at the Libby Adit Site outside of the existing DEQ-permitted disturbance area of 11.6 acres. Some facilities, such storage areas and soil stockpiles, would be relocated within the existing disturbance area (Figure 310). If additional disturbance was needed outside the existing disturbance area, MMC would need authorization from DEQ and not the KNF because the adit site is not on National Forest System lands and is entirely owned by MMC. MMC would snowplow Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) in the winter to provide access to the Libby Adit Site from US 2.

Project activities would consist of construction and relocation of facilities at the Libby Adit Site, Libby Adit dewatering and rehabilitation, development of 35 drill stations and 6,300 feet of

underground drifts (15 feet by 15 feet) above the ore body, and underground evaluation and drilling within MMC's extralateral rights. MMC would keep all drifts and drill pads 1,000 feet from Rock Lake and 300 feet from Rock Lake Fault; these buffers would be verified by an independent mine surveyor selected by the KNF.

MMC would conduct geotechnical investigations between Poorman Creek and Little Cherry Creek on National Forest System lands in Sections 23 through 26, T28N, R31W and Section 19, T28N, R30W to provide additional information about subsurface conditions at a possible impoundment site (Figure 311). Access to the geotechnical investigation area from US 2 would be via Libby Creek Road, Bear Creek Road (NFS road #278) and Little Cherry Loop Road (NFS road #6212).

An estimated 281,000 tons (135,000 cubic yards) of waste rock and 6,000 tons of ore (mineralized rock that may be economic to mine) would be generated during the Project from development drifts, muck bays, underground sumps, and underground drill hole stations (Table 313 in Chapter 2). Waste rock and ore would be hauled to the surface and stored at one of two lined storage areas at the Libby Adit Site (Figure 310). MMC would expand an existing waste rock storage area and develop a second lined storage area on the main portal pad site. The existing waste rock storage area would be expanded to the north and west, increasing the footprint to 2.5 acres (an expansion of 1.3 acres). The expansion would include a PVC liner that would tie into an existing PVC liner. In addition, a second storage area would be constructed to the northeast of the existing one, with a footprint of 2.7 acres. The new storage area would use a high-density polyethylene (HDPE) liner. MMC would cover stockpiles of alteration-zone waste rock and ore with an impermeable material to minimize infiltration from precipitation. The combined capacity of both storage areas would be 164,000 cubic yards. Waste rock would remain in the lined storage areas until closure. Some waste rock would be used to backfill the Libby Adit as described for Alternative 2, and the remainder would be regraded and covered with soil as part of reclamation activities. Alteration-zone waste rock would be returned underground west of the easternmost bedrock plug. Ore encountered outside of MMC's extralateral rights for which removal was reasonably incident for access or other evaluation activities either would be stored underground or, if operations required its removal to the surface, would be stored separately in the lined surface storage areas. It would remain on the surface until adit closure, when it would be returned underground west of the easternmost bedrock plug along with the alteration-zone waste rock. A new 360,000-gallon-capacity waste rock sump would be constructed to replace the existing 75,000-gallon-capacity sump. It would be double-lined with an 80-mil HDPE liner and would include a leak detection system. All precipitation falling on the waste rock and covered ore stockpiles would be captured in the sump and then pumped to the Water Treatment Plant before discharge at Outfall 001. The expanded capacity would be sufficient to manage runoff that reports to the sump from a 100-year, 24-hour design storm event. Other disturbances at the Libby Adit Site include relocating an existing soil stockpile and creating and revegetating a new soil stockpile within the existing 11.6-acre existing disturbance area.

As in Alternative 2, the Libby Adit would be dewatered completely, and water would be treated at the existing Water Treatment Plant. Once water was processed through the treatment plant, it would flow to the distribution box at the percolation pond (Outfall 001). MMC has not applied for and is not authorized to discharge stormwater from any areas other than those described for in MPDES permit MT0030279. Before the KNF would allow MMC to start the geotechnical investigation, MMC would obtain a permit to discharge stormwater from disturbances associated with the geotechnical investigations or any other activity, if DEQ determined those activities were

construction activity that could result in a discharge. MMC could either amend its MPDES permit or obtain coverage under Montana's General Permit for Storm Water Discharges Associated with Construction Activity if the geotechnical investigations or any other activities were eligible for coverage under the General Permit.

In Alternative 3, MMC would conduct a 12-week geotechnical investigation between Poorman Creek and Little Cherry Creek to collect sufficient field data to support lab testing and geotechnical analysis that would be used to confirm the stability, capacity, and geometry of a tailings impoundment, a facility needed for the Montanore Project. To complete the geotechnical investigations, MMC would open and reconstruct where necessary existing closed NFS roads (Table 315 in Chapter 2); construct new access roads; and construct drill pads for boring test wells, piezometers, and cone penetration testing. Construction of new access roads and drill pads for test wells and piezometers would disturb 6.4 acres on National Forest System lands; no new disturbance would occur for road reconstruction, test pits (within roadbeds), or drill pads for cone penetration testing (within roadbeds). MMC would rehabilitate restricted NFS roads used during the activity and would decommission and revegetate all new roads no longer required as soon as practical after completion of the geotechnical investigations. Boreholes that would not be completed as piezometers would be backfilled with the material removed from the hole. On all disturbed sites, MMC would amend the top 0 to 4 inches of soil before seeding with a KNF-approved wood-based organic amendment to raise the organic matter level in the soil to a minimum of 1 percent by volume. Disturbed areas associated with the geotechnical investigations would be reseeded using a seed mix approved by the KNF and consistent with the KNF-approved 2018 seed mix (Savage 2018).

In Alternative 3, before starting the Project, design features to reduce or avoid impacts on wildlife and fisheries would be implemented, pre-disturbance surveys would be completed, and monitoring would occur in certain locations, including the CMW. Table 304 in Chapter 2 summarizes the design features that would be implemented to reduce or avoid adverse impacts on wildlife and fisheries. Road access changes described in Table 309 are shown on Figure 312. Before any ground-disturbing activities occurred, MMC would complete an intensive cultural resources inventory and sensitive plant surveys on all areas where such surveys have not been completed and that would be disturbed during the Project. Monitoring required before the Project is summarized in Appendix C of the SEIS; most pre-Project monitoring relates to hydrological resources. Some monitoring would occur at certain locations in the CMW. Each monitoring plan in Appendix C describes the timing of implementation and location of activities.

In Alternative 3, design features such as road improvements and noise mitigation would be implemented during the Project. Mitigation for bull trout and wildlife also would be implemented. Monitoring required in Alternative 3 is summarized in Appendix C. In all cases, the monitoring would begin before or concurrently with the effect for which the monitoring occurred.

If MMC decided not to pursue development of the Montanore Project, MMC would reclaim the Libby Adit Site. Site reclamation in Alternative 3 would differ somewhat from Alternative 2. If needed, a third adit plug would be installed beneath the east side of the Cabinet Mountains to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. Alteration-zone waste rock and ore would be returned underground west of the easternmost bedrock plug.

As in Alternative 2, Project activities are anticipated to last 18 to 24 months, and the duration of the Project, including closure, may be up to 5 years. Employment related to activities at the Libby Adit Site and underground would be the same as Alternative 2. Geotechnical investigation work would be completed by 6 individuals on-site at any given time working up to 7 days per week, 10 hours per day over a 12-week period.

Alternative 4

In Alternative 4, the Project, including design features, would be the same as described for Alternative 3 apart from geotechnical investigations. Before and during the Project, activities would occur at the existing Libby Adit Site, underground in the Libby Adit and within MMC's extralateral rights, at certain monitoring locations in the CMW, between Poorman Creek and Little Cherry Creek, and along National Forest System roads used for access (Figure 315). Activity, including access changes, also may occur on 742.3 acres to be protected for grizzly bear habitat. Permit and disturbance areas would be similar to those described for Alternative 3. Alternative 4 geotechnical investigations would occur over a 4-week period; would occur in Sections 23 and 24, T28N, R34 W and Section 19, T28N, R30W; and would disturb 1.5 acres between Poorman and Little Cherry Creeks (Figure 316). Access to the geotechnical investigation area from US 2 would be the same as Alternative 3. Monitoring requirements before and during the Project would be the same as those described for Alternative 3. If MMC decided not to pursue Montanore Project development, reclamation would be the same as described for Alternative 3.

Forest Plan Consistency

The KFP (USDA Forest Service 2015a) provides a framework and text that guide resource management on National Forest System lands. The KNF reviewed all Evaluation Project action alternatives, including its preferred Evaluation Project alternative (Alternative 3), for consistency with all pertinent KFP direction. The *Regulatory Framework* subsection of each Chapter 3 resource section provides the pertinent KFP direction, and KFP compliance is discussed for each alternative in the *Regulatory/Forest Plan Consistency* subsections. An evaluation of Alternative 3 compliance with the KFP is included in the administrative record for the Project.

Alternatives 3 and 4 would be consistent with all pertinent KFP direction. With project-specific plan amendments suspending the following guidelines (RF-2, RF-4, MM-1, FW-GDL-RIP-01, FW-GDL-WL-01, FW-GDL-WL-15, and Guideline HU G8), Alternative 2 would be consistent with all pertinent KFP direction.

Affected Environment

The Project is on the KNF, 18 miles south of Libby, Montana. Elevation of the analysis area ranges from 2,600 feet along US 2 to nearly 8,000 feet in the Cabinet Mountains. Most of the area is forested. Annual precipitation varies over the area and is influenced by elevation and topography. Precipitation is between 30 and 50 inches annually in the analysis area. The ore body is beneath the CMW, and all access and surface facilities would be outside of the CMW boundary. The analysis area is drained by East Fork Rock Creek and the East Fork Bull River, which flow into the Clark Fork River, Libby Creek and its tributaries, and tributaries to the Fisher River. Libby Creek provides surface water drainage for most of the area where Project activities would occur. Most of the area is National Forest System lands managed in accordance with the KFP. Most private land in the analysis area is owned by Libby Placer Mining Company or MMC.

Residential areas are found along US 2, Libby Creek Road, and Bear Creek Road. Recreation, wildlife habitat, and timber harvesting are the predominant land uses. Important grizzly bear and lynx habitat is found in the area. Segments of Libby Creek, Rock Creek, East Fork Rock Creek, and the East Fork Bull River are designated bull trout critical habitat. Chapter 3 in the JFEIS provides more information about the affected environment. The SEIS updates or supplements the JFEIS affected environment descriptions for some resource sections, such as *Aquatic Life and Fisheries*, *Water Quality*, *Socioeconomics*, *Transportation*, and *Wildlife*.

Environmental Consequences

Table 301 summarizes the environmental consequences by resource for each alternative, including the No Action Alternative. The environmental consequences of each alternative are described in detail in Chapter 3.

Table 301. Comparison of Project Effects by Resource.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Air Quality	Particulate and gaseous emissions from the Libby Adit, electrical generators, and vehicles accessing the Libby Adit Site would continue until the adit was plugged. Emissions would return to existing conditions after the Libby Adit Site was reclaimed.	*Libby Adit Site*: Similar to Alternative 3. *Geotechnical Investigation Area*: No effect. *Other Areas*: Similar to Alternative 3.	*Libby Adit Site:* Project activities would meet National and Montana ambient air quality standards. Emissions would be substantially less than those allowed by MMC's air quality permit 3788-00, and, if Tier 4 engines were available and used in underground mobile equipment and on generators, emissions would be less than what was disclosed in the JFEIS. *Geotechnical Investigation Area*: Vegetation clearing and drilling activities would generate short-term (12 weeks or less) particulate and gaseous emissions. Emissions would be from mobile sources not regulated by the air quality permit and would meet National and Montana ambient air quality standards. *Other Areas*: Changes in $PM_{2.5}$ concentrations within Libby's nonattainment area would be negligible, and PSD Class I annual NO_2 increment would not be consumed by the NO_x emissions. Nitrogen deposition rates would be less than the deposition analysis thresholds at Upper Libby Lake, Lower Libby Lake, and Rock Lake. Sulfur deposition rates are expected to be below the sulfur deposition analysis threshold. Emissions would return to existing conditions after the Libby Adit Site was reclaimed.	*Libby Adit Site*: Same as Alternative 3. *Geotechnical Investigation Area*: Same as Alternative 3. *Other Areas*: Same as Alternative 3.
American Indian Rights	No effect.	No known effect.	No known effect.	No known effect.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Aquatic Life and Fisheries	*Streamflow and Water Quality Effects:* Effects of existing adit dewatering on streamflow, water quality, and bull trout habitat in Libby Creek would continue until the adit was plugged. No effect on streamflow in East Fork Rock Creek and East Fork Bull River, and no additional effect on Libby Creek streamflow.	*Streamflow and Water Quality Effects:* Same as Alternative 3.	*Streamflow and Water Quality Effects:* Beneficial increase in Libby Creek flow below Libby Adit Site; negligible change in streamflow in East Fork Rock Creek and East Fork Bull River. Negligible temperature and water quality changes associated with the Water Treatment Plant discharge to groundwater adjacent to Libby Creek. Negligible changes in total dissolved solids concentrations and temperature in East Fork Rock Creek, Rock Creek, East Fork Bull River, and lower Bull River.	*Streamflow and Water Quality Effects:* Same as Alternative 3.
	RHCAs: No effect.	*RHCAs:* No effect	*RHCAs:* 185 feet of access road unavoidably required. Implementation of BMPs would minimize or avoid sediment delivery to the adjacent wetlands; sediment delivery to a stream would be avoided.	*RHCAs:* No effect.
	Sediment: No effect.	*Sediment:* No effect.	*Sediment:* Possible short-term increase in sediment delivery to analysis area streams; long-term reduction in sediment delivery.	*Sediment:* Same as Alternative 3.
	Bull Trout: No effect.	*Bull Trout:* No effect.	*Bull Trout:* May affect and is not likely to adversely affect bull trout in the Kootenai River core area or in the Lake Pend Oreille core area.	*Bull Trout:* Same as Alternative 3.
	Bull Trout Critical Habitat: No effect.	*Bull Trout Critical Habitat:* No effect.	*Bull Trout Critical Habitat:* May affect and is not likely to adversely affect critical habitat in the Kootenai River core area or in the Lake Pend Oreille core area.	*Bull Trout Critical Habitat:* Same as Alternative 3.
	Sensitive Species: No effect.	*Sensitive Species:* No effect.	*Sensitive Species:* May impact individuals but not likely to lead to a federal listing.	*Sensitive Species:* Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Cultural Resources	Natural weathering, deterioration, and vandalism of cultural resources would continue.	*Libby Adit Site*: Same as Alternative 3.	*Libby Adit Site*: No additional ground disturbance outside of the existing 11.6-acre disturbance area; no cultural resources at the site would be affected. Review and consultation with the State Historic Preservation Office (SHPO) is required for site 24LN943 (logging camp at the Libby Adit area).	*Libby Adit Site*: Same as Alternative 3.
		Geotechnical Investigation Area: No effect.	*Geotechnical Investigation Area:* Adverse effects on the Libby Mining District from construction of new access roads and drill pads. An estimated 2,690 feet of Site 24LN1209 (road #1408) would be used for access and adversely affected.	*Geotechnical Investigation Area*: Adverse effects on the Libby Mining District from construction of new access roads and drill pads. Site 24LN1209 (road #1408) would not be used for access.
		Other Areas: No effect.	*Other Areas*: Road best management practices (BMPs) and culvert removal/access changes on grizzly bear mitigation lands would cause some ground disturbance; an intensive cultural resource inventory of any location to be disturbed that had not been previously inventoried would be completed. MMC would follow the requirements of a Programmatic Agreement between the KNF and the SHPO.	*Other Areas*: Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Groundwater Hydrology—Underground Evaluation Area	*Groundwater Drawdown*: Effects of existing adit dewatering on groundwater levels would continue until the adit was plugged. No additional groundwater drawdown.	*Groundwater Drawdown*: Same as Alternative 3.	*Groundwater Drawdown*: As predicted by a 3D groundwater model, drawdown would be greatest along the trend of the Libby Adit and along the Snowshoe fault, ranging between 10 and 100 feet in most locations. The predicted drawdown was between 100 and 500 feet in a few areas.	*Groundwater Drawdown*: Same as Alternative 3.
	Baseflow: Effects of existing adit dewatering on Libby Creek baseflow would continue until the adit was plugged. No effect on baseflow in East Fork Rock Creek and East Fork Bull River and no additional effect on Libby Creek baseflow.	*Baseflow*: Same as Alternative 3.	*Baseflow*: Small reductions in baseflow of less than 3 percent (predicted by 3D model) would be expected in Libby Creek, East Fork Rock Creek, and East Fork Bull River.	*Baseflow*: Same as Alternative 3.
	Springs and Seeps: Effects of existing adit dewatering on springs and seeps would continue until the adit was plugged.	*Springs and Seeps*: Effect same as Alternative 3. No groundwater-dependent ecosystem monitoring proposed.	*Springs and Seeps*: Springs below an elevation of about 5,000 to 5,600 feet may derive their water from both shallow and deep groundwater and may be affected by groundwater drawdown. Groundwater-dependent ecosystem monitoring described in Appendix C would require determination of sources for springs.	*Springs and Seeps*: Effect and monitoring same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Groundwater Hydrology—Libby Site Closure	MMC would place two plugs in the Libby Adit, and Water Treatment Plant discharges would cease. Groundwater levels and baseflow in Libby Creek would reach steady-state conditions 2 to 3 years after the adit flooded. Baseflow in East Fork Rock Creek and East Fork Bull River would not be affected. Groundwater storage effects would be less than Alternatives 2, 3, and 4 due to less underground development.	MMC would place two plugs in the Libby Adit, and Water Treatment Plant discharges would cease. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. A change in groundwater flow path may occur, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. Any changes in baseflow in East Fork Rock Creek and East Fork Bull River would be more likely to be permanent than in Alternatives 3 and 4. The estimated increase in groundwater storage compared to storage before underground activities would be about 60 million gallons or 186 acre-feet of water.	MMC would place two plugs in the Libby Adit as described in Alternative 2, and Water Treatment Plant discharges would cease. If needed, a third plug would be placed in the adit to prevent a change in groundwater flow path described in Alternative 2. If the third plug was installed, the time to fill the adit and drifts and to reach steady-state groundwater levels would be about half of what it would be with two plugs (Alternative 2). Changes in baseflow in East Fork Rock Creek and East Fork Bull River would return to existing conditions. The estimated increase in groundwater storage would be slightly less than Alternative 2 due to smaller drift sizes.	Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Surface Water Hydrology	*Streamflow*: Effects of existing adit dewatering on Libby Creek streamflow would continue until the adit was plugged. No effect on streamflow in East Fork Rock Creek and East Fork Bull River and no additional effect on Libby Creek streamflow.	*Streamflow*: 3D model-predicted streamflow would increase in Libby Creek at LB-300 and LB-2000. Streamflow in the East Fork Bull River at the mouth (3D model-predicted) would decrease slightly due to baseflow reductions. Changes to the wetted perimeter would occur in Rock Creek (reduction at RC-3) and Libby Creek (increase at LB-2). Discharges would slightly increase peak flow and average annual flow in Libby Creek (LB-300). *Rock Lake and Rock Lake Meadows*: Negligible reductions to lake volume would occur due to predicted reductions in groundwater discharge to the lake. Slight flow reductions in the East Fork Rock Creek (3D model-predicted) would occur where it enters Rock Creek Meadows due to predicted baseflow reductions.	Predicted effects on streamflow, wetted perimeters, and Rock Lake would be the same as Alternative 2. Because of increased buffer zones, the likelihood of encountering higher inflows adjacent to the Rock Lake Fault would be less than in Alternative 2.	Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Surface Water Hydrology—Libby Site Closure	MMC would place two plugs in the Libby Adit, and Water Treatment Plant discharges would cease. Streamflow in Libby Creek would return to existing conditions 2 to 3 years after the adit flooded. Streamflow in East Fork Rock Creek and East Fork Bull River would not be affected.	Libby Adit plugging same as Alternative 1. If groundwater flowed from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage, streamflow in west-side streams probably would be more than predicted by the 3D model for the Evaluation Project but less than existing conditions. Libby Creek flow may be slightly greater than existing conditions if such a diversion of groundwater occurred.	MMC would place two plugs in the Libby Adit, and the KNF would assess if a third plug was needed. A third plug, if needed, would ensure that streamflow in East Fork Rock Creek, East Fork Bull River, and Libby Creek would return to existing conditions. A third plug also would ensure that groundwater discharge into Rock Lake would return to existing conditions.	Same as Alternative 3.
Water Rights	No senior water right would be adversely affected.	No senior water right would be adversely affected.	No senior water right would be adversely affected. Water for field permeability testing of piezometers would be from potable sources and brought to the site with a water truck or from nearby piezometer wells developed within the same aquifer to be tested. Water testing or monitoring is not a beneficial use of water requiring a permit. The Forest Service's 40 cfs instream right in Libby Creek would not be adversely affected by MMC's permeability testing.	Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Water Quality—Adit Inflows, Discharge, and Stream Temperatures	Effect of adit inflows and discharges on groundwater and surface water quality in Libby Creek and groundwater quality beneath the Libby Adit Site would continue until the adit was plugged.	The effects of groundwater drawdown and waste rock management while the Libby Adit remained open would be similar to Alternative 3. The effects of Water Treatment Plant discharges and sanitary waste management on water quality, including stream temperatures, would be the same as Alternative 3. MMC's Explosives Management Plan would minimize effects of residual nitrate residue on waste rock (from blasting).	*Groundwater Drawdown*: Effects on stream and Rock Lake water quality would be negligible. Water quality changes in springs and seeps may be slight and not detectable, depending on the ratio between shallow and deep groundwater contribution to each spring. *Water Treatment Plant Discharge*: Discharges to groundwater are predicted to increase concentrations of nutrients and some metals in groundwater beneath the Libby Adit Site. Discharges also would increase total dissolved solids, nitrogen, total phosphorus, and some metal concentrations in Libby Creek at and below LB-300 to above ambient concentrations. DEQ approved mixing zones in both groundwater and surface water. Board of Health and Environmental Sciences (BHES) Order limits or applicable nondegradation criteria would not be exceeded outside of approved mixing zones. *Stream Temperature*: Temperature changes in Libby Creek associated with the Water Treatment Plant discharge to groundwater adjacent to Libby Creek have been and would continue to be negligible. The quality of the treated effluent would continue to be monitored in accordance with the 2017 MPDES permit. MMC would measure water levels and temperatures at MW07-01 and MW07-02, monitoring wells downgradient of the percolation pond, with electronic data recorders. *Sanitary Waste Management*: BHES Order limits would not be exceeded for nitrate in groundwater or total inorganic nitrogen (TIN) in nearby Libby Creek.	Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Water Quality—Stormwater Runoff and Erosion	Same as Alternative 2.	Compliance with MMC's Stormwater Pollution Prevention Plan (SWPPP) would minimize erosion and sediment transport from the Libby Adit Site. Stormwater could be discharged without treatment in the unlikely event that a storm greater than the 25-year/24-hour storm occurs at the Libby Adit Site. The risk would be higher than in Alternatives 3 and 4 due to the smaller size of the pond.	Compliance with MMC's SWPPP would minimize erosion and sediment transport from the Libby Adit Site. MMC would obtain a permit to discharge stormwater associated with the geotechnical investigations or any other activity, if DEQ determined those activities were construction activity that could result in a discharge. At the Libby Adit Site, stormwater could be discharged without treatment in the unlikely event that a storm greater than the 100-year/24-hour storm occurred. The risk would be 4 times less than in Alternative 2, which would use a smaller pond. Implementing BMPs would briefly increase turbidity and sediment concentrations but would ultimately reduce sediment in area creeks. Sediment and runoff from all disturbed areas in the geotechnical investigation area would be minimized through the use of BMPs. Access changes for wildlife mitigation would reduce the average annual sediment delivery to area streams from roads. Roads on 742.3 acres of grizzly bear mitigation lands would be monitored for stability, drainage, and erosion control.	Similar to Alternative 3. The limited nature of the geotechnical investigations in Alternative 4 would result in a slightly lower risk of increased sediment delivery compared to Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Water Quality—Libby Site Closure	Effect of discharges to groundwater on surface water in Libby Creek and groundwater quality beneath the Libby Adit Site would continue until the adit was plugged.	See above under Groundwater. Any changes in water quality in East Fork Rock Creek, Rock Lake, and East Fork Bull River due to a change in groundwater flow path would be more likely to be permanent than in Alternatives 3 and 4.	See above under Groundwater. Installing a third plug, if necessary, would ensure that water quality in East Fork Rock Creek, East Fork Bull River, and Libby Creek would return to existing conditions. Installing a third plug also would ensure that groundwater discharge into Rock Lake and Rock Lake water quality also would return to existing conditions.	Same as Alternative 3.
Geotechnical Engineering (Subsidence)	Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Potential subsidence from the Libby Adit would be mitigated by backfilling the entire adit length that occurred in unconsolidated bedrock.	The risk of chimney subsidence would be the same as Alternative 3. 500-foot vertical and horizontal buffers from Rock Lake and a 100-foot barrier pillar from the Rock Lake Fault would reduce subsidence risk and the interception of groundwater near the drifts and drill pads. The adit extension, drift, and drill pads would be 18 feet high and 18 feet wide; caving propagation heights of up to 100 feet could occur.	A depth to cover of at least 2,100 feet would make it unlikely that chimney subsidence (if it occurred) would breach the surface to form sinkholes. Increased buffers from Rock Lake (1,000 feet) and Rock Lake Fault (300 feet) would decrease the risk of subsidence compared to Alternative 2. Potential subsidence risk also would be less than in Alternative 2 due to reduced height and width (15 feet by 15 feet) of the adit extension, drift, and drill pads and due to smaller caving propagation heights.	Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Land Use	Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Use of National Forest System lands would continue to be managed in accordance with the KFP. Existing land use of private land in the analysis area would continue.	*Libby Adit Site:* Same as Alternative 1. *Geotechnical Investigation Area*: No disturbance or change in land use. *Other Areas:* No disturbance or change in land use.	*Libby Adit Site*: Same as Alternative 1. *Geotechnical Investigation Area*: 6.4 acres of disturbance within MA6-General Forest. *Other Areas:* MMC would transfer fee title or place a conservation easement on 742.3 acres of private land for grizzly bear mitigation. The measure would restrict future residential and commercial development on these lands.	*Libby Adit Site*: Same as Alternative 3. *Geotechnical Investigation Area*: 1.5 acres of disturbance within MA6. *Other Areas:* Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Recreation	*Libby Adit Site:* Visitors to the area may experience increased noise levels from reclamation activities at the Libby Adit Site. These effects would be temporary, and there would be no long-term effects on visitors' recreational experiences if Project activities were not implemented.	*Libby Adit Site*: Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) would be snowplowed in the winter, improving winter recreation access to areas off of the roads. Snowmobile and cross-country skiing use of Libby Creek Road and parts of Upper Libby Creek Road would not be available during the Project. The ROS class along these roads would change to Roaded Natural/Rural. After the Libby Adit Site was reclaimed and closed, ROS classes along these roads would return to pre-Project conditions. *Geotechnical Investigation Area*: No effect. *Other Areas:* No effect.	*Libby Adit Site:* Same as Alternative 2. *Geotechnical Investigation Area:* Negligible effects on recreationalists using the area and people fishing along Libby Creek due to noise from short-term drilling operations. *Other Areas:* Access and road access changes in Alternatives 3 and 4, including the fee title mitigation lands option, would change the ROS classes along 19 roads, increasing semiprimitive nonmotorized recreational opportunities. MMC would transfer fee title to or place a conservation easement on 742.3 acres of private land for grizzly bear mitigation. Mitigation lands may be used for nonmotorized recreation, provided such use was consistent with grizzly bear recovery. Lands transferred to the KNF under the fee title option would be managed under the KFP.	*Libby Adit Site*: Same as Alternative 2. *Geotechnical Investigation Area*: Same as Alternative 3. *Other Areas:* Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Scenery	*Libby Adit Site*: The existing Libby Adit Site disturbances would remain and would be visible from one KOP in a montane forest at a NFS road #231 pullout. Disturbances on private land at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Regrading and revegetating the site would create areas with similar landscape characteristics to the surrounding area over the long term.	*Libby Adit Site*: Project activities would not alter the scenic integrity of any National Forest System lands. The existing Libby Adit Site would continue to alter views from the scenic overlook at KOP 2, Elephant Peak (KOP 3), the south NFS road #231 pullout (KOP 4), a portion of NFS roads #231 and #4776, portions of the CMW, and a portion of a private land parcel along Libby Creek northeast of the adit site. Viewing significance, as defined by the Concern Levels from the three KOPs and two roads, would remain high due to high visitor use and long viewing duration. *Geotechnical Investigation Area*: No effect. *Other Areas:* No effect.	*Libby Adit Site*: Same as Alternative 2. *Geotechnical Investigation Area:* 6.4 acres of vegetation would be cleared between Poorman Creek and Little Cherry Creek. Clearing. MMC would implement measures to harmonize operations with scenic values (to be described in the Evaluation Phase Project Vegetation Removal and Disposition Plan). The geotechnical investigations would comply with scenic integrity objectives of low and moderate. *Other Areas:* MMC would implement or fund yearlong access changes on National Forest System and private14 roads. Over the long term, as vegetation on the decommissioned roads became established, the scenic integrity of decommissioned roads would return to conditions before the roads were constructed.	*Libby Adit Site*: Same as Alternative 2. *Geotechnical Investigation Area:* 1.5 acres of clearings between Poorman Creek and Little Cherry Creek. Mitigation would be the same as Alternative 3. *Other Areas: S*ame as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Social/ Economics	Economic effects associated with activities at the Libby Adit Site would continue until the site was reclaimed in accordance with Operating Permit No. 00150.	*Libby Adit Site:* During dewatering and adit rehabilitation, MMC would employ 6 to 10 people at the Libby Adit Site. During drift development and drilling, MMC would employ up to 30 to 35 people at the Libby Adit Site and would work two 10-hour shifts 7 days per week. Secondary employment is estimated be 18 to 21 people. Total estimated income during the Project, including secondary income, would be $3.67 million in 2017 dollars. *Geotechnical Investigation Area*: No effect.	*Libby Adit Site:* Same as Alternative 2. *Geotechnical Investigation Area*: Work would be completed by contractors during a 12-week period (2.5 man-years on an annual basis). Direct labor income for the contract individuals is estimated to range from $200,000 to $250,000. Total Project cost is estimated to range from $650,000 to $950,000 with non-labor costs allocated to equipment rental, materials, and other contractor indirect charges.	*Libby Adit Site*: Same as Alternative 2. *Geotechnical Investigation Area:* Work would be completed by contractors during a 4-week period (0.75 man-years on an annual basis). Direct labor income for the contract individuals is estimated to range from $60,000 to $75,000. Total Project cost is estimated to range from $200,000 to $290,000 with non-labor costs allocated to equipment rental, materials, and other contractor indirect charges.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Soils and Reclamation	MMC would reclaim all existing soil disturbances in accordance with Operating Permit No. 00150 except for seed mixtures, which would be locally sourced and selected in consultation with the KNF and DEQ. Erosion and sedimentation would occur at existing rates along NFS roads #231 and #2316 and other existing roads. Soil erosion losses due to rainfall, runoff, and wind would continue at natural rates at other locations in the analysis area.	*Libby Adit Site*: Similar to Alternative 1. Increased traffic on NFS roads #231 and #2316 would lead to some increased soil loss. Reclamation would be the same as Alternative 1. *Geotechnical Investigation Area*: No effect.	*Libby Adit Site*: MMC would disturb existing revegetated areas and an existing soil stockpile within the existing 11.6-acre disturbance area at the Libby Adit Site, resulting in loss of some soil material. A new soil stockpile would be created. Reclamation would be the same as Alternative 2. *Geotechnical Investigation Area*: 6.4 acres of disturbance. Most coniferous forest debris would be removed before soil salvage to minimize metal leaching, low pH, and nutrient loss. Physical, chemical, and biological changes in stored soils would be negligible due to the short duration of storage. MMC would decommission and revegetate all new roads no longer required as soon as practical. Soil compaction would be short-term in all disturbed areas due to mitigation measures such as ripping and harrowing. On new disturbances on National Forest System lands, MMC would be required to comply with Region 1 soil quality standards. MMC would use KNF detrimental soil disturbance field forms to assess pre-disturbance and post-disturbance soil conditions. *Other Areas:* Implementing the required Road Management Plan, BMPs, and reduction of contributing road lengths at six RHCA crossings would ensure that erosion and sediment delivery from roads would be minimized.	*Libby Adit Site*: Same as Alternative 3. *Geotechnical Investigation Area*: Disturbed acreage for geotechnical investigations would be less in Alternative 4 than Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Sound	Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. These activities would increase ambient noise levels near the adit. After the site was reclaimed, sound levels would return to existing conditions.	*Libby Adit Site:* Existing noise sources would continue and would increase slightly with increased activities, such as construction and traffic. Reclamation activities would increase ambient noise levels near the adit until reclamation. Noise levels are predicted to reach the existing ambient daytime noise level of 30 dBA at 3.3 miles from the Libby Adit Site. Noise levels at the Libby Creek Recreational Gold Panning Area would range from 35 to 45 dBA. Once reclamation was complete, sound levels would return to existing conditions. *Geotechnical Investigation Area:* No effect. *Other Areas*: No effect.	*Libby Adit Site*: Similar to Alternative 2; noise mitigations would minimize effects from the site. *Geotechnical Investigation Area:* During a 12-week period, increased noise would occur from road construction and drilling in the area between Poorman Creek and Little Cherry Creek. Outdoor users of private property east of the geotechnical investigation area (900 feet to the closest) would experience noise levels between 55 and 60 dBA and would perceive a substantial increase in noise levels from ambient levels. Noise mitigation would minimize effects. *Other Areas*: Mitigation activities, such as culvert removals and other activities associated with access changes, would have a minor short-term effect on sound levels.	*Libby Adit Site*: Similar to Alternative 3. *Geotechnical Investigation Area:* Compared to Alternative 3, duration of the geotechnical investigations would be shorter and the distance from private property would be farther (2,500 feet). *Other Areas:* Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Transportation	Any traffic and congestion associated with current activities at the Libby Adit Site would remain until the site was reclaimed in accordance with Operating Permit No. 00150. Traffic, congestion, and safety impacts probably would increase slightly during site reclamation and decrease from existing conditions after the site reclamation was completed and site monitoring ceased.	*Libby Adit Site*: Project activities would generate more vehicles per day on US 2 than in Alternative 3 as there would be no limitations on the use of personal vehicles. MMC would snowplow NFS roads #231 and #2316. *Geotechnical Investigation Area:* No effect. *Other Areas:* No effect.	*Libby Adit Site*: Before starting the Project, MMC would develop and implement a Transportation Plan and a Road Management Plan. Project activities would generate 10 or fewer additional vehicle trips per day on US 2 as there would be limitations on the use of personal vehicles and employees would be transported to the Libby Adit Site by buses, vans, and pickup trucks. Managers would also be required to carpool to the extent practicable, slightly reducing overall traffic and minimizing indirect effects compared to Alternative 2. *Geotechnical Investigation Area:* During the 12-week investigation period, traffic, congestion, and safety impacts would be slightly higher than Alternative 2 on US 2 and NFS roads #231 and #2316. Four to six vehicle trips per day would be made to and from the geotechnical investigation area. Traffic on county road 1408 and NFS roads #6212 and #278 would increase slightly. *Other Areas*: Access changes for wildlife mitigation would decrease traffic on some NFS roads compared to Alternative 2.	*Libby Adit Site*: Similar to Alternative 3. Traffic, congestion, and safety impacts related to the geotechnical investigations would be shorter in duration and confined to a smaller area. *Geotechnical Investigation Area:* Similar to Alternative 3. Duration of investigations would be shorter. *Other Areas:* Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Vegetation Communities	Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150, except for seed mixtures, which would be locally sourced and selected in consultation with the KNF and DEQ. Regrading and revegetating the site would create areas with similar landscape characteristics to the surrounding area over the long term.	*Libby Adit Site*: Same as Alternative 1. *Geotechnical Investigation Area:* No effect.	*Libby Adit Site*: Same as Alternative 1. *Geotechnical Investigation Area:* 6.4 acres of disturbance (3.4 acres of previously harvested coniferous forest and 3 acres of mature coniferous forest) would require some vegetation clearing. Reclamation would reestablish plant communities, but the biodiversity would be less, introduced species would be more common, species composition would not be the same, and timber production would be lost until the seral forest reestablished after several decades.	*Libby Adit Site*: Same as Alternative 1. *Geotechnical Investigation Area:* 1.5 acres of disturbance (1.1 acres of previously harvested coniferous forest and 0.4 acres of mature coniferous forest) would require some vegetation clearing. Effects similar to Alternative 3.
Old-Growth Ecosystems	All old-growth areas would maintain their existing conditions and continue to provide habitat for those species that use the area over the long term. In the Crazy PSU, 8,350 acres of old growth would remain.	Same as Alternative 1.	Negligible impact (less than 0.1 acre) on old growth in the Crazy PSU due to construction of a new access road, which would bisect a patch of old-growth habitat for 165 feet, increasing old-growth habitat fragmentation. Disturbance would be necessary to avoid additional impacts on Riparian Habitat Conservation Areas. In the Crazy PSU, 8,350 acres of old growth would remain.	Same as Alternative 1.
Threatened, Endangered, and Sensitive Plant Species	No effect on any Forest Service sensitive species.	Same as Alternative 1.	No impact on any Forest Service sensitive species. MMC would update surveys for Forest Service sensitive species before any ground-disturbing activities and develop mitigation for any unavoidable adverse effect.	Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Noxious Weeds	Noxious weeds at the Libby Adit Site would continue to be controlled in accordance with existing permits and approvals.	*Libby Adit Site:* Similar to Alternative 1. A 3-year continuous monitoring and treatment program would be implemented. Per the reclamation plan, vegetation composition would have less than 10 percent cover of noxious weeds. *Geotechnical Investigation Area:* No effect.	*Libby Adit Site*: Same as Alternative 2. *Geotechnical Investigation Area:* 6.4 acres of disturbance. Weed BMPs would be implemented. On reclaimed areas, noxious weeds would be less than 10 percent cover of species listed as Category 1 (established infestations) and 0 percent cover of categories 2 and 3 (potential invaders and new invaders). Native seed mix, if commercially available and consistent with the KNF-approved 2018 seed mix, would be used and would reduce the spread of invasive or noxious species. Shrubs and trees would be planted by hand in random patterns to prevent the spread or infestation of noxious weeds by limiting disturbance from machinery.	*Libby Adit Site*: Same as Alternative 2. *Geotechnical Investigation Area:* Similar to Alternative 3, but would have less disturbance (1.5 acres).

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Wetlands and Other Waters of the U.S.	No disturbance to or impacts on wetlands or other waters of the U.S.	No direct effects on jurisdictional or isolated wetlands. *Libby Adit Site*: Activities would avoid all wetlands and waters of the U.S. *Geotechnical Investigation Area:* No effect. *Other Areas*: No effect. *Indirect Effects*: Effects on wetlands, springs, and seep habitat overlying the Libby Adit may occur during adit dewatering and after reclamation, and would be difficult to predict.	No direct effects on jurisdictional or isolated wetlands. *Libby Adit Site*: Same as Alternative 2. *Geotechnical Investigation Area:* MMC would avoid isolated and jurisdictional wetlands and other waters of the U.S. when conducting the geotechnical investigations. *Other Areas*: Some BMPs and road activities associated with wildlife mitigation may require a 404 permit from the Corps. *Indirect Effects*: Effects on wetlands, springs, and seep habitat overlying the Libby Adit would be less than for Alternative 2 due to mitigations such as buffer zones, groundwater-dependent ecosystem monitoring, and an additional adit plug (if needed) at adit closure.	Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Wilderness	Sounds associated with existing activities at the Libby Adit Site would continue to be audible (at a level below a whisper) in a small portion of the CMW in the upper Libby Creek drainage until reclaimed in accordance with Operating Permit No. 00150. Noise levels in the CMW would return to low, ambient levels when reclamation was completed. Monitoring wells and other devices installed for monitoring, such as data loggers, would be removed and the area reclaimed.	No physical disturbance in the CMW and no direct effects on wilderness character. *Indirect Effects:* A slight increase in the indirect noise and visual effects in the CMW from activities at the Libby Adit Site compared to Alternative 1. Visual effects would diminish and noise effects would cease after reclamation at closure. Reductions in baseflow may directly impact aquatic habitat and associated ecological processes in the CMW; the average wilderness user would not notice reductions in flows or be able to distinguish changes from natural variability. Reductions in groundwater discharge may negligibly impact Rock Lake.	No physical disturbance in the CMW (other than installation of some monitoring equipment) and no direct effects on wilderness character. *Indirect effects:* Indirect noise and visual effects in the CMW would be slightly higher than in Alternative 2. Sources of noise and visual impacts include 12 weeks of geotechnical activities in addition to activities at the Libby Adit Site. Impacts from groundwater drawdown and associated reductions in baseflow would be less than in Alternative 2 due to such mitigations as increased buffer zones and an additional adit plug at reclamation. Reductions in groundwater discharge may negligibly impact Rock Lake. Additional water resources monitoring would occur in the CMW. Wilderness users may notice some additional monitoring equipment and may see monitoring crews working in the CMW. As part of the grizzly bear mitigation plan, MMC would fund access changes on three roads providing access to the CMW in the Bear Creek, Standard Creek, and East Fork Rock Creek drainages (Figure 312). These roads would be barriered and converted into trails, allowing vegetation to move toward more natural conditions.	Same as Alternative 3. *Indirect effects:* Same as Alternative 3.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Roadless Areas	Sounds associated with existing activities at the Libby Adit Site would continue to be audible (at a level below a whisper) in portions of the Cabinet Face East Inventoried Roadless Area (IRA) in the Libby Creek drainage. Noise levels in the Cabinet Face East IRA would return to low, ambient levels when reclamation was completed.	No direct effects, such as road construction or timber harvest, would occur. *Indirect Effects:* Slight increase in the indirect noise and visual effects in the Cabinet Face East IRA from activities at the Libby Adit Site compared to Alternative 1. Effects would diminish after reclamation at closure. Changes in baseflow would be negligible and would not affect the natural integrity of the Rock Creek and McKay Creek IRAs.	No road construction or timber harvest would occur. *Indirect Effects:* Noise and visual effects in the Cabinet Face East IRA from activities at the Libby Adit Site would be slightly higher than in Alternative 2. Sources of noise and visual impacts include 12 weeks of geotechnical activities in addition to activities at the Libby Adit Site. Water resources monitoring would occur in the Libby Creek and East Fork Rock Creek drainages. Recreational users may notice monitoring crews working in those drainages. Access changes on four roads leading into the Cabinet Face East IRA in the Bear Creek and Standard Creek drainages would improve the wintertime opportunities for solitude and primitive recreation. Effect on the natural integrity of the Rock Creek and McKay Creek IRAs same as Alternative 2.	No road construction or timber harvest would occur. *Indirect Effects*: Effects on the Cabinet Face East IRA would be similar to Alternative 3, but noise and visual impacts from the geotechnical investigations between Poorman and Little Cherry Creeks would be shorter in duration. Effect on the Rock Creek and McKay IRAs would be the same as Alternative 2.
Wild and Scenic Rivers	No impacts on eligible river segments.	No change to the free-flowing character or the scenic value of the East Fork Bull River or Bull River.	Same as Alternative 2.	Same as Alternative 2.

Resource	Alternative 1 No Action	Alternative 2 MMC's Proposal	Alternative 3	Alternative 4
Wildlife	*Snags and Woody Debris:* No effect.	*Snags and Woody Debris:* No effect.	*Snags and Woody Debris:* Negligible effect.	*Snags and Woody Debris:* Negligible effect.
	Elk Security Areas: No effect.	*Elk Security Areas:* No effect.	*Elk Security Areas:* Road access changes, specifically installation of barriers, included in Alternative 3 would increase elk security habitat by 807 acres.	*Elk Security Areas:* Same as Alternative 3.
	Big Game Habitat: Same as Alternative 2.	*Big Game Habitat:* No effect on cover or special habitats; minor effect on winter range and connectivity areas.	*Big Game Habitat:* No effect on special habitats; negligible effect on cover; minor effect on winter range and connectivity areas.	*Big Game Habitat:* Same as Alternative 3.
	Mountain Goat: Negligible effect.	*Mountain Goat:* Negligible effect.	*Mountain Goat:* Negligible effect.	*Mountain Goat:* Negligible effect.
	Sensitive Species: Same as Alternative 2.	*Sensitive Species:* Except for the black-backed woodpecker, same as Alternative 3. No effect on the black-backed woodpecker.	*Sensitive Species:* For all species, may impact individuals or their habitat, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.	*Sensitive Species:* Same as Alternative 3.
	Grizzly Bear: May affect and is not likely to adversely affect the grizzly bear.	*Grizzly Bear:* May affect and is likely to adversely affect the grizzly bear.	*Grizzly Bear:* May affect and is not likely to adversely affect the grizzly bear.	*Grizzly Bear:* Same as Alternative 3.
	Lynx: May affect and is not likely to adversely affect the lynx.	*Lynx:* May affect and is not likely to adversely affect the lynx.	*Lynx:* May affect and is not likely to adversely affect the lynx.	*Lynx:* Same as Alternative 3.
	Migratory Birds: Same as Alternative 2.	*Migratory Birds:* Negligible effect.	*Migratory Birds:* Negligible effect.	*Migratory Birds:* Negligible effect.
	Moose: No effect.	*Moose:* Minor effect.	*Moose:* Minor effect.	*Moose:* Minor effect.

Where to Obtain More Information

More information on the Project can be found on the KNF's website: http://www.fs.usda.gov/projects/kootenai/landmanagement/projects. If you have any additional questions or concerns, please contact:

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Chapter 1. Purpose of and Need for Action

The proposed federal action analyzed in the SEIS is approval of a Plan of Operations for the Montanore Evaluation Project (Project), consistent with the Organic Administration Act, Locatable Minerals Regulations 36 Code of Federal Regulations (CFR) 228 Subpart A, and the Multiple Use Mining Act. The Project would use an existing evaluation adit on private land in upper Libby Creek to drill into and evaluate a copper and silver ore body; would conduct surface monitoring activities, including some in the Cabinet Mountains Wilderness (CMW); and, in some alternatives, would complete geotechnical and hydrologic studies on National Forest System lands between Little Cherry Creek and Poorman Creek. Montanore Minerals Corporation (MMC), a subsidiary of Mines Management, Inc. (MMI), a subsidiary of Hecla Mining Company, would be the Project operator. The SEIS tiers to environmental analysis completed in 2015 for the Montanore Project, a previously proposed underground copper and silver mine about 18 miles south of Libby near the Cabinet Mountains in the Libby Ranger District, Kootenai National Forest (KNF), Lincoln County, Montana. The Draft SEIS has been prepared in compliance with the USDA NEPA regulations (7 CFR 1b), the Forest Service's NEPA regulations (36 CFR 220), and the Forest Service's Environmental Policy and Procedures Handbook (Forest Service Handbook 1909.15).

As described below in Section 1.3.2.1.3, *Litigation Related to Approvals*, the KNF prepared the SEIS in response to two U.S. District Court opinions issued in May 2017 and a June 2017 order regarding the 2015 JFEIS, 2016 Record of Decision (ROD), and 2014 Biological Opinions for the Montanore Project. The Project has independent utility from the Montanore Project and would allow MMC to make a determination whether and how to proceed with the Montanore Project (see discussion below under Section 1.4, *Federal Action*). Although MMC may subsequently seek approval for the Montanore Project, the Evaluation Project, an evaluation of an ore body and an assessment of the hydrogeologic conditions of a possible tailings impoundment site, is not an interdependent part of a larger action, nor does it depend on any larger action for its justification.

Deficiencies identified by the District Court are that the Forest Service (1) approved the Montanore Project, which violated the Clean Water Act and Organic Administration Act insofar as it violated Montana's nondegradation standards during phases subsequent to the Montanore Project's Evaluation Phase; (2) found that the Montanore Project would be neutral with regard to progress toward desired condition FW-DC-WTR-02, which states "water quality meets applicable state water quality standards and fully supports beneficial uses"; (3) did not assess the Riparian Management Objective for water temperature in Poorman Creek or the wetted/depth requirements in other streams and did not indicate that temperature conditions would not be degraded; and (4) failed to consider mitigation in relation to the pumpback well system and baseflow reductions in Poorman Creek, which were part of the Montanore Project. This SEIS addresses the deficiencies found by the Court as follows.

1. In issuing a 2016 ROD and a 2017 Montana Pollutant Discharge Elimination System (MPDES) permit, DEQ determined that the Evaluation Phase of the Montanore Project would comply with surface water quality standards, Montana's nondegradation policy, and the Board of Health and Environmental Sciences (BHES) Order to ensure that the current and future beneficial uses of state waters are protected. Additional discussion of DEQ's determination is provided in Section 1.3.2.2, *Water Quality–Related Approvals*

and Section 3.11.1.2, *State Requirements* in the *Surface Water Hydrology* section. With the exception of the proposed geotechnical investigations, the Evaluation Project would have the same activities as the Evaluation Phase of the Montanore Project.

2. Section 3.10.4.6.3, *National Forest Management Act/Kootenai Forest Plan*, Section 3.11.4.6.4, *National Forest Management Act/Kootenai Forest Plan*, and Section 3.13.4.7.3, *National Forest Management Act/Kootenai Forest Plan* update the KNF's assessment of the Project's effects on progress toward desired condition FW-DC-WTR-02.
3. Section 3.6.4.3.6, *Riparian Management Objectives* and Section 3.6.4.6.4, *National Forest Management Act/Kootenai Forest Plan* discuss whether the Project would retard or prevent the attainment of any Riparian Management Objective. The Evaluation Project would have no effect on streamflow or temperature in Poorman Creek. Consequently, the KNF did not assess the Riparian Management Objective for water temperature in Poorman Creek.
4. The Project does not include construction of a tailings impoundment or a pumpback well system, both of which were proposed as part of the Montanore Project. The Evaluation Project would have no effect on streamflow in Poorman Creek or any other stream in the Libby Creek watershed other than Libby Creek. Consequently, the KNF did not consider mitigation for Poorman Creek.

In addition to responding to the District Court's opinions and order, the SEIS updates other resource analyses where the KNF identified significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. According to 40 CFR 1502.9(c)(1)(i-ii), a supplemental EIS shall be prepared if (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns or (ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. For the SEIS, the analyses disclosed in the 2015 JFEIS are updated or supplemented for resources that may be significantly affected by changes in circumstances or new information. Only the specific issues associated with supplemental information are addressed in the SEIS. For example, the JFEIS contained a section on Other Required Disclosures (Section 3.26) that disclosed the effects on environmental justice, prime farmlands, and other issues required by the JFEIS lead or cooperating agencies. The KNF did not identify any significant new circumstances or information relevant to the issues in JFEIS Section 3.26. Consequently, the KNF did not discuss Other Required Disclosures in this SEIS.

The KNF is the lead agency for the SEIS. A Draft ROD will be subject to the objection process described in 36 CFR 218. The ROD will document the KNF Supervisor's decision whether to approve the Plan of Operations as submitted or approve the Plan of Operations with changes.

1.1 Document Structure

The SEIS is organized into four chapters:

- Chapter 1. Purpose of and Need for Action: Chapter 1 includes information on the history of the Project, the purpose of and need for the Project, and the KNF's proposal for achieving that purpose and need.

- Chapter 2. Alternatives, Including the Proposed Action: This chapter summarizes how the KNF informed the public of the proposal. This chapter also provides a detailed description of the Project and alternatives.
- Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the affected environment and environmental effects of implementing the Project. This analysis is organized alphabetically by resource.
- Chapter 4. Consultation and Coordination: Chapter 4 provides the preparers and entities that KNF consulted during the development of the Draft SEIS.

The following appendices provide more detailed information to support the analyses presented in the Draft SEIS (appendix letters match those used in the Montanore Project JFEIS):

- Appendix C—KNF's Conceptual Monitoring Plans, Alternatives 3 and 4
- Appendix G—Mass Balance Calculations

Additional documentation, including more detailed analyses of Project-area resources, may be found in the Project record at the KNF Supervisor's Office in Libby, Montana.

The following disclaimer pertains to all geographic information system (GIS) maps in this document:

> These products are reproduced from geospatial information prepared, in part, by the USDA Forest Service and other sources. GIS data and product accuracy may vary. They have been developed from sources of differing accuracy and resolution, accurate only at certain scales, based on modeling or interpretation, and some sources may have been incomplete while being created or revised. Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results. The KNF reserves the right to correct, update, modify, or replace its GIS products without notification.

1.2 Project Area Description

Activities before and during the Project would occur 18 miles south of Libby near the Cabinet Mountains of northwestern Montana (Figure 301; all figures are at the end of the document). The ore body to be evaluated is beneath the CMW. All access and surface facilities would be outside of the CMW boundary (Figure 321).

The Montana Department of Environmental Quality (DEQ) operating permit area for the Libby Adit Site is in Sections 10, 11, 14, and 15, T27N, R29W, Montana Meridian, in Lincoln County, Montana. Activities would occur at the Libby Adit Site under all action alternatives. Depending on the alternative, before and during the Project, activities would occur underground beneath the CMW, at certain monitoring locations in the CMW (in Alternatives 3 and 4 only), between Poorman Creek and Little Cherry Creek (in Alternatives 3 and 4 only), along National Forest System roads used for access, and on roads where access changes would occur for grizzly bear mitigation. Activity, including access changes, also may occur on 742.3 acres to be protected for grizzly bear habitat (in Alternatives 3 and 4 only).

1.3 Background

1.3.1 Mineral Rights

MMC's mineral rights are described in the Montanore Project JFEIS.

1.3.2 Permitting and Approvals for the Montanore Project

1.3.2.1 General Mine and Transmission Line Approvals

1.3.2.1.1 Mine and Transmission Line Approvals (1993)

A prior permitting process for the Montanore Project between 1989 and 1993 is described in the JFEIS. As discussed in JFEIS Section 1.3.1, *Mineral Rights*, Noranda Minerals Corporation (NMC) conveyed its interests in lode claims HR 133 and HR 134 to Newhi, Inc., a subsidiary of MMI, in 2002. By that time, many of NMC's permits for the Montanore Project were relinquished, terminated, or expired, such as DEQ's air quality permit, the U.S. Army Corps of Engineers' (Corps) 404 permit, the KNF's approval, and DEQ's transmission line certification. In 2002, NMC notified the KNF it was relinquishing the approval to operate and construct the Montanore Project. NMC's Operating Permit No. 00150 and MPDES permit MT0030279, both issued by DEQ, remained in effect because reclamation of the Libby Adit was not completed.

1.3.2.1.2 Mine and Transmission Line Approvals (2006–2016)

In 2004, MMI applied to DEQ for a hard rock operating permit and to the KNF for a proposed Plan of Operations for the Montanore Project. MMI also submitted an application for an exploration license to DEQ, which was issued in 2005 (#00648). In 2005, MMI submitted to DEQ an application for a 230 kV transmission line certificate of compliance and an application for an air quality permit.

In 2006, Newhi acquired all the issued and outstanding shares of NMC pursuant to the terms of a Stock Transfer Agreement between Noranda Finance, Newhi, and MMI. Although the name of NMC was changed to MMC immediately after Newhi's acquisition of NMC's shares, MMC (formerly NMC) remains the holder of Operating Permit No. 00150 for the Montanore Project and the existing MPDES permit. After the acquisition of NMC, MMI and MMC advised the KNF that MMC will be the owner and operator of the Montanore Project. Consistent with that indication, Newhi reconveyed HR 133 and HR 134 to MMC, and MMI and MMC requested that DEQ consider MMI's application for a hard rock operating permit as an application by MMC to modify DEQ Operating Permit No. 00150 (Klepfer Mining Services 2008).

In 2006, MMC submitted, and DEQ approved, two requests for revisions to DEQ Operating Permit No. 00150 (MR 06-001 and MR 06-002). The revisions involved reopening the Libby Adit and reinitiating the evaluation drilling program that NMC began in 1989. The key elements of the revisions include reexcavation 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. MMC requested a revision to its operating permit that involved the relocation of fuel and oil storage areas at the Libby Adit and the addition of more fuel storage capacity. DEQ approved the revision in 2009 (MR 08-001).

MMC submitted an updated Plan of Operations to the KNF in 2008 that clarified differences between the 2005 Plan of Operations and DEQ Operating Permit No. 00150. It also incorporated

plans required by DEQ Operating Permit No. 00150 and additional environmental data collected since 2005 (MMC 2008).

In 2008, the KNF decided the best approach for disclosing the environmental effects of the Libby Adit evaluation activities was to consider this activity as the initial phase of the overall Montanore Project in the Montanore Project EIS. The Libby Adit evaluation activities were to be the first phase of the Montanore Project in Alternatives 3 and 4.

The KNF and DEQ, along with the Bonneville Power Administration (BPA) and the Corps as cooperating agencies, issued a Draft EIS for the Montanore Project in 2009. In response to comments, the KNF revised Alternatives 3 and 4 (Alternatives 3 and 4) and transmission line alignments (Alternatives C-R, D-R, and E-R) and issued a Supplemental Draft EIS in 2011. After a pre-decisional administrative review (Objection Process), the KNF and DEQ, along with cooperating agencies, prepared and issued a JFEIS for the Montanore Project in December 2015 identifying Alternative 3 (Agency Mitigated Poorman Alternative) and Transmission Line Alternative D-R (Miller Creek Transmission Line Alternative) as the preferred alternatives. The KNF and DEQ each issued an ROD in February 2016.

The KNF ROD documented the KNF Supervisor's decision to approve an amended Plan of Operations for the development of all phases of the Montanore Project consistent with Alternative 3 and Alternative D-R as modified by the ROD (the selected mine and transmission line alternatives). The selected mine and transmission line alternatives included stipulations and mitigation measures, the KNF's December 2015 Terrestrial Threatened and Endangered Species Mitigation Plan and Bull Trout Mitigation Plan, and the terms and conditions from the USFWS's 2014 Biological Opinions for the grizzly bear and the bull trout and bull trout critical habitat. The ROD also approved amendments to the 2015 Kootenai Forest Plan (KFP) to suspend six KFP guidelines and two KFP standards in order to implement the selected mine and transmission line alternatives while still maintaining consistency with the KFP.

The DEQ ROD documented the DEQ Director's decision to conditionally approve amendments to the provisions of Operating Permit No. 00150 pertaining to the first phase (Evaluation) only to make the permit provisions consistent with Alternative 3 as modified by the ROD (the selected alternative). Approval was conditioned on subsequent DEQ approval of the renewal of MPDES Permit No. MT0030279, which was finalized in 2017. DEQ also conditionally approved Alternative D-R, the selected transmission line alternative, and issued a Certificate of Compliance, which was conditioned on subsequent approval for the Construction and Operations Phases of the Montanore Project. DEQ issued Montana Air Quality Permit (MAQP) #3788-00 to MMC in 2016.

1.3.2.1.3 Litigation Related to Approvals

Several environmental groups (Save Our Cabinets, Earthworks, Clark Fork Coalition, and Defenders of Wildlife) and the Libby Placer Mining Company challenged the KNF ROD, the December 2015 Joint Final EIS, the March 2015 Final EIS (Objection Review Draft), the July 2015 Response to Objections, and the USFWS Biological Opinions (*Save Our Cabinets v. U.S. Dep't of Agric.*, No. CV-16-53-M-DWM; *Libby Placer Mining Co. v. U.S. Forest Serv.*, No. CV 16-56-M-DWM; and *Save Our Cabinets v. U.S. Fish & Wildlife Serv.*, No. CV 15-69-M-DWM). In a U.S. District Court opinion and order issued on May 30, 2017, on a consolidated case (*Save Our Cabinets v. U.S. Dep't of Agric.*, No. CV-16-53-M-DWM; and *Libby Placer Mining Co. v. U.S. Forest Serv.*, No. CV 16-56-M-DWM), the U.S. District Court ruled that the Forest Service

had violated the Clean Water Act, the National Forest Management Act, and the National Environmental Policy Act (NEPA) by approving the Montanore Project. In a separate opinion and order in *Save Our Cabinets v. U.S. Fish & Wildlife Serv.*, No. CV 15-69-M-DWM, issued concurrently with the first, the Court ruled that the USFWS had violated the Endangered Species Act (ESA) because its no-jeopardy conclusions as to bull trout and grizzly bears were flawed and that the Forest Service had violated the ESA by relying on the flawed Biological Opinions. In a June 29, 2017, order, the Court remanded the 2015 JFEIS back to the Forest Service for further action and vacated the 2016 KNF ROD. The Court also remanded to the USFWS its 2014 Biological Opinions.

1.3.2.2 Water Quality–Related Approvals

A 1992 BHES Order, issued to NMC (now MMC), authorized degradation and established allowable changes in the quality of surface water and groundwater adjacent to the Montanore Project and affected by the Project (BHES 1992). The Order establishes numeric limits for total dissolved solids, chromium, copper, iron, manganese, and zinc in both surface water and groundwater; nitrate+nitrite in groundwater only; and total inorganic nitrogen (nitrate+nitrite+ammonia) in surface water only. For these parameters, the limits contained in the authorization to degrade apply. For the parameters not covered by the authorization to degrade, the applicable nonsignificance criteria established by the 1994 nondegradation rules apply, unless MMC obtains an authorization to degrade under current statute. Pursuant to BHES's Order, these limits apply to all surface water and groundwater affected by the Montanore Project and remain in effect during the operational life of the mine and for so long thereafter as necessary (BHES 1992). The Order also adopted the modification developed in Alternative 3, Option C, of the Final EIS, addressing surface water and groundwater monitoring, fish tissue analysis, and instream biological monitoring. The Order is presented in JFEIS Appendix A.

The Order also indicates that land application and disposal treatment, as then proposed, would satisfy the requirement in Administrative Rules of Montana (ARM) 16.20.631(3) (now ARM 17.30.1207) to treat industrial wastes using technology that is the best practicable control technology available, or, if such technology has not been determined by the Environmental Protection Agency (EPA), then the equivalent of secondary treatment as determined by DEQ. In 1992, the DHES (now DEQ) determined that land application and disposal treatment, with at least 80 percent removal of nitrogen, would satisfy the requirements of ARM 16.20.631(3). The Order requires DEQ to review design criteria and final engineering plans to determine that at least 80 percent removal of nitrogen would be achieved.

In 1997, DEQ issued an MPDES permit to NMC (MT0030279) to allow discharges of water flowing from the Libby Adit to Libby Creek. Three outfalls were included in the permit: Outfall 001—percolation pond; Outfall 002—infiltration system of buried pipes; and Outfall 003—pipeline outlet to Libby Creek. Surface discharge from the evaluation adit ceased in 1998, and water in the adit flowed to the underlying groundwater.

DEQ renewed the MPDES permit in 2006. A minor modification of the MPDES permit in 2008 reflected an owner/operator name change from NMC to MMC. In 2010, MMC applied to DEQ to renew the existing MPDES permit and requested the inclusion of five new stormwater outfalls under the permit. DEQ issued a draft renewal MPDES permit in 2015 and held a public hearing on the draft permit. MMC also held MPDES permit MTR104874 for stormwater discharges from the Libby Adit Site. These discharges were incorporated into the draft renewal MPDES permit

No. MT0030279. DEQ finalized approval of the renewal of MPDES Permit No. MT0030279 in 2017 (DEQ 2017a), along with responses to comments on prior draft permits (DEQ 2017c). MMC submitted a final Stormwater Pollution Prevention Plan (SWPPP) to DEQ in 2017 as required by the permit (MMC 2017a).

In 2016, DEQ issued a ROD on the Montanore Project (DEQ 2016b). In the ROD, DEQ determined that activities associated with the Evaluation Phase of the Montanore Project, except the discharges to surface water, would comply with the Montana Water Quality Act, including the nondegradation provisions. DEQ's approval of the amendments to Operating Permit No. 00150 pertaining to the Project was conditioned on MMC receiving DEQ's approval of the renewal of MPDES Permit No. MT0030279. In issuing the MPDES permit, DEQ set effluent limits and conditions for Outfall 001 that comply with the surface water quality standards, the nondegradation policy, and the BHES Order to ensure that the current and future beneficial uses of state waters are protected (DEQ 2016c).

1.3.2.3 Status of Existing Permits

1.3.2.3.1 Hard Rock Operating Permit

MMC holds Hard Rock Operating Permit No. 00150. In a 2016 ROD, DEQ conditionally approved amendments to the provisions of Operating Permit No. 00150 pertaining to the first phase (Evaluation) only to make the permit provisions consistent with the selected alternative, Alternative 3 as modified by the ROD (DEQ 2016b). Approval was conditioned on subsequent DEQ approval of the renewal of MPDES Permit No. MT0030279, which was finalized in March 2017. MMC has not submitted an application to DEQ to amend Operating Permit No. 00150 to be consistent with the DEQ 2016 ROD. Operating Permit No. 00150 remains as described under 1.3.2.1.2, *Mine and Transmission Line Approvals (2006–2016)*. If the KNF selects an alternative for Project activities that differs from DEQ's selected alternative in its 2016 ROD, MMC will submit an application to DEQ to modify Hard Rock Operating Permit No. 00150 or its Exploration License No. 00648 to be consistent with the KNF's selected alternative.

1.3.2.3.2 Exploration License

MMC has an active Exploration License No. 00648, issued by DEQ in 2005. MMC currently collects water sampling data on National Forest System lands under the authority of the exploration license. Certain Project activities, such as the geotechnical investigations in Alternatives 3 and 4, would require authorization from DEQ under an exploration license (82-4-303(12) Montana Code Annotated [MCA]). MMC will submit an application to DEQ to modify Hard Rock Operating Permit No. 00150 or Exploration License No. 00648 to be consistent with the KNF's selected alternative.

1.3.2.3.3 Air Quality Permit

DEQ issued a Montana Air Quality Permit (MAQP #3788-00) to MMC on March 1, 2016. MAQP #3788-00 established required limits, emission controls, and mitigations for all Montanore Project activities, including the evaluation phase, covered by the permit.

1.3.2.3.4 BHES Order

The BHES Order No. 93-001-WQB is in JFEIS Appendix A. The Order remains in effect for the operational life of the project and for as long as necessary thereafter. The Order established numeric limits for total dissolved solids, chromium, copper, iron, manganese, and zinc in both surface water and groundwater; nitrate+nitrite in groundwater only; and total inorganic nitrogen

in surface water only. Since the Order was issued, the applicable water quality criteria for most parameters have changed; the water quality criteria as listed in the current version of Circular DEQ-7 are the water quality criteria applicable to any discharge associated with the Project (DEQ 2017b).

1.3.2.3.5 MPDES Permit

MPDES Permit No. MT0030279 regulates wastewater discharges from the Libby Adit and sets effluent limits for discharges to both surface water and groundwater. Currently, MMC is permitted by DEQ under Operating Permit No. 00150, revision 06-002, to treat Libby Adit inflows through an existing Water Treatment Plant at the Libby Adit Site before discharge to the percolation pond (MPDES permit Outfall 001), which is one of three MPDES permitted outfalls. See Section 3.13.1.1.2, *MPDES Permit MT0030279*, in Chapter 3 for a more detailed description of the MPDES permit. MMC's SWPPP describes stormwater management at the Libby Adit Site, best management practices (BMPs), control measures, and monitoring procedures that will ensure compliance with the terms and conditions of the MPDES permit.

1.3.2.3.6 Water Rights

MMC holds two 1902 surface water rights on Libby Creek, one for mining near the Libby Adit Site in Section 15, T27N, R1W (with a maximum diversion of 44.9 gallons per minute [gpm] between April 1 and December 19, and a 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 groundwater right near the Libby Adit Site in Section 15, T27N, R31W (with a total diversion of 40 gpm year-round).

1.4 Federal Action

The KNF's federal action analyzed in the SEIS is approval of a Plan of Operations for the Montanore Project consistent with the Organic Administration Act, Locatable Minerals Regulations 36 CFR 228 Subpart A, the Wilderness Act, and the Multiple Use Mining Act. A No Action Alternative and three action alternatives (Alternatives 2, 3, and 4) are analyzed in the SEIS and described in Chapter 2. During the Project, MMC would use an existing evaluation adit on private land in upper Libby Creek; would conduct certain monitoring activities; and, in Alternatives 3 and 4 only, would complete geotechnical and hydrologic studies on National Forest System lands between Little Cherry Creek and Poorman Creek. Before starting the Project in Alternatives 3 and 4, MMC would fund or implement access changes and transfer fee title or place a conservation easement on 742.3 acres for wildlife mitigation.

The KNF did not analyze the Montanore Project as a connected action because the Montanore Project did not meet the definition of a connected action in 40 CFR 1508.25(a)(1). The Evaluation Project would not automatically trigger the Montanore Project, approval of which would require an EIS and new ESA compliance. The Evaluation Project has independent utility from the Montanore Project and would allow MMC to make a determination whether and how to proceed with the Montanore Project. The Evaluation Project could proceed independently and is not dependent on other actions taken previously or occurring simultaneously. Although MMC may subsequently seek approval for the Montanore Project, the Evaluation Project, an evaluation of an ore body and an assessment of the hydrogeologic conditions of a possible tailings impoundment site, is not an interdependent part of a larger action, nor does it depend on any larger action for its justification.

1.5 Purpose and Need

The KNF's overall purpose and need is to process MMC's proposed Plan of Operations to evaluate the Montanore copper and silver deposit. To achieve this purpose, certain monitoring activities and geotechnical and hydrologic studies on and beneath National Forest System lands need to be completed to evaluate if a Plan of Operations to develop and operate the Montanore Project could be approved in compliance with all applicable laws, while minimizing adverse environmental effects on National Forest System lands.

1.5.1 Kootenai National Forest

As discussed in the JFEIS, the Forest Service verified in 1985 and 1993 that valid rights to the minerals patented on claims HR 133 and HR 134 have been established within the CMW. Those rights are currently held by MMC. The role of the KNF under its primary authorities in the Organic Administration Act, Locatable Regulations 36 CFR 228 Subpart A, the Wilderness Act, and the Multiple Use Mining Act is to ensure that mineral operations are limited to exercise of valid existing rights, minimize adverse environmental effects on National Forest System lands, and comply with all applicable laws. The KNF has no authority to unreasonably circumscribe or prohibit reasonably necessary activities under the General Mining Law that are otherwise lawful. Through the Mining and Mineral Policy Act, Congress has stated it is the continuing policy of the federal government, in the national interest, to foster and encourage private enterprise in:

- The development of economically sound and stable domestic mining, minerals, and metal and mineral reclamation industries
- The orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security, and environmental needs

In a June 2017 order vacating the 2016 decision, the Court stated: "By setting aside the Record of Decision in its entirety, the agency has the opportunity to decide how it would like to proceed, either through issuing a new Record of Decision that approves only the Evaluation Phase or one that once again addresses the entire project."

From the perspective of the Forest Service, the need is to:

- Address the U.S. District Court opinions issued on May 30, 2017, regarding the 2015 JFEIS, 2016 KNF ROD, and 2014 Biological Opinions relevant to the Evaluation Project;
- Ensure measures would be included, where practicable, that provide for reclamation of the surface disturbance;
- Ensure the selected alternative requires compliance with other applicable federal and state laws and regulations; and
- Ensure the selected alternative, where feasible, would minimize adverse environmental impacts on National Forest System surface resources.

1.5.2 Montanore Minerals Corporation

MMC's purpose for the Project is (1) to carry out the Libby Adit evaluation program and other activities to obtain more geologic, hydrologic, and other information; and (2) to complete further analysis needed to inform and reach a determination whether and how to proceed with the Montanore Project. MMC's need is to receive all necessary governmental approvals and authorizations for the Project. MMC proposes to conduct Project activities in an environmentally sound manner, subject to reasonable mitigation measures designed to avoid or minimize environmental impacts to the extent practicable.

1.6 Agency Roles, Responsibilities, and Decisions

For the SEIS, the KNF is the lead agency responsible for analysis specific to the Project. Before the Project could begin, various other permits, certificates, licenses, or approvals would be required from state and federal agencies (see Table 302 at the end of this chapter). Table 302 is not a comprehensive list of all permits, certificates, or approvals needed but lists the primary federal, state, and local agencies with permitting responsibilities. The major decisions to be made by state and federal agencies with primary environmental permitting and regulatory responsibilities are discussed briefly in JFEIS Section 1.6, *Agency Roles, Responsibilities, and Decisions*. These remain unchanged and are not repeated in the SEIS; decisions related to the transmission line are not relevant to the Project. The sections below describe the decisions to be made by the KNF, USFWS, and EPA.

1.6.1 Kootenai National Forest

1.6.1.1 Applicable Laws and Regulations

Most of the proposed disturbance for the Project would be on private land. Some disturbance, such as road improvements and geotechnical investigations, would be on National Forest System lands managed by the KNF. The KNF is obligated under certain laws and regulations to evaluate and take action on MMC's request to conduct mineral operations on National Forest System lands. The applicable major laws are summarized below:

- **1872 General Mining Law**—This law gives U.S. citizens the right to explore, locate mining claims, make discoveries, patent claims, evaluate deposits, and develop mines on National Forest System lands open to mineral entry.
- **1897 Organic Administration Act**—This act authorizes the Forest Service to regulate use and occupancy, such as mineral operations, on National Forest System lands. The Forest Service's locatable minerals regulations are promulgated at 36 CFR 228 Subpart A. These regulations require that a proposed Plan of Operations be submitted for operations that might cause significant disturbance to National Forest System surface resources.
- **1955 Multiple Use Mining Act**—This act affirms that unpatented mining claims may be used for prospecting, mine processing, and uses reasonably incident thereto and reinforces Forest Service authority to ensure mineral operations are restricted to these uses.

- **1964 Wilderness Act**—This act allowed mineral exploration and development under the General Mining Law to occur in wilderness to the same extent as before the Wilderness Act until December 31, 1983, when the Wilderness Act withdrew the CMW from mineral exploration and entry, subject to valid and existing rights. Holders of mining claims with valid existing rights within National Forest Wilderness are accorded the rights provided by the U.S. mining laws. Mineral operations and access are subject to the 36 CFR 228 Subpart A regulations.
- **1970 National Mining and Minerals Policy Act**—This act states that the continuing policy of the federal government is to foster and encourage private enterprise in the development of economically sound and stable domestic mining and mineral industries and the orderly and economic development of domestic mineral resources.
- **1973 Endangered Species Act (ESA)**—This act requires the KNF to ensure that any actions it approves will not jeopardize the continued existence of a threatened or endangered (T&E) species or result in the destruction or adverse modification of critical habitat. The Forest Service will submit BAs that evaluate the potential effect of the proposed project on T&E species, including measures the Forest Service would require to minimize or compensate for effects.
- **1972 Federal Water Pollution Control Act (Clean Water Act)**—This act, as amended, aims to protect and improve the quality of water resources and maintain their beneficial uses. Proposed mineral operations on National Forest System lands are subject to compliance with Clean Water Act Sections 401, 402, and 404 as applicable. DEQ, the EPA, and the Corps all have regulatory, compliance, and enforcement responsibilities under the Clean Water Act. If the proposed mineral operation may result in any discharge into navigable waters, the operator must obtain a 401 certification from the designated Clean Water Act entity. Pursuant to the Clean Water Act, MMC must obtain a 401 certification from DEQ for proposed discharges into navigable waters unless DEQ waives its issuance (see Section 1.6.2.1, *Montana Department of Environmental Quality*, in the JFEIS). The 401 certification from DEQ certifies that the operator's proposed discharges of fill permitted under a Section 404 permit are in compliance with all applicable water quality requirements of the Clear Water Act. Unless the 401 certification is waived, the operator must give a copy of the 401 certification to the Forest Service before the KNF can allow the operator to commence any activity that requires a 404 permit. Pursuant to 33 United States Code (USC) 1341(d), special conditions of the 401 certification must be incorporated into the Forest Service's approval of MMC's Plan of Operations. The EPA has delegated responsibility for Section 402 of the Clean Water Act, which covers surface water discharges, to DEQ (see JFEIS Section 1.6.2.1, *Montana Department of Environmental Quality*).
- **1976 National Forest Management Act**—This act requires the development, maintenance, and, as appropriate, revision of land and resource management plans (forest plans) for units of the National Forest System. These forest plans provide for the multiple use and sustained yield of renewable resources in accordance with the Multiple-Use Sustained-Yield Act of 1960.

  While mineral development, such as the Project, is not regulated by the National Forest Management Act or by the KFP, which was developed and revised pursuant to the National Forest Management Act (16 USC 528, 16 USC 1604(e), 36 CFR 219.1), per se, an approved Plan of Operations cannot be inconsistent with applicable KFP standards and guidelines. 16 USC 478 bars the Forest Service from prohibiting

locatable mineral operations on lands subject to the U.S. mining laws either directly or by regulation amounting to a prohibition. This means that if applicable KFP standards and guidelines would not unreasonably restrict mineral operations conducted pursuant to the U.S. mining laws, the approved Plan of Operations must reflect that direction. If the KFP purports to prohibit locatable mineral operations on lands open to the U.S. mining laws, or if the KFP direction would effectively amount to a prohibition of operations conducted pursuant to those laws for reasons such as the technical impossibility of complying with that direction, or the prohibitive cost of complying with that direction, then the KFP standards and guidelines must give way in light of 16 USC 478.

- **1980 Alaska National Interest Lands Conservation Act—**This act directed the KNF to provide access to non-federally owned land (which includes patented claims and private mineral estates) within the boundaries of National Forest System lands, allowing landowners reasonable use and enjoyment of their property.
- **Kootenai Forest Plan and EIS—**The KFP (USDA Forest Service 2015a) includes the forestwide desired condition to contribute to the economic strength and demands of the nation by supplying mineral and energy resources while assuring that the sustainability and resiliency of other resources are not compromised or degraded (FW-DC-MIN-01). The Montanore Project analysis disclosed in the JFEIS and the Evaluation Project analysis disclosed in the SEIS tier to the 2013 Forest Plan Final Environmental Impact Statement (USDA Forest Service 2013), the associated 2015 Errata for the Final EIS for KFP (USDA Forest Service 2015b), and the Final Record of Decision (USDA Forest Service 2015c).
- **Title 36, Code of Federal Regulations, Part 228, Subpart A**—These regulations provide rules and procedures for conducting locatable mineral operations on National Forest System lands. The regulations apply to operations conducted under the U.S. mining laws as they affect surface resources on National Forest System lands under the jurisdiction of the Secretary of Agriculture. Operations are defined as all functions, work, and activities in conjunction with prospecting, exploration, development, mining, or processing of mineral resources, and all uses reasonably incident thereto, including roads and other means of access on lands subject to the regulation in this part, regardless of whether said operations take place on or off mining claims (36 CFR 228.3(a)).

The Forest Service's locatable minerals regulations require that mineral operations be conducted, where feasible, to minimize adverse environmental impacts on National Forest surface resources. The KNF and DEQ would share the responsibility to monitor and inspect the Project, and would require MMC to post a joint reclamation bond to ensure that both federal and state reclamation requirements were met. As stipulated in a 1989 Memorandum of Understanding (MOU) between the Forest Service-Northern Region and the Montana Department of State Lands (DSL) (now DEQ), a joint reclamation bond can be held by DEQ to ensure compliance with the reclamation plan associated with the operating permit and an approved Plan of Operations. If MMC defaulted on its obligations, the KNF may jointly collect or access the bond or one of the agencies may collect the bond with the concurrence of the other agency. Even if the reclamation bond is collected by one of the agencies, the bond must be expended in a manner that satisfies both federal and state reclamation requirements. Financial assurance is discussed in more detail in Section 1.7, *Financial Assurance*.

Kootenai National Forest Responsibilities to Federally Recognized Tribes. Federal agencies have government-to-government responsibilities to consult with federally recognized American Indian Tribes. Among those tribes are the Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho, who have retained off-reservation treaty rights in the analysis area through the Hellgate Treaty of 1855. The responsibilities of the KNF regarding tribal consultation are found in the following laws and treaties:

- Hellgate Treaty of 1855
- National Historic Preservation Act
- National Environmental Policy Act
- National Forest Management Act
- American Indian Religious Freedom Act
- Archaeological Resources Protection Act
- Native American Graves Protection and Repatriation Act
- Religious Freedom Restoration Act
- Food, Conservation, and Energy Act
- Interior Secretarial Order 3175

As a federal agency, the KNF is subject to presidential Executive Orders. Applicable Executive Orders are discussed by resource in Chapter 3.

1.6.1.2 Decision

The KNF Supervisor will issue a decision on the proposed federal action, approval of the Montanore Evaluation Project, in a ROD. The decision objective is to select an action that meets the legal rights of MMC, while protecting the environment in compliance with applicable laws, regulations, and policy. The KNF Supervisor will use the SEIS process to make an informed decision as required by 36 CFR 228 Subpart A. Based on the alternatives developed in the JFEIS and the additional analysis presented in the SEIS, the KNF will issue a ROD in which one of the following decisions will be made:

- Approval of the Project, subject to submittal of and KNF approval of an updated Plan of Operations
- Notification to MMC that the KNF Supervisor will not approve a Plan of Operations until a Plan of Operations that meets the mandates of applicable laws and regulations is submitted

The alternative selected by the KNF must meet the purpose of the Forest Service locatable mineral surface management regulations as described in 36 CFR 228 Subpart A and the Mining and Minerals Policy Act.

1.6.2 U.S. Fish and Wildlife Service

1.6.2.1 Applicable Laws and Regulations

The USFWS has responsibilities under the ESA, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act, which are described in the JFEIS.

1.6.2.2 Decision

The KNF will submit two new BAs to the USFWS, one for terrestrial species and one for aquatic species, that will describe the potential effect of the proposed federal action on T&E species that may be present in the area. If the KNF determines the Project "may affect" a listed species, then it will either initiate formal consultation or seek written concurrence from the USFWS that the action "is not likely to adversely affect" a listed species. The USFWS will decide if implementation of the Project would jeopardize the continued existence of any species listed as T&E under the ESA, or adversely modify critical habitat. If the KNF determines the Project "is likely to adversely affect" a listed species, the USFWS's decision will be documented in two Biological Opinions. For proposed species, Section 7(a)(4) of the ESA requires federal agencies to confer with the USFWS on any agency action that is likely to jeopardize the continued existence of any species proposed for listing or result in the adverse modification of critical habitat proposed to be designated. A conference may involve informal discussions between the USFWS, the action agency, and the applicant. Following informal conference, the USFWS issues a conference report containing recommendations for reducing adverse effects. These recommendations are discretionary, because an agency is not prohibited from jeopardizing the continued existence of a proposed species or from adversely modifying proposed critical habitat. If the BA indicates that the action is not likely to jeopardize the continued existence of proposed species or result in the destruction or adverse modification of proposed critical habitat, and the USFWS concurs, then a conference is not required.

1.6.3 Environmental Protection Agency

The EPA has responsibilities under the Clean Air Act to review Draft EISs, including supplemental EISs, and federal actions potentially affecting the quality of the environment. The EPA evaluates the adequacy of information in Draft EISs and the overall environmental impact of the Proposed Action and alternatives. The EPA also reviews 404 permit applications and provides comments to the Corps, and has veto authority under the Clean Water Act for decisions made by the Corps on 404 permit applications. The EPA has oversight responsibility for Clean Water Act programs delegated to and administered by DEQ. The EPA may also intervene to resolve interstate disputes if discharges of pollutants in an upstream state may affect water quality in a downstream state.

1.7 Financial Assurance

JFEIS Section 1.6.3, *Financial Assurance*, described the KNF's authorities for requiring financial assurance and described the process used to calculate the reclamation costs and prepare reclamation bonds. DEQ currently holds a reclamation bond of $1,154,966 for 11.6 acres of disturbance at the Libby Adit Site. The KNF, in collaboration with DEQ, would use the same authorities and processes described in JFEIS Section 1.6.3 to develop a new reclamation bond for additional development within the 11.6-acre disturbance at the Libby Adit Site and for disturbances associated with the geotechnical investigations. The bond amount will be determined after the ROD and operating permit modification have been issued. When calculated, the bond amount will be based on the information and requirements contained in the ROD and operating permit modification. Until these decisions are issued, bond amounts based on alternatives presented in the SEIS would be based on incomplete information and may be misleading.

Pursuant to ARM 17.24.140, the total amount of the bond calculated by DEQ must be in place before the issuance of an operating permit or permit amendment unless the applicable plan

identifies phases or increments of disturbance that may be individually identified and for which individual, incremental bonds may be calculated. 36 CFR 228.13 requires submittal of a bond for reclaiming disturbances on National Forest System lands before approval of a Plan of Operations. None of the disturbances at the Libby Adit Site are on National Forest System lands. As JFEIS Section 1.6.3.2.3, *Other Reclamation Costs* discussed, other reclamation costs include site monitoring and maintenance for a period after initial site reclamation has been completed. This period typically lasts from 5 to 20 years but in some instances may be extended depending on the complexity and longevity of the risk of environmental impact. Activities associated with site monitoring and maintenance may include water sampling, repair of recent erosion events, and revegetation.

Table 302. Permits, Licenses, and Approvals Required for the Project.

Permit, License, or Approval	Purpose
Kootenai National Forest	
Approval of Plan of Operations (36 CFR 228 Subpart A)	To allow MMC to conduct activities on or beneath National Forest System lands. Approval incorporates management requirements to minimize or eliminate effects on other surface resources. Review of the proposed plans is coordinated with DEQ and other appropriate agencies. Approval of the Plan of Operations is contingent on MMC incorporating all stipulations and mitigations (as listed in the ROD) into an updated Plan of Operations.
Timber Sale Contract	To allow MMC to harvest commercial timber from the Project area on National Forest System lands. Harvesting would be conducted to clear vegetation for road construction.
U.S. Fish and Wildlife Service	
Biological Opinion	To protect T&E species and any designated critical habitat. Consultation with the KNF.
Montana Department of Environmental Quality	
Hard Rock Operating Permit Modification (Montana Metal Mine Reclamation Act)	To allow a change in an approved operating permit. Proposed activities must comply with state environmental standards and criteria. Approval may include stipulations for final design of facilities and monitoring plans. A sufficient reclamation bond must be posted with DEQ before implementing an operating permit amendment or modification. Coordinate with the KNF.
Exploration License Amendment (Metal Mine Reclamation Act)	To allow a change in an approved exploration license. Proposed activities, such as the geotechnical investigations, must comply with state environmental standards and criteria. Approval may include stipulations and monitoring plans. A sufficient reclamation bond must be posted with DEQ before implementing an exploration license amendment. Coordinate with the KNF.
Montana Air Quality Permit (Clean Air Act of Montana)	To control criteria air pollutants when the potential to emit is more than 25 tons per year. Final permit issued in 2016 (DEQ 2016a).
MPDES Permit (Montana Water Quality Act)	To establish effluent limits, treatment standards, and other requirements for point source discharges, including stormwater discharges, to state waters including groundwater. Coordinate with the EPA. Final permit issued in 2017 (DEQ 2017a).
Hazardous Waste and Solid Waste Registration (various laws)	To ensure safe storage and transport of hazardous materials to and from the site and proper storage and transport and disposal of solid wastes. Some classes of solid waste disposal are covered under the Metal Mine Reclamation Act. Solid wastes may be addressed under an operating permit.
Montana State Historic Preservation Office	
Cultural Resource Clearance	To review and comment on federal compliance with the National Historic Preservation Act.
Lincoln County Weed District	
Noxious Weed Management Plan	To minimize propagation of noxious weeds.

Chapter 2. Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the Project; figures are included at the end of the SEIS. This chapter has been organized differently than the JFEIS in order to more clearly describe the timing of activities that would occur before, during, and after the Project.

2.1 Public Involvement

Public involvement, scoping activities, and issues identified during the EIS process are described in detail in JFEIS Section 1.1, *Public Involvement*. Public involvement for the SEIS process is described.

2.1.1 Scoping Activities

A Notice of Intent to prepare the SEIS was published in the *Federal Register* on December 28, 2017, and a press release was distributed to the KNF's news media list, which includes, among others, the *Missoulian*, *Flathead Beacon*, and *Western News*. The Notice of Intent and press release described the KNF's intent to prepare an SEIS for the Evaluation Project.

The KNF conducted public scoping for the Montanore Project in 2005; additional scoping for an SEIS is not required and was not conducted (40 CFR 1502.9(c)(4)). During the course of the public scoping process for the Montanore Project, the KNF and DEQ received 47 written submissions containing 72 signatures. These written comments were received from 33 individuals, 4 government agencies, 15 groups or organizations, and 4 private businesses (ERO Resources Corp. 2005). A detailed list of these respondents and their comments can be found in the *Montanore Project Scoping Content Analysis Report* located in the administrative record for the Montanore Project. Consultation and coordination for the SEIS are discussed in Chapter 4.

2.1.2 Issues

For the Project, the KNF reevaluated the key issues identified for the Montanore Project and determined that they were also relevant to the SEIS analysis. The seven key issues identified by the KNF are:

- Issue 1: Potential for acid rock drainage and metal leaching
- Issue 2: Effects on quality and quantity of surface water and groundwater resources
- Issue 3: Effects on fish and other aquatic life and their habitats
- Issue 4: Changes in the Project area's scenic integrity
- Issue 5: Effects on threatened or endangered wildlife species
- Issue 6: Effects on wildlife and their habitats
- Issue 7: Effects on wetlands and streams

2.2 Summary of Alternative Components

Alternatives development for the Montanore Project is described in Section 1.2, *Development of Alternatives*, in the JFEIS. The transmission line described in the JFEIS as part of the Montanore Project would not be constructed or used during the Project. The SEIS uses the Evaluation Phase components of the JFEIS mine alternatives as the basis for the alternatives analyzed for the Evaluation Project. The SEIS also uses source material developed for the Montanore Project JFEIS. In those sources, the Evaluation Project is referred to as the "Evaluation Phase." For clarity and consistency in the SEIS, the terms "Evaluation Project" or "Project" are used, even if the source material used "Evaluation Phase." The following sections describe Evaluation Project alternatives analyzed in the SEIS.

Table 303 summarizes components of Alternative 1 (No Action); Alternative 2, which is MMC's activities permitted by DEQ; and Alternatives 3 and 4 (agency-mitigated alternatives). MMC's Operating Permit No. 00150 has a total permit area of 3,424 acres, of which 219 acres is for the Libby Adit Site, and a permitted disturbance area of 1,272 acres, of which 11.6 acres has been disturbed at the Libby Adit Site. Except for access road use, all activities in Alternative 2 would occur within the existing 11.6 acres of disturbance at the Libby Adit Site. Alternatives 3 and 4 are largely similar, except for the location and extent of geotechnical investigations between Poorman Creek and Little Cherry Creek. Project design features to avoid or minimize impacts by alternative are summarized in Table 304.

Table 303. Action Alternative Comparison of Project Activities.

Project Facility or Feature	Alternative 2	Alternative 3	Alternative 4
Operating Permit Area of Libby Adit Site	219 acres	219 acres	219 acres
Disturbance Areas Libby Adit Site (existing) Geotechnical Investigations	 11.6 acres 0 acres	 11.6 acres 6.4 acres	 11.6 acres 1.5 acres
Primary Facilities			
Existing Libby Adit	14,000 feet in length; dewater and reclaim from current level to end of adit	Same as Alternative 2	Same as Alternative 2
Libby Adit Extension, Drifts, and Drill Stations	3,300-foot decline extension from the existing adit to beneath the ore body; 7,100 feet of drifts 18 feet high and 18 feet wide; 16 drill stations	4,200-foot incline drift from the existing adit to above the ore body; 6,300 feet of lateral drifts; all drifts would be 15 feet high and 15 feet wide; 35 drill stations	Same as Alternative 3
Access Roads	Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316)	Same as Alternative 2 for Libby Adit access; geotechnical drilling access via Libby Creek Road and Bear Creek Road (NFS road #278)	Same as Alternative 3

Project Facility or Feature	Alternative 2	Alternative 3	Alternative 4
Water Treatment	Existing Libby Adit Water Treatment Plant	Same as Alternative 2; upgraded if necessary to treat parameters such as dissolved metals to meet MPDES permitted effluent limits	Same as Alternative 3
Waste Rock and Ore Management			
Ore Volume	0 tons	6,000 tons	Same as Alternative 3
Waste Rock Volume and Material	545,300 tons	281,000 tons	Same as Alternative 3
Characterization	Collect representative rock samples from within the adit extension and drifts; within the ore zones; and above, below, and between the ore zones; for static and kinetic testing	Same as Alternative 2; in addition, collect samples of the lead waste zone and altered waste zones within the lower Revett and Prichard Formations for static and kinetic testing; assess potential for trace metal release from waste rock	Same as Alternative 3
Stockpile and Storage	Stored at two lined storage areas at the Libby Adit Site	Same as Alternative 2; existing storage area, which is lined with polyvinyl chloride (PVC) liner, would be expanded and also lined with a PVC liner; new storage area would be lined with a high-density polyethylene (HDPE) geomembrane liner	Same as Alternative 3
Collection of Infiltrated Precipitation	In an existing waste rock sump lined with a 60-mil PVC liner and designed for the 25-year/24-hour storm	In a reconstructed waste rock sump double-lined with a 80-mil HDPE liner and designed for the 100-year/24-hour storm; leachate collection system installed between the two liners	Same as Alternative 3
Geotechnical Investigations			
Geotechnical Investigation	None proposed	Between Poorman Creek and Little Cherry Creek; access from US 2 would be via Libby Creek Road and then Bear Creek Road (NFS road #278), Little Cherry Creek Loop Road (NFS road #6212), and short spur roads	Between Poorman and Little Cherry Creeks; less extensive than Alternative 3
Road Use Impassable (Open) Gated Roads Barriered Roads	None proposed	2,690 feet 16,236 feet 1,716 feet	2,690 feet 12,653 feet None

Project Facility or Feature	Alternative 2	Alternative 3	Alternative 4
Wells or Piezometers Borings Test Pits	None proposed	13 22 9	5 7 0
Libby Adit Site Closure			
Libby Adit Site Closure Plugs	One water-retaining plug in bedrock at about 600 feet from portal and one plug not water-retaining at adit entrance	Two near-surface plugs same as Alternative 2; if needed, an additional plug installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from adit beneath the east side of the Cabinet Mountains	Same as Alternative 3
Backfill	6,500 and 7,000 cubic yards backfilled between adit plugs	Backfill between two near-surface plugs same as Alternative 2; alteration-zone waste rock and ore (mineralized rock that may be economic to mine) returned underground west of the easternmost bedrock plug	Same as Alternative 3

Table 304. Action Alternative Comparison of Project Design Features.

Project Facility or Feature	Alternative 2 MMC's Proposed Mine	Alternative 3 Agency Mitigated Poorman Alternative	Alternative 4 Agency Mitigated Little Cherry Creek Alternative
Underground Investigations			
Underground Barriers	All drifts and drill pads 500 feet from Rock Lake and 100 feet from Rock Lake Fault	All drifts and drill pads 1,000 feet from Rock Lake and 300 feet from Rock Lake Fault; verified by independent mine surveyor selected by the KNF	Same as Alternative 3
Activity Outside of MMC's Extralateral Rights	One drill pad and two drill holes proposed outside MMC's extralateral rights	No drilling outside MMC's extralateral rights; verified by independent mine surveyor selected by the KNF; ore (mineralized rock that may be economic to mine) encountered during adit extension would either be stored underground or brought to the surface and stored at the Libby Adit Site separately from waste rock	Same as Alternative 3
Air Quality			
Electrical Power	Three existing Tier 3 225 kW electrical generators during dewatering; three Portable Tier 2 generators (MAQP #4063-00) during drift development (only two would operate at a time)	Use Tier 4 generators, if available, or Tier 3 generators for all activities (MAQP #3788-00); use Tier 4 engines, if available, or Tier 3 engines on underground mobile equipment and emergency generators	Same as Alternative 3
Ultra-Low-Sulfur Fuel	Not specified	Use ultra-low-sulfur diesel fuel in engines on underground mobile equipment and emergency generators	Same as Alternative 3
Cultural Resources			
Adversely Affected Resources	No effect	Develop mitigation plans for sites 24LN1209 and 24N1323 in consultation with the SHPO that could include developing an interpretive sign along Libby Creek Road or developing a display in the Libby Heritage Museum	Site 24LN1209 (road #1408) not affected; mitigation for site 24N1323 same as Alternative 3

Project Facility or Feature	Alternative 2 MMC's Proposed Mine	Alternative 3 Agency Mitigated Poorman Alternative	Alternative 4 Agency Mitigated Little Cherry Creek Alternative
Noxious Weed Management			
Noxious Weed Management	Implement Weed Control Plan approved by Lincoln County Weed Control District	Same as Alternative 2 with the Weed Control Plan incorporating the following changes: After KNF approval of the final Weed Control Plan, submit it to the Lincoln County Weed Control District for approval. Submit an annual report to the KNF describing weed control efforts Implement all weed BMPs identified in Appendix A of the KNF Invasive Plant Management Final EIS for all weed-control measures Include integrated noxious weed management in the environmental training To the extent possible, survey all proposed ground disturbance areas for noxious weeds before initiating disturbance; describe in final design plans the extent to which surveys and pretreatment would not be feasible; where noxious weeds were found, treat infestation the season before the activity was planned Pressure wash all off-road equipment, including equipment for underground activities, vegetation clearing and road construction for geotechnical investigations, and reclamation, before entering the Project area	Same as Alternative 3
Reclamation Plans			
Vegetation Removal and Disposition	Not specified	Implement a Project-specific Vegetation Removal and Disposition Plan	Same as Alternative 3
Soil Stockpiles	For road disturbances, salvaged soils stockpiled along entire road corridors	For road disturbances, salvaged soils stockpiled in clearings immediately adjacent to new roads	Same as Alternative 3

Project Facility or Feature	Alternative 2 MMC's Proposed Mine	Alternative 3 Agency Mitigated Poorman Alternative	Alternative 4 Agency Mitigated Little Cherry Creek Alternative
Soil Management	No new soil disturbances; no pre-disturbance and post-disturbance soil condition assessment required	On new disturbances on National Forest System lands, MMC would be required to comply with Region 1 soil quality standards; MMC would use KNF detrimental soil disturbance field forms to assess pre-disturbance and post-disturbance soil conditions	Same as Alternative 3
Revegetation Seedbed Preparation	Apply organic amendments as needed or when soil tests demonstrate deficiencies	Same as Alternative 2 for Libby Adit Site; on National Forest System lands, agency-approved wood-based organic amendment would be incorporated into upper 4 inches of respread soil to improve nutrient content and the organic matter level to 1 percent by volume	Same as Alternative 3
	Use mycorrhizae-inoculated trees and shrubs if readily available	Same as Alternative 2 for Libby Adit Site; for National Forest System lands, mycorrhizae would be added to soil in areas where trees are to be planted	Same as Alternative 3
Seed Mixtures	Native and introduced species	Same as Alternative 2 for Libby Adit Site; for National Forest System lands, local native seed from the Forest Service Coeur d'Alene Nursery or one that is consistent with the KNF-approved 2018 seed mix	Same as Alternative 3
Noxious Weeds on Reclaimed Areas	No more than 10 percent noxious weeds	Same as Alternative 2 for Libby Adit Site; for National Forest System lands, 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	Same as Alternative 3
Transportation			
Road Improvements	Not specified	Implement BMPs on NFS road #231	Same as Alternative 3
Seasonally Gated Roads NFS roads #231 and #2316	Install and maintain each closure device; gates would have dual-locking devices to allow the KNF fire or administrative access	Same as Alternative 2	Same as Alternative 2

Project Facility or Feature	Alternative 2 MMC's Proposed Mine	Alternative 3 Agency Mitigated Poorman Alternative	Alternative 4 Agency Mitigated Little Cherry Creek Alternative
Other Access Changes	None proposed	Fund or implement access changes on currently open, gated, or seasonally restricted roads; maintain each closure device (see Table 309 and Table 310)	Same as Alternative 3
Development of Plans	Not specified	Develop and implement a Road Management Plan and Transportation Plan	Same as Alternative 3
Fisheries and Wildlife			
Grizzly Bear Road and Trail Access Changes before starting Evaluation Project	Implement seasonal access changes on currently open roads (see Table 306)	Implement access changes on currently open roads; fund or implement access changes on currently open, gated or seasonally restricted roads (see Table 309 and Table 310)	Same as Alternative 3
Grizzly Bear Habitat Protection before starting Evaluation Project	None specified	Before starting the Project, secure or protect (through conservation easement with conveyance of fee title or perpetual conservation easement to the Forest Service or private conservation organization independent of MMC) from development (including but not limited to housing and motorized access) and use (timber harvest, grazing, and mining) 742.3 acres of grizzly bear habitat. The 14.5-acre Rock Lake parcel, parcel 11, would be secured or protected through a perpetual conservation easement conveyed to the Forest Service or a private conservation organization independent of MMC. The conservation easement on the parcel would contain an allowance for a ventilation adit and reclamation should MMC decide to pursue Montanore Project development in the future. The ventilation adit as previously proposed was described in JFEIS Section 2.4.1.3. If the Montanore Project included a ventilation adit on the Rock Lake parcel as a project component and if the Montanore Project proceeded as described in Section 2.4.4, *Site Closure*, the adit's effects and reclamation, if any, on habitat value and any necessary mitigation would be disclosed in the future environmental analysis of the project.	Same as Alternative 3

Project Facility or Feature	Alternative 2 MMC's Proposed Mine	Alternative 3 Agency Mitigated Poorman Alternative	Alternative 4 Agency Mitigated Little Cherry Creek Alternative
Other Wildlife Protection Measures	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 the permit areas Bear-proof all garbage containers Prohibit the feeding of bears and leaving of food or other bear attractants in the field	Fund two FWP positions (one full-time Law Enforcement Officer and one full-time Grizzly Bear Specialist) for 5 years or as otherwise agreed by the Forest Service in consultation with USFWS If both the Evaluation Project and Rock Creek Project were concurrent, fund a local FWP Habitat Conservation Specialist for 5 years or as otherwise agreed by the Forest Service in consultation with USFWS Fund, develop, and implement an enhanced public outreach information and education program Remove big game animals killed by any vehicles daily from road rights-of-way on all NFS roads used for Project activities. Fund and maintain up to 35 bear-resistant refuse containers for employees and operational facilities Fund fencing, electrification, and maintenance 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 Implement the updated wildlife awareness program for employees and contractors A mandatory reporting system would be established and maintained for MMC and KNF employees to immediately report grizzly and black bear incidents, observations, or mortalities to the FWP grizzly bear specialist and law enforcement officer, including yearly requirements for MMC and KNF to report any sanitation incidents and correction measures taken during the previous year	Same as Alternative 3

Project Facility or Feature	Alternative 2 MMC's Proposed Mine	Alternative 3 Agency Mitigated Poorman Alternative	Alternative 4 Agency Mitigated Little Cherry Creek Alternative
Bull Trout	None proposed	Reduce the contributing surface road lengths at six crossings where Libby Creek Road crosses or intercepts a RHCA to 150 feet where the existing lengths were currently greater than 150 feet. When completing instream work within 0.25 mile of a bull trout occupied stream, MMC would: Conduct all instream work between July 15 and September 1; work can be completed outside of that period if it can be implemented in a dry portion of the stream channel and all other potential impacts are fully mitigated Place straw bales in the streams below the culvert where practicable Minimize the duration of instream work to the extent practicable	Same as Alternative 3

2.3 Alternative 1

The existing Libby Adit Site is on private land owned by MMC, which is a patented mining claim in the upper Libby Creek drainage. It is 2.5 miles west of Howard Lake. MMC maintains the Libby Adit under the authority of DEQ Operating Permit No. 00150 (as revised in revisions 06-001, 06-002, and 08-001). The 219-acre operating permit area of the Libby Adit Site, located in Sections 10, 11, 14, and 15, T27N, R29W, includes an existing 11.6-acre disturbance area. For analysis purposes in the JFEIS, the KNF used an 18-acre disturbance area for the Libby Adit Site to assess effects on surface resources. For maximum flexibility, MMC would have bonded to cover the entire disturbance area even if no activities were proposed. The JFEIS approach would have allowed MMC to construct temporary and seasonal roads and other facilities within these disturbance area boundaries as needed. The site has an office trailer and a shop building, a Water Treatment Plant, a lined stormwater pond, and a lined waste rock storage area and an associated waste rock sump (Figure 302).

In Alternative 1, the No Action Alternative, the environmental, social, and economic conditions described in JFEIS Chapter 3 would continue, unaffected by the Project. MMC would not undertake underground activities beneath the CMW, aboveground geotechnical investigations, or habitat protection. DEQ's Operating Permit No. 00150 as revised in revisions 06-001, 06-002, and 08-001 would remain in effect. MMC probably would not continue with the DEQ-permitted activities at the Libby Adit Site. Any existing evaluation-related or baseline data collection disturbances by MMC would be reclaimed in accordance with Operating Permit No. 00150, with the exception of seed mixtures. MMC intends to use locally sourced seed when possible. MMC may substitute specific species in the final seed mixtures at the Libby Adit Site if approved by DEQ (see Section 2.4.4.1, *Closure of the Libby Adit and Site Reclamation*).

The conditions under which the Forest Service could select the No Action Alternative are described in Section 1.6, *Agency Roles, Responsibilities, and Decisions*.

2.4 Alternative 2

The Project, as permitted by DEQ, is described as Alternative 2. Project activities are incorporated into MMC's Hard Rock Operating Permit No. 00150 through two revisions, MR 06-001 (MMC 2006a) and MR 06-002 (MMC 2006b). DEQ approved the 2006 revisions in 2006 (DEQ 2006a, 2006b). Another minor revision, MR 08-001, allowed relocation of fuel and oil storage areas at the Libby Adit Site and the addition of more fuel storage capacity. MMC conducted rehabilitation work on half of the Libby Adit consistent with DEQ approvals before ceasing in 2009; the work involved dewatering, installation of ground support and utilities, and ventilation.

2.4.1 Permit and Disturbance Areas

Project activities would occur at the existing Libby Adit Site and underground in the Libby Adit within and outside of MMC's extralateral rights. MMC also would use National Forest System roads for access (Figure 303). The Libby Adit Site location and disturbance area are the same for all alternatives. Existing facilities are as described for Alternative 1 (Figure 302). Alternative 2 facility modifications that would occur within the disturbance area are shown on Figure 307. MMC does not anticipate any disturbance outside of the DEQ-permitted disturbance area of 11.6 acres (Table 305).

Project activities are anticipated to last 18 to 24 months; the duration of the Project, including closure, may be up to 5 years.

Table 305. Surface Disturbance and DEQ Operating Permit Areas, Alternative 2.

Facility	Disturbance Area (acres)	DEQ Operating Permit No. 00150 Permit Area (acres)
Existing Libby Adit Site	11.6	219
Geotechnical Investigations New Roads Drill Pads	 0.0 0.0	 0 0
Total	11.6	219

2.4.2 Access and Road Access Changes

MMC would use Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) as the primary year-round access to the surface facilities at the Libby Adit Site. MMC would snowplow Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) in the winter. Project activities at the Libby Adit Site would increase vehicle trips per day on Libby Creek and Upper Libby Creek Roads. There would be no limitations on the use of personal vehicles in Alternative 2. During dewatering and adit rehabilitation, MMC would employ 6 to 10 employees at the Libby Adit Site, working two 10-hour shifts 7 days per week. During drift development and drilling, MMC would employ 30 to 35 people at the Libby Site, working 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. MMC would implement road access changes to reduce or avoid adverse impacts on wildlife and fisheries (Table 306; Figure 304). MMC would check the status of the closures twice a year (spring and fall) and repair any gate or barrier that is allowing access. Gates would have dual-locking devices to allow the KNF fire or administrative access.

The JFEIS erroneously stated that MMC would request that the KNF implement access changes on two roads, NFS road #4784 (Upper Bear Creek Road) and NFS road #4724 (South Fork Miller Creek), before the Project to protect grizzly bear habitat. MMC proposed these changes “prior to beginning construction activities,” but not before beginning the dewatering of the Libby Adit.

Table 306. Road Access Changes, Alternative 2.

NFS Road Number	Road Name	Length (miles)			Current Closure Device and Access Status for Motor Vehicles	Proposed Closure Device and Proposed Access Status for Motor Vehicles	Notes
		In a BMU	In the BORZ	Total			
231 2316	Libby Creek Upper Libby Creek	2.3 2.2	0.0 0.0	2.3 2.2	Open[1]	Gated, ATM 11: seasonally restricted to all motor vehicles, including over-snow vehicles, except MMC traffic April 1 to May 15	Gate located on NFS road #231 below existing Libby Adit Site. Seasonal restriction would continue until Libby Adit Site closure, expected within 5 years of Project initiation.
4778 4778E	Midas-Howard Creek Midas-Howard Creek E	6.0 0.8	0.9 0.0	6.9 0.8	Open[1]	Gated, ATM 13; seasonally restricted to all motor vehicles, including over-snow vehicles April 1 to June 15	Spur Road 4778E is currently impassible to vehicles due to revegetation. Seasonal restriction would continue until Libby Adit Site closure, expected within 5 years of Project initiation.
Total Access Changes		11.2	0.9	12.1			

[1]Seasonal closures were temporarily implemented with the KNF's approval in 2007 (KNF 2007a) to MMC for snowplowing portions of NFS roads #231 and #2316.

BMU = Bear Management Unit.

BORZ = Bears outside of the Recovery Zone.

ATM = Restricted Use Access Travel Management Code; designated for NFS roads in the INFRA database.

Totals may differ due to rounding.

2.4.3 Project Activities

2.4.3.1 Underground Evaluation and Associated Activities

The existing Libby Adit (decline) is 14,006 feet in length from the portal entrance and is 18 feet wide and 18 feet high. Before work ceased in 2009, MMC conducted rehabilitation work on part of the Libby Adit consistent with its DEQ Operating Permit No. 00150 (as revised in revisions 06-001, 06-002, and 08-001); work involved dewatering, installation of ground support and utilities, and ventilation in the first 7,200 feet of the adit (MMC 2017b). MMC has continued the maintenance and care of the dewatered portion of the decline since that time, including dewatering.

The evaluation drilling would consist of dewatering and rehabilitation of the remaining extent of the existing Libby Adit (Figure 305), development of underground drifts (Figure 306), and underground evaluation and drilling. Project activities are anticipated to last 18 to 24 months; the duration of the Project, including closure, may be up to 5 years. During dewatering and adit rehabilitation, MMC would employ 6 to 10 employees at the Libby Adit Site, working two 10-hour shifts 7 days per week. During drift development and drilling, MMC would employ 30 to 35 people at the Libby Site, working 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.

2.4.3.1.1 Libby Adit Dewatering and Rehabilitation

MMC would complete the rehabilitation of the lower segment of the Libby Adit (Figure 305). MMC would dewater the flooded adit, install ground support, mount underground support utilities (electric, compressed air, water pipeline, communications) on the walls of the adit, and reestablish ventilation.

For dewatering, MMC would reestablish pumping stations originally used during the development of the Libby Adit. MMC would continue to use the existing sumps and muck bays for underground water management. Temporary pump placement would advance based on actual dewatering rates. Permanent pump stations would be developed as appropriate along the adit for staged pumping. Sumps would be oversized where necessary to ensure sufficient capacity existed to store sediment generated during evaluation and drilling. Sump placement would be completed to meet operational and water treatment needs.

The Libby Adit would be dewatered completely, and adit water would be treated at the existing Water Treatment Plant. MMC's MPDES permit MT0030279 regulates wastewater discharges from the Libby Adit and sets effluent limits for discharges to both surface water and groundwater (see Section 2.4.3.1.5, *Water Use and Management*). Dewatering rates of up to 500 gpm could be used initially over a 3- to 4-week period and would be reduced to maintenance levels after initial dewatering. Water would be pumped to the Water Treatment Plant through an existing pipe. Once water was treated, it would discharge to the distribution box to one of three MPDES-permitted outfalls for Libby Adit water: Outfall 001—percolation pond discharging to groundwater; Outfall 002—drainfield with three infiltration zones discharging to groundwater; and Outfall 003—pipeline outlet to Libby Creek. The percolation pond (Outfall 001) has an estimated capacity of 25 acre-feet. The drainfields (Outfall 002) are designed to accommodate discharge flows in excess of 200 gpm. Outfall 003 has not been constructed (EPA 2003; MMC 2009b).

Electrical power at the Libby Adit to dewater the currently flooded segments of the Libby Adit would be provided by three Tier 3 225 kW electrical generators that are currently operating at the Libby Adit Site. Emissions from these generators are below the 25 tons per year that require an air quality permit (TRC Environmental Corp. 2006).

2.4.3.1.2 Development of Underground Drifts

After dewatering the full extent of the existing Libby Adit, MMC would extend the adit 3,300 feet and develop an additional 7,100 feet of development drifts and 16 drill stations below the currently defined ore zones. The drifts would be 18 feet wide and 18 feet high. Development of the drifts would occur in two phases. Phase I would include 3,300 feet of adit extension and 1,900 feet for drill development/drill stations. Phase II would include 5,200 feet for drill development/drill stations (Figure 306).

As described in JFEIS Section 2.4.1.7, *Electrical Power*, MMC anticipates the need for more power for drift development and drilling than can be generated by the three existing generators currently operating on-site (described above). A contractor, Cummins USA, has been issued an air quality permit (MAQP #4063-00) for portable diesel generator sets in various locations throughout Montana (DEQ 2007). MMC proposes to use these portable 800 kW Tier 2 generators at the Libby Adit under an "intent to transfer" notification for temporary power. Two of the three generators would operate at any one time with the other used as a backup. Under the conditions of the Cummins USA air quality permit, each generator cannot operate more than 6,450 hours in any rolling 12-month period for a total hourly use of 19,350 hours for three generators (DEQ 2007).

2.4.3.1.3 Underground Drilling and Evaluation

Phase I drilling would consist of an estimated 15,000 feet of diamond drilling on 400-foot spacing. If necessary an additional 5,600 feet of infill drilling would be implemented. Phase II drilling would consist of 20,000 feet with a possible 7,200 feet of infill drilling. Additional drilling would occur along the extralateral rights border and the Rock Lake Fault (Figure 306).

MMC would drill ahead of the drifts and keep all drill stations 500 feet from Rock Lake and 100 feet from the Rock Lake Fault (Figure 306). 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 100-foot barrier in advance of approaching the buffer zone.

2.4.3.1.4 Grouting and Groundwater Control

MMC would grout water-bearing faults and fractures to control and minimize inflow of groundwater to the Libby Adit. The purpose of the grouting would be to control and minimize groundwater inflow into the adit and development drifts. As rehabilitation and extension of the Libby Adit was initiated, documentation of groundwater inflow would be completed. MMC would monitor the effectiveness of grouting by monitoring inflow and pumping rates. The monitoring plan would be:

- Inspect, record, and document water-producing units and rock falls
- Record previous grouting evidence
- Measure any adit flows before and after grouting
- Make periodic measurements based on visible flows

Documented adit flows, major fracture, fault systems, water contribution, grouting success, and other information would be submitted in MMC's Annual Report.

2.4.3.1.5 Water Use and Management

The Libby Adit would be dewatered completely, and water would be treated at the existing Water Treatment Plant, which uses ultrafiltration to remove metals sorbed onto particulates suspended in the water, thereby reducing total suspended sediments and metal concentrations. The Water Treatment Plant has a current design capacity of 500 gpm, which would be adequate for anticipated discharges. MMC anticipates and the KNF concurs that proper management of explosives and use of emulsions would reduce nitrate concentrations from those detected during the initial Libby Adit construction in the late 1980s. MMC would complete monitoring required by the MPDES permit. MMC currently samples and analyzes untreated water monthly for both total and dissolved metals. MMC would continue to maintain a detailed water balance and report inflows and discharges in an annual report.

MMC holds two 1902 surface water rights on Libby Creek, one for mining near the Libby Adit Site in Section 15, T27N, R31W (with a maximum diversion of 44.9 gpm between April 1 and December 19, and a 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 groundwater right near the Libby Adit Site in Section 15, T27N, R31W (with a total diversion of 40 gpm year-round). MMC would use either its groundwater right with a year-round diversion or its surface water right with a diversion between April 1 and December 19 for any required water usage. MMC would not appropriate any adit water for beneficial use during the Project; therefore, a beneficial water use permit would not be required. If any of the adit and mine water was used for any beneficial use, such as drilling, milling, or dust suppression, MMC would need to obtain a beneficial water use permit for these uses (DNRC 2012). Water used for drilling would be reused or sent to the Water Treatment Plant for treatment before discharge.

2.4.3.1.6 Waste Rock Management

An estimated 545,300 tons of waste rock would be generated from development drifts, muck bays, underground sumps, and underground drill hole stations (Table 307). No ore or alteration-zone waste rock is anticipated to be encountered. Waste rock would be hauled to the surface and stored at one of two lined waste rock storage areas at the Libby Adit Site (Figure 307). One waste rock storage area currently exists on-site; it has a polyvinyl chloride (PVC) liner. A second waste rock storage area would be constructed. Precipitation that infiltrated the storage areas would be collected and conveyed to an existing stormwater pond that is lined with a 60-mil PVC liner and designed for the 25-year/24-hour storm. Waste rock would remain in the lined storage areas until closure. MMC would backfill 15.5 tons of waste rock into the Libby Adit between the two adit plugs and would regrade, topsoil, and reseed the remainder as part of reclamation activities (see Section 2.4.4.1, *Closure of the Libby Adit and Site Reclamation*). MMC may submit geotechnical data to support changing backfill requirements at closure.

MMC completed the testing of waste rock required by DEQ's approval of revision 06-002. The tests are described in Alternative 3.

Table 307. Estimated Schedule for Waste Rock Production and Disposal, Alternative 2.

Formation	Current (tons)	Evaluation (tons)	Placement[1]
Prichard	377,700	0	Libby Adit pad (1989–1991); 66,000 tons lined storage area (2007)
Burke	42,500	0	Libby Adit pad (1989–1991)
Revett (non-lead)	4,200	0	Libby Adit pad (1989–1991)
Revett combined	0	545,300	Lined Libby Adit pad
Total	424,400	545,300	

[1]15.5 tons would be placed underground adjacent to portal plug at closure.
All units are tons; conversion from bank cubic yards presented in MMC 2009a are based on a density of 12.18 cubic feet/ton.
Prichard includes Prichard-Burke transition rock.
Revett waste reported as combined when data do not distinguish barren lead from other altered zones.
Source: MMC 2009a.

2.4.3.1.7 Explosives Management Plan

Explosives management would be the same as described for Alternative 3.

2.4.3.1.8 Weed Control

MMC has a Weed Control Plan approved by the Lincoln County Weed Control District that would remain in effect for the Libby Adit Site.

2.4.3.2 Project Monitoring

2.4.3.2.1 Water Resources Monitoring

MMC would complete monitoring associated with the MPDES permit as appropriate to meet the permit conditions. In addition to the monitoring required or planned, the following would be monitored for the water rock storage area, would be based on test results, and may be modified to ensure adequate samples were collected when water was available:

- Weekly sampling when water is present
- Detection limits consistent with permit requirements
- Documentation of quantities of waste, shot information, dates, and other important information to assist in understanding nitrate loading

2.4.3.2.2 Geotechnical Monitoring (Underground)

Geotechnical monitoring would be completed to collect rock mechanic data and geologic information that would be pertinent to subsequent mine design criteria and employee safety. Monitoring would focus on areas near the surface that would be most susceptible to potential subsidence. After dewatering the Libby Adit, MMC would hire a geotechnical firm to develop and initiate a more advanced geotechnical data collection program to supplement current mine design criteria for a feasibility study. The program could include but would not be limited to geotechnical logging of core, geotechnical mapping, span testing using borehole extensometers, and in situ stress measurements. Data collection would involve the planned drill holes and other

methods of collecting important geotechnical data. Data would be compiled, assessed, and reported to DEQ and the KNF in an annual report.

2.4.3.3 Design Features

2.4.3.3.1 Grizzly Bear

MMC's grizzly bear mitigation plan is described in the JFEIS. The plan consists of habitat protection, measures to reduce mortality risks, and mitigation plan management. The JFEIS erroneously indicated that MMC would fund or implement access changes on two roads before the Evaluation Phase of the Montanore Project: NFS roads #4784 and #385. MMC's plan was to fund or implement these access changes before construction of the Montanore Project began.

MMC prepared a Wildlife Awareness Management Plan for its employees and contractors (MMC 2019). 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 Evaluation Project, establish company procedures and protocols that address these issues, and develop employee and contractor awareness of wildlife issues. The wildlife awareness plan includes the education of employees about bear awareness and safety, refuse management, company policies regarding wildlife, and other wildlife concerns.

MMC's mitigation applicable to the Evaluation Project to reduce grizzly bear mortality risk is:

- Report road-killed animals to Montana Fish, Wildlife & Parks (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 the permit area
- Bear-proof all garbage containers
- Prohibit the feeding of bears and leaving of food or other bear attractants in the field

2.4.4 Site Closure

Successful completion of the Evaluation Project would be a prerequisite to development of the Montanore Project. If MMC decided to pursue approval to mine the Montanore ore body, it would provide the KNF with any additional information necessary to assess effects of the Montanore Project. The Montanore Project would occur after the Evaluation Project only if (1) MMC decided to pursue Montanore Project development, (2) the KNF approved the Montanore Project after completing additional NEPA analysis and ESA compliance, and (3) DEQ permitted the Montanore Project after completing additional Montana Environmental Policy Act (MEPA) analysis. The Montanore Project is described in detail in Chapter 2 in the JFEIS.

2.4.4.1 Closure of the Libby Adit and Site Reclamation

DEQ currently holds a reclamation bond to cover reclamation of 11.6 acres at the Libby Adit Site, including plugging the existing adit, associated with its approval of revision 06-002. MMC would reclaim facilities associated with the Project in the following manner if MMC did not pursue the Montanore Project or if the Montanore Project was not approved and implemented. Because the Libby Adit Site is on private land, MMC would maintain control of the Libby Adit Site disturbance area with a fence until the site was reclaimed and the reclamation bond was released.

MMC would place two plugs in the Libby Adit near the Libby Adit portal after the KNF and DEQ allowed MMC to proceed with adit plugging. One of the plugs would be installed in bedrock near the bedrock/colluvial contact point about 600 feet from the portal opening; the KNF would confirm the location before placement. MMC would complete an engineering assessment that would assess hydrologic and geotechnical data to evaluate the water retaining plug design. Another plug would be installed near the portal entrance and serve as an access barrier to the adit. The portal plug would not be a water retention feature because no water is anticipated in the colluvial zone of the adit.

Because the adit has been opened for an extended period with no deterioration to the structure, the likelihood of subsidence is minimal. The most susceptible section would be the first 200 to 300 feet where the cover over the adit is thinner. MMC would backfill waste rock into the adit from the bedrock plug out to the surface opening plug. Based on the dimensions of the adit, it would take between 6,500 and 7,000 cubic yards to completely fill the void space. Waste rock would be hauled back into the adit by truck, dumped, and then pushed into place. Placement of the waste rock would be within 1 to 2 feet of the top of the adit.

Water treatment would continue until discharge from the adit met appropriate water quality standards or limits without treatment or until both adit plugs were installed, whichever came first. Water treatment also would continue until the quality of the water from the waste rock storage areas met appropriate water quality standards or limits without treatment.

Once the portal entrance plug was installed, excavated material from the patio would be placed back over the portal plug and general opening and regraded to match the surrounding topography. All structures would be removed, and above- and below-grade features would be resloped (Figure 308). The waste rock storage areas would be regraded with slopes less than 2:1 with the top surface regraded away from the face. Reducing the slopes to 2:1 on waste rock storage area #1 would require the removal of 43,000 cubic yards of material. The excess material would be used to fill in the percolation pond. Other surface features, including the percolation pond, road, pads, and parking areas, would be generally regraded to match the adjacent topography.

Growth medium would be placed over the regraded and scarified areas. Because soil is limited, MMC intends to cover all areas with the available growth medium, but it may have limited thickness. The disturbed sites would be reseeded using an acceptable seed mixture approved by DEQ and the KNF (MMC 2018a). The seed mixture would be broadcasted at a rate of 20 pounds per acre or as directed by DEQ and the KNF for rates of seed mixture.

Monitoring of the site would continue to ensure that the plugs are functioning properly and that seeding was successful. Weed management also would be performed to ensure successful establishment of native vegetation. MMC would maintain control of the Libby Adit Site disturbance area with a fence until the site was reclaimed and the reclamation bond was released.

2.4.4.2 Road Access Changes

After the site was reclaimed and closed, seasonal access changes on Libby Creek Road, Upper Libby Creek Road, and Midas-Howard Creek Road and its spur would no longer be required, and access on these roads would return to pre-Project status (Table 306).

2.4.4.3 Monitoring Equipment

Any existing monitoring well or piezometer installed by MMC or its predecessors would be removed and plugged according to ARM 36.21.810. The well casing would be removed below the ground surface, and the well covers would be removed and disposed of off-site. The small area associated with the monitoring well would be regraded to blend with the natural surroundings. The area would be ripped if appropriate, and soil would be placed consistent with the general soil placement plans. All other monitoring equipment, such as data loggers, would be removed before reclamation bond release.

2.4.5 Reporting

MMC would continue to submit an annual report to the KNF.

2.5 Alternative 3

Alternative 3 would incorporate modifications and design features proposed by the KNF to avoid or minimize adverse environmental impacts. These measures are in addition to or instead of the mitigations proposed by MMC as part of Alternative 2. The KNF's modifications and design features were developed on anticipated Project effects on key issues identified during the JFEIS scoping process (ERO Resources Corp. 2005 and ERO Resources Corp. 2006) and determined to be applicable to the Project analyzed in the SEIS (see Section 2.1.2, *Issues*).

2.5.1 Permit and Disturbance Areas

In Alternative 3, Project activities would occur at the existing Libby Adit Site, underground in the Libby Adit and within MMC's extralateral rights, at certain monitoring locations in the CMW, between Poorman Creek and Little Cherry Creek, along National Forest System roads used for access (Figure 309), and on roads where access changes would occur for grizzly bear (Table 309). Activity, including access changes, also may occur on 742.3 acres to be protected for grizzly bear habitat (see Section 2.5.3.1, *Design Features*). At the Libby Adit Site, MMC would construct and relocate some facilities, such as waste rock storage areas and soil stockpiles, within the existing disturbance area (Figure 310). MMC does not anticipate any additional disturbance outside of the existing DEQ-permitted disturbance area of 11.6 acres (Table 308). If additional disturbance outside of the DEQ-permitted disturbance area was needed, MMC would need authorization from DEQ and not the KNF because the adit site is entirely owned by MMC. During the Project, MMC would maintain an existing fence surrounding the Libby Adit Site disturbance area.

MMC maintains existing infrastructure at the Libby Adit Site, including a Water Treatment Plant with a capacity of 500 gpm. Other existing supporting surface facilities include an office, a shop, portable generators, a waste rock storage area, and other ancillary facilities. During the Project, MMC would expand the existing waste rock storage area, develop an additional lined waste rock storage area on the main portal pad site, and reconstruct and enlarge the existing waste rock sump (Figure 310).

Table 308. Surface Disturbance and DEQ Operating Permit Areas, Alternative 3.

Facility	Disturbance Area (acres)	DEQ Operating Permit No. 00150 Permit Area (acres)
Existing Libby Adit Site	11.6	219
Geotechnical Investigations[1]		
New Roads	6.3	0
Drill Pads	0.1	0
Total	18.0	219

[1]Some of the Alternative 3 geotechnical investigation area is encompassed by the Operating Permit No. 00150 permit area of Alternative 2.

MMC would conduct geotechnical investigations between Poorman Creek and Little Cherry Creek on National Forest System lands in Sections 23 through 26, T28N, R31W and Section 19, T28N, R30W to provide additional information about subsurface conditions at an impoundment site (Figure 311). Disturbance associated with the geotechnical investigations would include construction of new access roads and drill pads on National Forest System lands.

Project activities would take 18 to 24 months, and data evaluation would take 2 to 3 years. If MMC decided not to pursue Montanore Project development, closure of the Libby Adit Site would take 2 to 3 years. Because Project activities, data evaluation, and reclamation could overlap, the total duration of the Evaluation Project may be up to 5 years.

2.5.2 Access and Road Access Changes

MMC would use Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) as the primary year-round access to the surface facilities at the Libby Adit Site. MMC would snowplow Libby Creek Road and Upper Libby Creek Road in the winter (Figure 309). Libby Creek Road would be gated just past the intersection of Bear Creek Road (NFS road #278) (Table 309; Figure 312). Except between April 1 and May 15, public motorized use of Libby Creek Road and Upper Libby Creek Road would be allowed. Between April 1 and May 15, MMC and its contractors would be allowed past the gate, but public motorized use of Libby Creek Road would be restricted. The seasonal restriction would continue until Libby Adit Site closure, expected within 5 years of Project initiation.

Project activities at the Libby Adit Site would generate 10 or fewer additional vehicles per day on Libby Creek Road and Upper Libby Creek Road. Access to the geotechnical investigation area from US 2 would be via Libby Creek Road and then Bear Creek Road (NFS road #278), Little Cherry Creek Loop Road (NFS road # 6212), and short spur roads (Figure 309 and Figure 311). Four to six vehicle trips per day would be made to and from the geotechnical investigation area.

The term “before starting the Project” is used throughout the SEIS, associated mitigation plans, and monitoring plans (Appendix C) to describe when certain mitigation and monitoring plan components would be implemented. Many of the mitigation plan components are design features of the Evaluation Project and would be implemented after Forest Service approval of an amended Plan of Operations for the Evaluation Project. To ensure the term “before starting the Project” is clear, the term means the component would be implemented after the Forest Service approves the amended Plan of Operations for the Project and before the Forest Service issues MMC a letter to

proceed to start Project activities of (1) dewatering the Libby Adit beyond the 7200-foot level or (2) creating any new surface disturbance at the Libby Adit Site or the geotechnical investigation area.

2.5.2.1 Access Changes on National Forest System Lands

MMC would implement road access changes before starting the Project to reduce or avoid adverse impacts on grizzly bears, although other species of wildlife and fisheries may benefit (Table 309; Figure 312). Under direction of the KNF, MMC would be responsible for installing and maintaining each closure device. MMC would check the status of the closures twice a year (spring and fall) and repair any gate or barrier that was allowing access. Gates on Libby Creek Road would have dual-locking devices to allow the KNF fire or administrative access.

Roads that would be barriered would be placed into intermittent stored service or decommissioned. Intermittent stored service road treatments would include:

- Conducting noxious weed surveys and performing necessary weed treatments before storage activities
- Blocking entrance to the road prism
- Removing culverts determined by the KNF to be high risk for blockage or failure; laying back streambanks at a width and angle to allow flows to pass without scouring or ponding so that revegetation has a strong chance of success
- Installing cross drains so the road surface and inside ditch would not route any intercepted flow to ditch-relief or stream-crossing culverts
- Removing and placing unstable material at a stable location where stored material would not present a future risk to watershed function
- Replacing salvaged soil and revegetating with grasses in treated areas and unstable roadway segments to stabilize and reduce erosion potential

Decommissioned roads would be removed from service and would receive a variety of treatments to minimize the effects on other resources. In addition to all of the intermittent stored service road treatments, a decommissioned road would be treated by one or more of the following measures:

- Conducting noxious weed surveys and performing necessary weed treatments before decommissioning
- Removing any remaining culverts and removing or bypassing relief pipes as necessary
- Stabilizing fill slopes
- Obliterating the road prism by restoring natural slope and contour
- Restoring all watercourses to natural channels and floodplains
- Revegetating the road prism
- Installing water bars or outsloping the road prism
- Removing unstable fills

MMC would use the following BMPs during instream work, such as culvert replacement or removals, within 0.25 mile of a bull trout occupied stream:

- Conduct all instream work between July 15 and September 1; work can be completed outside of that time period if it can be implemented in a dry portion of the stream channel and all other potential impacts are fully mitigated
- Place straw bales in the streams below the culvert where practicable
- Minimize the duration of instream work to the extent practicable

2.5.2.2 Access Changes Associated with Mitigation Lands

Before starting the Project, MMC would secure or protect (through conservation easement with conveyance of fee title or perpetual conservation easement to the Forest Service or private conservation organization independent of MMC) 742.3 acres of private land that it or an affiliated company currently owns to improve grizzly bear habitat (see Section 2.5.2, *Access and Road Access Changes*). To improve access and habitat parameters on the mitigation lands, MMC would implement or fund road access changes on private and NFS roads before starting the Project by replacing existing gates with barriers (Table 310 and Figure 312). MMC would be responsible for installing and maintaining each barrier. Roads on mitigation lands would be decommissioned (as described above in Section 2.5.2.1, *Access Changes on National Forest System Lands*). MMC would check the status of the barriers twice a year (spring and fall) and repair any barrier that was allowing access. Treatments and BMPs associated with decommissioned roads and roads within 0.25 mile of a bull trout occupied stream would be the same as described in Section 2.5.2.1, *Access Changes on National Forest System Lands*. The removal of stream crossing structures on barriered roads would occur prior to barrier construction so as to avoid future adverse effects on streams. Removals of culverts or other structures in a water of the U.S., if they resulted in a discharge of fill, would not proceed without all required permits and authorizations.

2.5.3 Activities before Starting the Project

In Alternative 3 and Alternative 4, certain activities such as implementation of design features to reduce or avoid impacts on wildlife and fisheries and completion of pre-disturbance surveys and monitoring would be required before the Project. The following sections describe these activities.

2.5.3.1 Design Features

2.5.3.1.1 Transportation Plan Development and Implementation

MMC would develop a Transportation Plan for the Evaluation Project before starting the Project. The plan would be incorporated into an amended Plan of Operations for the Project. The plan's objectives would be to minimize Project-related vehicular traffic traveling between US 2 and the Libby Adit Site and to minimize parking at the Libby Adit Site. Transporting employees to the Libby Adit Site, requiring managers to carpool to the extent practicable, and establishing a supply staging area in Libby to consolidate shipments to the site would be a part of the plan. The transportation hub would be in a convenient location in Libby, MT, most likely the Kootenai Business Park. The plan would specify that exceptions to staging and consolidation of supplies would include full load shipments, expedited shipments to repair equipment, and other emergencies as specified in the plan. Deliveries of supplies would be scheduled for day shift, Monday through Friday only, unless emergency situations dictate supply deliveries over the weekend.

Table 309. Road and Trail Access Changes, Alternatives 3 and 4.

NFS Road Number	Road Name	Length (miles)			Current Closure Device and Access Status for Motor Vehicles	Proposed Closure Device and Proposed Access Status for Motor Vehicles	Notes
		In a BMU	In the BORZ	Total			
231 2316	Libby Creek Upper Libby Creek	2.3 2.2	0.0 0.0	2.3 2.2	Open[1]	[2]Gated, ATM 11: seasonally restricted to all motor vehicles, including over-snow vehicles, except MMC traffic April 1 to May 15	Gate located on NFS road #231 below existing Libby Adit Site. Seasonal restriction would continue until Libby Adit Site closure, expected within 5 years of Project initiation.
4778 4778E	Midas-Howard Creek Midas-Howard Creek E	6.0 0.8	0.9 0.0	6.9 0.8	Open[1]	[2]Gated, ATM 13: seasonally restricted to all motor vehicles, including over-snow vehicles April 1 to June 15	Spur road #4778E is currently impassible to vehicles due to revegetation. Seasonal restriction would continue until Libby Adit Site closure, expected within 5 years of Project initiation.
4776A	Horse Mtn Lookout A	1.5	1.2	2.7	Open	Barriered, ATM XX[3]: restricted yearlong to motor vehicles except for over-snow vehicles, open to over-snow vehicles December 1 to March 31	Proposed change would allow over-snow vehicles but minimize disturbance during the grizzly bear spring use period by ending over-snow vehicle access March 31.
14458	Midasize	0.3	0.0	0.3	Open	Barriered, ATM 05: restricted yearlong to all motor vehicles, including over-snow vehicles	Proposed change consistent with existing yearlong closure on remaining portion of the road.
4778C	Midas Howard Creek C Lower segment Upper segment	1.8 1.6	0.0 0.0	1.8 1.6	Open Barriered, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	Barriered, ATM XX[3]: restricted yearlong to motor vehicles except for over-snow vehicles, open to over-snow vehicles December 1 to March 31	On the lower 1.8 miles, the proposed change would allow over-snow vehicles but minimize disturbance during the grizzly bear early spring use period by ending over-snow vehicle access March 31. On the upper 1.6 miles, the proposed change would result in over-snow vehicle access.

NFS Road Number	Road Name	Length (miles)			Current Closure Device and Access Status for Motor Vehicles	Proposed Closure Device and Proposed Access Status for Motor Vehicles	Notes
		In a BMU	In the BORZ	Total			
150A	East Fork Rock Creek/ Rock Lake Trail #935 Rock Lake Trail #935 only	3.0 1.1	0.0 0.0	3.0 1.1	Gated, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	Barriered, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	No change proposed to the existing public motorized access status. Convert Road #150A to a trail where necessary. Trail #935 begins at the gate on East Fork Rock Creek Road and coincides with Road #150A for 2.95 miles. The remaining 1.1 miles of Trail #935 extending to Rock Lake is already a tread trail. Access change in conjunction with mitigation land parcel #21 would increase width at the south constricted area in the north-south corridor.
4776C 4776F 6200 6200D 6200E 6200F 6214 6214F	Horse Mtn Lookout Horse Mtn Lookout F Granite-Bear Creek Granite-Bear Creek D Granite-Bear Creek E Granite-Bear Creek F Cable-Poorman Creek Cable-Poorman Creek F	0.0 0.7 1.8 0.9 0.3 0.4 3.6 0.6	0.9 0.4 0.0 0.0 0.0 0.0 0.0 0.0	0.9 1.1 1.8 0.9 0.3 0.4 3.6 0.6	Gated, ATM 09: restricted yearlong to motor vehicles except for over-snow vehicles, open to over-snow vehicles December 1 to April 30	Barriered, ATM XX[3]: restricted yearlong to motor vehicles except for over-snow vehicles, open to over-snow vehicles December 1 to March 31	Proposed change would reduce existing over-snow vehicle access by 1 month to minimize disturbance during the grizzly bear early spring use period.
6214E	Cable-Poorman Creek E	1.0	0.0	1.0	Barriered, ATM 09: restricted yearlong to motor vehicles except for over-snow vehicles, open to over-snow vehicles December 1 to April 30	Barriered, ATM XX[3]: restricted yearlong to motor vehicles except for over-snow vehicles, open to over-snow vehicles December 1 to March 31	Access change on this spur necessary to be consistent with the main road (#6214). Proposed change would reduce existing over-snow vehicle access by 1 month to minimize disturbance during the grizzly bear early spring use period.
6745	Standard Creek	4.4	0.0	4.4	Gated, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	Barriered, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	No change is proposed to the existing public motorized access status. Convert to trail where necessary.

NFS Road Number	Road Name	Length (miles)			Current Closure Device and Access Status for Motor Vehicles	Proposed Closure Device and Proposed Access Status for Motor Vehicles	Notes
		In a BMU	In the BORZ	Total			
4784	Upper Bear Creek	2.7	0.0	2.7	Gated, ATM 02: seasonally restricted to motor vehicles October 15 through June 30, open to over-snow December 1 to April 30.	Barriered, ATM XX[3]: restricted yearlong to motor vehicles, open to over-snow vehicles December 1 to March 31	MMC would implement the barrier only if the Rock Creek Project had not yet done so; access change would occur regardless of Rock Creek Project status. Convert to trail where necessary. Proposed change would reduce existing over-snow vehicle access by 1 month to allow over-snow vehicles during the winter period but minimize disturbance during the grizzly bear spring use period. The over-snow change differs from the Rock Creek Project mitigation which allowed over-snow vehicles December 1 to April 30. The access change would remain in place for one of the following possible scenarios: (1) minimum of 10 years, or (2) if either project was permitted, the longer of (a) life of Montanore Project or (b) life of Rock Creek Project.
Total access change							
Open – Seasonal		11.2	0.9	12.1			
Open – Barriered		3.6	1.2	4.8			
Gated – Barriered		18.4	1.3	19.7			
Barriered – Barriered		2.6	0.0	2.6			
Trail		1.1	0.0	1.1			
Total Access Changes		37.0	3.4	40.4			

BMU = Bear Management Unit
BORZ = Bears outside the Recovery Zone
ATM = Restricted Use Access Travel Management Code; designated for NFS roads in the INFRA database.

[1]Gate was installed and seasonal closures were temporarily implemented with the KNF's approval in 2007 (KNF 2007a) to MMC for snowplowing segments of NFS roads #231 and #2316.

[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 create core or change Open Motorized Route Density (OMRD) or Total Motorized Route Density (TMRD) within the BMU or open or total linear miles within the BORZ.

[3]A restricted use ATM (Access Travel Management Code assigned in the NFS INFRA roads database for legal restrictions) code has not yet been assigned for this seasonal restriction; it is assigned the value of "XX" for the analysis.

Totals may differ due to rounding.

Table 310. Road Access Changes Associated with Mitigation Lands, Alternatives 3 and 4.

Road Number	Road Name	Length (miles)				Current Cost-Share Status	Current Closure Device and Access Status for Motor Vehicles	Proposed Closure Device and Proposed Access Status for Motor Vehicles	Notes
		By Ownership		In BMU	Total				
		NFS	MMC[1]						
2315 2315A 2315B 2315D	Trail Creek Spotted Trail Kicking Bear Wounded Knee	0.8 0.0 0.6 0.0	1.2 0.6 0.8 0.7	2.0 0.6 1.4 0.7	2.0 0.6 1.4 0.7	Yes, all 2.0 miles Yes, all 0.6 miles Yes, on 0.6 miles Yes, all 0.7 miles	Gated, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	Barriered, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	No change is proposed to the existing public motorized access status.
99812 99812B 99812C 99821 99822 99822A	Teton 99812 Teton 99812B Teton 99812C Trail Creek 99821 Trail Creek 99822 Trail Creek 99822A	0.2 0.2 0.0 0.0 0.0 0.0	1.3 0.8 0.2 1.0 1.0 0.2	1.5 1.0 0.2 1.0 1.0 0.2	1.5 1.0 0.2 1.0 1.0 0.2	No, all are private roads	Gated, Private Roads, restricted yearlong to unauthorized vehicles, including over-snow vehicles	Barriered, ATM 05: restricted yearlong to motor vehicles, including over-snow vehicles	No change is proposed to the existing public motorized access status.
Total Access Changes		1.8	7.9	9.7	9.7	9.7			

[1]Owner is MMC or related entity.
NFS = National Forest System.
ATM = Restricted Use Access Travel Management Code; designated for NFS roads in the INFRA database.
Totals may differ due to rounding.

2.5.3.1.2 Road Management Plan Development and Implementation

KFP Guideline RF-2 requires the development and implementation of a Road Management Plan. Before starting the Project, MMC would develop a Road Management Plan for the two access roads to the Libby Adit Site (segments of NFS roads #231 and #2316; Figure 309), the two access roads to the geotechnical investigation area (segments of NFS roads #278 and #6212; Figure 309), roads used in the geotechnical investigations (Figure 311), and other roads affected by access changes required to be implemented for wildlife mitigation (Figure 312). The plan would be incorporated into an amended Plan of Operations for the Project. The plan would describe:

- Criteria that govern road operation, maintenance, management, and decommissioning
- 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
- Analysis of any new road constructed in a Riparian Habitat Conservation Area (RHCA), documenting it is the minimum necessary for the approved mineral activity

The plan's elements would include BMPs to minimize sediment delivery to area streams and would be the same as described in the SWPPP. The plan would include the timing and level of management for each road depending on the determined purpose for that road. MMC would post warning signs for speed limits and other important road conditions and require all authorized vehicles to follow all traffic control restrictions, such as speed. Other appropriate wording may be used as approved in the Road Management Plan.

The plan also 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 bull trout watersheds. MMC would install or fund the installation of signage where sidecasting would be avoided. Use of salt would be prohibited on roads during winter plowing operations.

2.5.3.1.3 Road Use and Improvements

The KNF identified six locations where Libby Creek Road crosses or intercepts a RHCA. MMC would reduce the contributing road surface lengths at the six crossings to 150 feet where the existing lengths were currently greater than 150 feet (ERO Resources Corp. 2017b). The activity would be implemented before implementing the BMPs shown in Table 311.

MMC would implement before the Project and maintain during the Project the BMPs shown in Table 311, such as installing, replacing, or upgrading culverts, to bring NFS road #231 up to KFP standards and guidelines and Forest Service guidance (USDA Forest Service 2008, 2015a). All ditches on NFS roads #231 and #2316 would be cleaned out to enhance drainage and reduce sedimentation. MMC would not disturb any land outside of a right-of-way easement between the United States and Libby Placer Mining Company where road improvements would occur on lands owned by Libby Placer Mining Company. The BMPs associated with road improvements within 0.25 mile of a bull trout occupied stream would be the same as described in Section 2.5.2.1, *Access Changes on National Forest System Lands*.

Some of the BMPs listed in Table 311 may require a 404 permit from the Corps. Any activity that may result in any discharge into waters of the U.S. cannot proceed until MMC provides the KNF a copy of the Corps 404 permit and a 401 certification from DEQ, unless DEQ waives its issuance.

Table 311. Proposed Road Improvements on NFS Road #231, Alternatives 3 and 4.

Milepost South from Junction of NFS Road #231 with NFS Road #4778	Required Activity
0.05	Install 24-inch ditch-relief culvert
0.10	Replace existing 18-inch corrugated metal pipe (CMP) with 24-inch CMP
0.13	Install 24-inch CMP; scoured channel enters ditch; no pipe present to allow water to cross road
0.30	Install surface drainage; drain to the east side of road
0.40	Surface drainage needed; drain to the east
0.50	Lower existing 18-inch CMP and replace if necessary
0.60	Clean out existing CMP
0.70	Replace CMP and armor outlet
0.84	Replace existing CMP with a 24-inch CMP
0.90	Provide surface drainage needed; drain to south
0.91	Repair or replace existing 18-inch CMP inlet
1.03	Provide road surface drainage; drain to the south
1.20	Provide road surface drainage; drain to the south
1.30	Armor inlet of existing 24-inch CMP
1.41	Install 24-inch CMP; install a drainage ditch on private property
1.43	Provide road surface drainage; drain to the south

2.5.3.1.4 Grizzly Bear

The terrestrial wildlife mitigation plan for Alternative 3 will be presented in its entirety in Appendix A of the terrestrial BA that the KNF will submit to the USFWS. The plan will include all of the Project's design features to minimize or avoid adverse impacts on the grizzly bear and the Canada lynx. The plan's five major components for grizzly bears, which are summarized in the following sections, are:

- Design Features and Measures to Reduce Mortality Risks
- Design Features and Measures to Maintain and Enhance Grizzly Bear Core Habitat
- Design Features and Measures to Compensate for Displacement Effects and the Loss of Grizzly Bear Habitat
- Design Features and Measures to Address Habitat Constriction and Fragmentation within the North-South Movement Corridor
- Design Features and Measures to Reduce Effects in Cabinet Face BORZ Reoccurring Use Areas

Design Features and Measures to Reduce Mortality Risks

MMC would fund two new full-time local FWP positions for 5 years or as otherwise agreed by the Forest Service in consultation with USFWS: a Law Enforcement Officer and a Grizzly Bear

Specialist. Funding would be provided before starting the Evaluation Project and implementation of land transfers or conservation easements. If both the Evaluation Project and Rock Creek Project were concurrent, MMC would fund a local FWP Habitat Conservation Specialist for 5 years or as otherwise agreed by the Forest Service in consultation with USFWS. The Habitat Conservation Specialist would address grizzly bear/land use issues, coordinate and account for implementation of the mitigation plan, and coordinate conservation easements if used for grizzly bear mitigation.

- MMC would implement a transportation plan designed to minimize vehicular traffic traveling between US 2 and the Libby Adit Site.
- MMC would, in coordination with the Forest Service, FWP, and USFWS, fund, develop, and implement an enhanced public outreach information and education program to build support and understanding for the conservation of the Cabinet-Yaak grizzly population.
- MMC would ensure the fencing installed around the Libby Adit Site disturbance area is in good condition and would maintain the fencing until site closure.
- MMC would not use salt during winter plowing operations.
- MMC would monitor the number of big game animals killed by vehicle collisions along NFS roads #231 and #2316 for as long as snowplowing NFS roads #231 and #2316 continued and on NFS road #278 and #6212 during the geotechnical investigations and would report findings annually.
- MMC would remove big game animals killed by any vehicle daily from the above roads for the same duration. MMC would move road-killed animals at least 50 feet beyond the road's edge or as far as necessary to be out of sight from the road.
- MMC would monitor and report within 24 hours all grizzly bear, lynx, wolf, and black bear mortalities within the Libby Adit Site permit area for 5 years and along the above access roads for the same duration.
- MMC would provide funding for purchase and maintenance of up to 35 bear-resistant refuse containers for use at the Libby Adit Site if one is not already in place and for personal use by Project employees that live in or near grizzly bear habitat, and would fund replacements as needed for 5 years.
- MMC would 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.
- MMC would 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 would fund 2 replacement electric fencing kits each year for 5 years that can be installed by FWP bear specialists at bear problem sites.
- MMC would implement a wildlife awareness program for employees and contractors (MMC 2019). As part of the wildlife awareness program, MMC would require employees (including all management staff) to attend training related to living and working in grizzly bear habitat before starting work and at least once a year thereafter for the life of the Evaluation Project.
- All mortality reduction measures would be subject to modification based on adaptive management, where new information supports changes.

- A mandatory reporting system would be established and maintained, in coordination with the FWP grizzly bear specialist and law enforcement officer, to ensure that MMC and KNF employees are required to immediately report any black bear or grizzly bear incidents, observations, or mortalities to ensure preemptive management, hazing, or removal of food attractants would occur to avoid risks of habituation, mortality, or displacement of grizzly bears. This system would also require both MMC and the KNF to commit to the following:
    - MMC would submit an annual summary report to the Forest Service by December of each year beginning in the year in which the Evaluation Project activities started, for 5 years or as otherwise agreed by the Forest Service in coordination with FWP and in consultation with USFWS, describing any grizzly or black bear sanitation incidents involving MMC personnel and corrective measures taken during the previous year associated with the Project.
    - The KNF would submit an annual report to the USFWS by April 1 of each year, beginning in the year in which the Evaluation Project activities started, for 5 years or as otherwise agreed by the Forest Service in coordination with FWP and in consultation with USFWS, describing any grizzly or black bear sanitation incidents and corrective measures within the Cabinet Mountains portion of the Cabinet-Yaak Ecosystem and Cabinet Face BORZ taken during the previous year.

Design Features and Measures to Maintain and Enhance Grizzly Bear Core Habitat

Under the direction of the Forest Service, MMC would implement or fund access changes on roads specified in Table 309 and Table 310. These roads would be included in the Road Management Plan. All roads specified in Table 309 and Table 310 are shown on Figure 312. The access changes on NFS roads and trails listed in Table 309 (except for #4784) would increase core habitat by 3,992 acres; the access changes on NFS or private roads associated with the Mitigation Land parcels listed in Table 310 would increase core habitat by 1,123 acres. Total created core habitat would be 5,115 acres.

In addition, MMC would implement or fund monitoring of the effectiveness of closure devices at least twice annually and would complete any necessary repairs immediately. Roads would be closed for at least 10 years. Should MMC not pursue Montanore Project development, MMC would provide the KNF with sufficient funding to monitor the effectiveness of closure devices at least twice annually and complete any necessary repairs for a period of 10 years from closure, minus the length of the Evaluation Project. For example, if the Libby Adit Site was reclaimed in Year 4, MMC would provide the KNF with an additional 6 years of funding. If the site was reclaimed in Year 5, funding would be for an additional 5 years.

The proposed seasonal restriction on Upper Libby Creek Road (NFS road #2316) and Midas-Howard Creek Road (NFS road #4778) and its spur (NFS road #4778E) would provide improved spring grizzly bear habitat conditions (836 acres); however, because these roads would not be gated for the entire active bear season, habitat improved through these seasonal road access changes would not contribute to changes in OMRD or TMRD. No change would occur to core as the roads would not be barriered. After the Libby Adit Site was reclaimed and closed, seasonal access changes on Libby Creek Road, Upper Libby Creek Road, and Midas-Howard Creek Road

and its spur would no longer be required, and spring grizzly bear habitat conditions would then return to pre-Project conditions adjacent to these four roads.

MMC would implement a barrier on Upper Bear Creek Road only if the Rock Creek Project has not yet done so and would include conversion of the road to a trail if necessary. The creation of 1,008 acres of core by this access change on Upper Bear Creek Road (NFS road #4784) is attributed not to the Project but to the Rock Creek Project and is analyzed as a cumulative effect on grizzly bear core in Section 3.25. The over-snow vehicle access change would occur regardless of the Rock Creek Project status. The proposed change would decrease existing over-snow vehicle access by 1 month to allow over-snow vehicles but would minimize disturbance during the grizzly bear early spring use period, which begins April 1. The change differs from the Rock Creek Project mitigation, which restricted motor vehicles yearlong but allowed over-snow vehicles December 1 through April 30. The access change would remain in place for one of the following possible scenarios: (1) a minimum of 10 years, or (2) if either project was permitted, the longer of (a) life of Montanore Project or (b) life of Rock Creek Project.

Design Features and Measures to Compensate for Displacement Effects and the Loss of Grizzly Bear Habitat

MMC would secure or protect (through conservation easement with conveyance of fee title or perpetual conservation easement to the Forest Service or private conservation organization independent of MMC) from development (including but not limited to housing and motorized access) and use (timber harvest, grazing, and mining) habitat to compensate for areas affected by displacement (Table 312; ERO Resources Corp. 2018b). The 14.5-acre Rock Lake parcel, parcel 11, would be secured or protected through a perpetual conservation easement conveyed to the Forest Service or a private conservation organization independent of MMC. The conservation easement on the parcel would contain an allowance for a ventilation adit and reclamation should MMC decide to pursue Montanore Project development in the future. The ventilation adit as previously proposed was described in JFEIS Section 2.4.1.3. If the Montanore Project included a ventilation adit on the Rock Lake parcel as a project component and if the Montanore Project proceeded as described in Section 2.4.4, *Site Closure*, the adit's effects and reclamation, if any, on habitat value and any necessary mitigation would be disclosed in the future environmental analysis of the project.

Table 312. Mitigation Lands Associated with the Evaluation Project.

Parcel ID[1]	Location	Section, Township, Range	Owner	Size[2] (acres)
11	Rock Lake	S29, T27N, R31W	MMC	14.503
21	Rock Creek Meadow	S06, T26N, R31W	Mines Management, Inc.	4.488
26	Trail Creek	S17, T26N, R30W	Hecla Montana, Inc.	640
34	Upper Trail Creek	S30, T26N, R30W	MMC	83.29
Total				742.281

[1]Parcel ID is based on tabulation of possible mitigation lands developed by Kasworm et al. 2013.
[2]Size shown is based on the parcel's deed.

The Forest Service would ensure that the specified acres of mitigation properties were managed for grizzly bear habitat in perpetuity. All replacement habitat for displacement has been purchased by MMC or a related entity (MMC is a subsidiary of Mines Management, Inc., a subsidiary of

Hecla Mining Company) and would be committed by MMC before starting the Project, accepted by the Forest Service (i.e., title conservation easements, recordation, and transfer to the Forest Service or private conservation organization independent of MMC), and completed before starting the Project. Costs of processing mitigation lands would be funded by MMC.

Design Features and Measures to Address Habitat Constriction and Fragmentation within the North-South Movement Corridor

The protection of the two parcels (11 and 21) in the East Fork Rock Creek drainage would improve the habitat constriction at the south constricted area within the north-south movement corridor, while protection of all four parcels would reduce potential for fragmentation and human development.

Design Features and Measures to Reduce Effects in Cabinet Face BORZ Reoccurring Use Areas

MMC would fund and the KNF would implement yearlong road access changes to one NFS road (#4776A) that would be barriered to reduce open and total linear road miles, and two gated NFS roads (#4776C and #4776F) that would be barriered to reduce total linear road miles within the Cabinet Face BORZ (Table 309). These changes would reduce yearlong open roads within the BORZ by 1.2 miles and total roads by 2.5 miles. The seasonal access change on NFS road #4778 within the BORZ would temporarily decrease linear miles of open road by 0.9 mile during the spring use period April 1 to June 15 as long as MMC snowplowed access roads to the Libby Adit Site.

Plan Management

Before starting the Project, the Forest Service, DEQ, FWP, and MMC would participate in the development of a Memorandum of Understanding (MOU); only the Forest Service, DEQ, and FWP would be signers on the MOU. The USFWS would be an advisor in the development and implementation of the MOU. The MOU would establish roles, responsibilities, and time lines of the parties.

The Forest Service, in coordination with FWP and in consultation with the USFWS, would assume responsibility for coordinating various aspects of the grizzly bear mitigation plan, assume responsibility for ensuring effective communication, ensure principles of adaptive management are included, and, where appropriate, based on new information, develop recommendations for modifications of the mitigation plan for the Project.

Before starting the Project, MMC would establish a trust fund and/or post a bond to adequately fund the mitigation plan implementation costs (Mitigation Funds). The amount of Mitigation Funds would be commensurate with projected work and associated required mitigation items. The MOU signers (Forest Service, FWP, and DEQ) and USFWS would determine the amount of Mitigation Funds. If the cost of implementing the plan exceeded the amount of Mitigation Funds, then MMC would contribute additional funds to fully implement those actions in a timely manner (as determined by the Forest Service in coordination with FWP and in consultation with the USFWS). The amount of Mitigation Funds would be commensurate with projected work and associated required mitigation items.

2.5.3.1.5 Bull Trout Monitoring

MMC would prepare for Forest Service approval, in consultation with the USFWS and FWP, a final comprehensive Fisheries Monitoring Plan that addresses all fisheries-related monitoring

needed to verify the extent and magnitude of Project effects. The Fisheries Monitoring Plan would identify the techniques, intensity, duration, and frequency of fisheries population and habitat monitoring needed in all affected streams or other water bodies in the analysis area. A conceptual monitoring plan is presented in Appendix C.

MMC would make arrangements with FWP (or other entities approved by FWP and the Forest Service in consultation with the USFWS) for immediate implementation (beginning with final Forest Service approval to initiate the Project) of the Fisheries Monitoring Plan, including reporting and approval requirements of annual monitoring efforts to USFWS documenting Project effects. The Annual Report would be approved by the Forest Service and submitted by KNF to the USFWS by March 1 of each following calendar year.

2.5.3.2 Surveys and Plans

Some Project activities, such as road improvements described in Section 2.5.3.1.3, *Road Use and Improvements*, and geotechnical investigations described in Section 2.5.4.2, *Geotechnical Investigations*, would require ground disturbance. Before any ground-disturbing activities occurred, MMC would complete a survey or inventory on all areas where such surveys have not been completed and that would be disturbed for cultural resources, sensitive plants, and wetlands and other waters of the U.S. MMC would also develop and implement the plans described in the following sections.

2.5.3.2.1 Intensive Cultural Resource Inventories

An intensive cultural resource inventory of any location to be disturbed that had not been previously inventoried would be completed to meet the requirements of 36 CFR 800, the guidelines in the 2012 KNF Site Inventory Strategy (KNF 2012), and the State Historic Preservation Office (SHPO). The KNF Site Inventory Strategy documents the federal laws that guide when, how, and why surveys are conducted as well as who and when to consult on projects. It also contains site types, locations, recordation methods, and the laws that protect these sites. This document is confidential and exempt from Freedom of Information Act requests.

Activities subject to survey requirements would include any surface disturbance required in design features described in Alternatives 3 or 4, such as road improvements listed in Table 311. An intensive cultural resource inventory is a pedestrian survey with transects no more than 100 feet apart. The adequacy of past intensive cultural resource inventories would be decided by the KNF in consultation with the SHPO. In addition, review and consultation with the SHPO is required for site 24LN943 (logging camp at the Libby Adit area) to receive a consensus determination of not eligible based on the loss of physical integrity of the site.

After completion of a cultural resource survey, MMC would follow the requirements of a Programmatic Agreement between the KNF and the SHPO. MMC would submit to the KNF an inventory report meeting SHPO requirements. The report would include recommendations of eligibility for listing on the National Register of Historic Places for all identified historic properties. When an adverse effect on an eligible historic property was anticipated, MMC may choose to redesign the activity to avoid the property. If avoidance is not feasible, MMC would undertake actions to mitigate any adverse effect following the requirements of 36 CFR 800.6.

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 the SHPO. Any mitigation plan for cultural resources would be developed by MMC and approved by the KNF in consultation with the SHPO under the project-specific Programmatic Agreement, and would include consulting the Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho (Tribes) if affected cultural resources were of cultural significance. The documentation needed to formalize the conclusion would be determined by the KNF, in consultation with the SHPO and the Corps. MMC would implement the mitigation plan and receive KNF concurrence of mitigation implementation before any ground-disturbing activities.

The Tribes would be afforded the opportunity to monitor any ground-disturbing activities associated with the Project. Section C.2, *Cultural Resources*, of Appendix C discusses monitoring requirements.

2.5.3.2.2 Sensitive Plant Surveys

MMC would update surveys for threatened, endangered, and Forest Service sensitive plant species on National Forest System lands for any areas that would be disturbed where such surveys have not been completed or for any species listed as threatened, endangered, or Forest Service sensitive since 2005. Survey reports would be submitted to the KNF for approval. If species of concern were identified and adverse effects could not be avoided, MMC would develop appropriate mitigation plans for the KNF's approval. MMC would implement the mitigation plan and receive KNF concurrence of mitigation implementation before any ground-disturbing activities. The plan, once approved, would become a component of the amended Plan of Operations.

2.5.3.2.3 Wetlands and Other Waters of the U.S.

Wetlands and other waters were delineated in the analysis area between 2005 and 2009 following Corps methods; functions and services for these wetlands were also evaluated using the 2008 MDT Montana Wetlands Assessment Method (see the JFEIS, Section 3.23.2.2.1, *Wetland Delineation and Functional Assessment*). Delineated wetlands and other waters of the U.S. would be avoided in the geotechnical investigation area. Wetland delineations, however, are typically valid for 5 years. Some of the BMPs listed in Table 311 and access changes on the 742.3 acres of mitigation lands may require a 404 permit from the Corps. MMC would conduct surveys as necessary in support of a 404 permit, if required for Project activities.

2.5.3.2.4 Vegetation Removal and Disposition Plan

Vegetation removal would be limited to road improvements described in Section 2.5.3.1.3, *Road Use and Improvements*, and geotechnical investigations described in Section 2.5.4.2, *Geotechnical Investigations*. Before any ground-disturbing activities occurred on National Forest System lands, MMC would prepare an Evaluation Project Vegetation Removal and Disposition Plan as part of the amended Plan of Operations. The plan would evaluate the opportunities to minimize tree and other vegetation clearing, particularly in RHCAs; consider potential uses of vegetation removed from disturbed areas; and describe disposition and storage plans. The plan would include measures to ensure that MMC would keep brush clearing on all roads used by the Project to the minimum level necessary to provide for public safety. The plan would apply to all National Forest System lands covered by the Plan of Operations and all private lands covered by the operating permit. It would not apply to private or state lands along Libby Creek Road. Vegetation removal and disposition on private lands along Libby Creek Road would be governed by the easement between the Forest Service and the private landowner.

To minimize metal leaching problems and low pH seepage from soil stockpiles containing large amounts of coniferous vegetation, the coniferous forest debris would be removed before soil removal to the extent feasible. 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 disturbance area would be managed in accordance with Montana law regarding reduction of slash (76-13-407, MCA) and KNF objectives regarding fuels reduction. Excess slash would be removed or burned in all timber clearing areas. Non-merchantable trees and coniferous forest debris would be removed using a brush blade or excavator to minimize soil accumulation. MMC would comply with Montana Department of Natural Resources and Conservation (DNRC) open burning requirements. Where possible, slash of non-coniferous forest debris or dead coniferous forest snags would be salvaged and chipped to be sold or used as mulch. All mulching materials would be certified noxious weed–seed free.

To protect scenic resources, MMC would complete a review of proposed new roads for the geotechnical investigations with a KNF representative, as described in Section 2.5.4.2, *Geotechnical Investigations*. MMC would mark only trees to be removed with water-based paint and would not mark any trees to remain.

2.5.3.2.5 Detrimental Soil Disturbance Monitoring Plan

Before any ground-disturbing activities occurred on National Forest System lands, MMC would prepare a Detrimental Soil Disturbance Monitoring Plan as part of the amended Plan of Operations. The plan would use KNF methods to document the extent of detrimental soil disturbance before and after geotechnical investigations were completed. Should detrimental soil disturbance exceed 15 percent after the Project, additional rehabilitation work would be completed.

2.5.3.2.6 Emergency Spill Response Plan

MMC would use small amounts of hazardous materials during the Evaluation Project including lubricants, fuel, and blasting agents. MMC would update its 2007 Emergency Spill Response Plan (Klepfer Mining Services 2007) for the Evaluation Project, incorporating applicable DEQ comments on the draft plan (DEQ 2008).

2.5.3.3 Monitoring

Conceptual monitoring plan requirements are summarized in Appendix C. Appendix C describes what additional monitoring is required before starting the Project. MMC would submit final monitoring plans as part of its amended Plan of Operations, Operating Permit, and other permits or approvals. Each monitoring plan would describe the timing of implementation and location of activities. Monitoring activities would involve small crews collecting data in the spring, summer, and fall to evaluate effects on groundwater-dependent ecosystems, streamflow water quality, fisheries, and other resources. Monitoring sites beyond gated or barriered roads would be accessed by nonmotorized means.

MMC would complete a pre-Project existing topographic survey over the mine area using aerial methods (LiDAR, InSAR, or equivalent). If LiDAR (light detection and ranging) was the approved technology, MMC would complete the topographic survey using either a helicopter or a small, fixed-wing airplane. The survey would take 2 or 3 days to complete. Satellite data would be used if InSAR was the approved technology.

Ongoing monitoring, such as water resources monitoring, has required the installation of some types of measuring equipment, such as data loggers, in the analysis area. Such equipment would continue to be used during Project monitoring, which would require the installation of additional similar pieces of equipment. In addition, some surveying would need to occur in the CMW and may involve the installation of survey monuments or ground-based reflectors. The KNF would conduct a Minimum Requirements Analysis according to the Minimum Requirements Decision Guide to evaluate different methods to accomplish monitoring in the CMW.

2.5.4 Project Activities

2.5.4.1 Underground Evaluation and Associated Activities

The existing Libby Adit (decline) is 14,006 feet in length from the portal entrance and is 18 feet wide and 18 feet high (Figure 313). Before work ceased in 2009, MMC conducted rehabilitation work on part of the decline consistent with DEQ Operating Permit No. 00150 (as revised in revisions 06-001, 06-002, and 08-001). Work involved dewatering, installation of ground support and utilities, and ventilation in the first 7,200 feet of the adit (MMC 2017b). MMC has continued the maintenance and care of the dewatered portion of the decline, including dewatering.

The objectives of the evaluation activities would be to:

- Expand the knowledge of the mineralized zones of the deposit
- Assess and define the mineralized zone within established valid existing rights
- Collect, provide, and analyze additional geotechnical, hydrological, and other information that could be used for the Montanore Project

The evaluation activities would consist of Libby Adit dewatering and rehabilitation, development of underground drifts, and underground evaluation and drilling. Drill core would be used to support resource modeling, mine planning, metallurgical testing, preliminary hydrology assessment, and rock mechanic studies for the Montanore Project. Project activities are anticipated to last 18 to 24 months; the duration of the Project, including closure, may be up to 5 years. During dewatering and adit rehabilitation, MMC would employ 6 to 10 people at the Libby Adit Site, working two 10-hour shifts 7 days per week. During drift development and drilling, MMC would employ 30 to 35 people at the Libby Site, working 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.

During the Project, MMC would maintain the structures, equipment, and other facilities in a safe, neat, and workmanlike manner. Hazardous sites or conditions resulting from the Project, if any, would be marked by signs, fenced, or otherwise identified to protect the public in accordance with federal and state laws and regulations. MMC also would comply with all applicable federal and state fire laws and regulations, take all reasonable measures to prevent and suppress fires on the area of operations, and require employees, contractors, and subcontractors to do likewise while working.

2.5.4.1.1 Libby Adit Dewatering and Rehabilitation

MMC would complete the rehabilitation of the lower segment of the Libby Adit (Figure 313). MMC would dewater the flooded portion of the adit, install ground support, mount underground

support utilities (electric, compressed air, water pipeline, communications) on the walls of the adit, and reestablish ventilation.

As the adit was dewatered, MMC would maintain a pump in the water pool and move the pump frequently. Water in the pool would be pumped to a series of underground sumps in the adit to allow for sediment reduction; a pipeline for such pumping would be installed in the side of the decline and extended as part of the rehabilitation work. From these sumps, water would be pumped to the surface through an existing pipe to the Water Treatment Plant. After the adit was dewatered, MMC could use 300 feet of the adit's distal end as a water pool if necessary to store water. The 300 feet of tunnel at the adit's distal end could hold 730,000 gallons of water, or 8 days of inflow at current inflow rates of 65 gpm, or 2 days of inflow at modeled inflow rates of 260 gpm. The Water Treatment Plant is described in Section 2.5.4.1.5, *Water Use and Management*.

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 would be to obtain existing pressure data and to track drawdown as dewatering proceeded, the piezometers would be drilled out in front of the existing working face. At each station, the two 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 monitoring required before and during the Project is presented in Appendix C.

As dewatering progressed, MMC would check the conditions of the Libby Adit to ensure safe working conditions and would install, as appropriate and as needed, rock bolts, wire mesh, cribbing, steel sets, or shotcrete. Site-specific conditions would govern the rock support and reinforcement strategy with the goals of underground stability and employee safety.

Electrical power at the Libby Adit Site is currently provided by three Tier 3 225 kW electrical generators. Emissions from these generators are below the 25 tons per year that require an air quality permit (TRC Environmental Corp. 2006). In Alternative 3, MMC would use Tier 4 generators, if available, or Tier 3 generators for all activities. MMC would use Tier 4 engines, if available, or Tier 3 engines on underground mobile equipment and use ultra-low-sulfur diesel fuel in generators and underground mobile equipment engines. MMC's air quality permit MAQP #3788-00 established required limits, emission controls, and mitigations for activities covered by the permit (DEQ 2016a).

2.5.4.1.2 Libby Adit Extension and Underground Drift Development

After dewatering the full extent of the existing Libby Adit, MMC would develop a 4,200-foot inclined adit extension to above the currently defined ore zones and 6,300 feet of lateral development drifts (Figure 314; MMC 2017b). The inclined adit extension and development drifts would be about 15 feet wide and 15 feet high. Beginning 400 feet from the bottom of the existing Libby Adit, MMC would develop a 4,200-foot inclined drift toward the mineralized (ore) zone. When the incline reached 400 feet above the general centerline (north-south) of the upper ore zone, MMC would transition into a series of lateral development drifts that would essentially parallel the dip of the ore zone. MMC would drill into the ore zone from above. Muck bays and drill stations would be established at various intervals along the development drifts. Sumps also would be established, where needed, to channel water from the drifts to be pumped to the surface.

JFEIS Section 1.3.1, *Mineral Rights*, discusses the history pertaining to the two mining claims (HR-133 and HR-134) that are the basis for the rights to the copper and silver mineralization. The two claims, shown on Figure 314, were patented in 2001. The apex provision of the General Mining Law entitles the owner of a mining claim to the rights to mineralization extending in a downward course beyond the sidelines but between the two vertical planes projected through the endlines of the claims. These rights are referred to as "extralateral rights." MMC's extralateral rights are defined by projections of the west endline of HR 133 and the east endline of HR 134. In MMC's revision 06-002 to its Hard Rock Mine Operating Permit No. 00150 (MMC 2006b), MMC proposed and DEQ approved areas of evaluation outside of its extralateral rights (Figure 306). In Alternative 3, MMC would not complete evaluation drilling for any ore (mineralized rock that may be economic to mine) outside of its extralateral rights. MMC would notify the KNF within 48 hours when ore was encountered during development of the adit extension or drifts. Ore encountered outside of MMC's extralateral rights for which removal was reasonably incident for access or other evaluation activities either would be stored underground or, if operations required its removal to the surface, would be stored separately in the lined surface storage areas. It would remain on the surface until adit closure, when it would be returned underground west of the easternmost bedrock plug along with the alteration-zone waste rock. Waste rock would be transported to the surface and stored separately at the Libby Adit Site. MMC would maintain buffers from the Rock Lake Fault and Rock Lake.

During the Project, MMC would drill ahead of the drifts and keep all drifts and drill stations 300 feet from the Rock Lake Fault and 1,000 feet from Rock Lake (Figure 314). MMC would fund a third-party mine surveyor selected by the KNF to assist with underground oversight (see Appendix C, Section C.4, *Rock Mechanics*). The mine surveyor would verify biannually that MMC was not exploring outside of its extralateral rights and that MMC was maintaining the 300-foot buffer from the Rock Lake Fault and 1,000-foot buffer from Rock Lake. MMC would fund and facilitate surveys of the adit extension and drifts that would be completed by an independent qualified mine surveyor. The surveyor would be selected and directed by the KNF through an agreement with MMC. The surveyor would have no financial interest in the Project. The KNF may also require more frequent surveys or as-built drawings if discrepancies arose. MMC would provide underground access, logistical support, and all information required by the surveyor to complete independent inspections and resulting documentation for the identified tasks. The surveyor would complete two surveys: one when the inclined adit extension was completed and before drift development, and one when the drifts and drill pads were completed. MMC would locate the eastern extralateral right boundary, which would be independently verified by the mine surveyor. After completing the survey, the independent surveyor would submit maps of the adit extension and drifts to the KNF and would report any underground disturbances that crossed the established extralateral rights boundary, entered designated buffer zones, or deviated from MMC's approved Plan of Operations.

An estimated 281,000 tons of waste rock and 6,000 tons of ore would be generated during the Project. Both types of rock would be transported out of the underground workings and stored at the Libby Adit Site. The storage areas would be lined to collect runoff from the area and seepage through the waste rock. Section 2.5.4.1.6, *Waste Rock and Ore Management*, discusses waste rock and ore storage and associated monitoring.

As needed for safe working conditions, MMC would install ground support in the adit and drifts that would include a variety of techniques such as rock bolting, wire mesh, cribbing, steel sets, or shotcrete. As with the adit rehabilitation work, the site-specific conditions of the new

development would govern the rock reinforcement strategy for any opening to provide stability and employee safety.

2.5.4.1.3 Underground Drilling and Evaluation

Underground evaluation drilling would start once drift development had advanced sufficiently to establish the drill stations and would continue throughout the rest of the Project. Underground drilling would be conducted from 35 drill stations in drifts above the mineralized zones (Figure 314; MMC 2017b). Drilling would consist of multiple individual underground drill holes that would be drilled from each drill station. The holes would fan out at various angles to intersect various targeted mineralized zones in both the upper and lower mineralized areas. Drill lengths would average 1,000 feet. None of the drill holes would breach the topographic surface above.

Because the Rock Lake Fault is a major geologic structure adjacent to the ore deposit, MMC would determine the following parameters by exploratory drilling ahead of development and flow testing (installation of piezometers underground):

- Fault location and dip (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

Piezometers would be equipped with pressure recording devices before the drift or adit was advanced. Additional description of water resources monitoring is presented in Appendix C, Section C.6.

2.5.4.1.4 Grouting and Groundwater Control

Drilling would occur ahead of drift development to allow identification of potential significant groundwater inflow areas. If drilling identifies areas of significant groundwater inflows, grouting would be completed ahead of blasting to reduce groundwater flow into the adit.

MMC would grout water-bearing faults and fractures encountered during adit and drift development as needed for groundwater control. The purpose of the grouting would be to control and minimize groundwater input into the adit and development drifts. Other techniques (besides or in addition to grouting) that MMC may use to minimize groundwater inflow would include plugging drill holes that produce water, placing “packers” on drill holes to control flow, and periodic re-grouting (secondary grouting) where appropriate or where needed.

For every 50 to 100 feet of advance in new adit or drift development, MMC would drill a probe hole ahead of the working face to a maximum depth of 100 feet to ascertain if significant water-bearing faults or fractures are present. If significant water flow (greater than an estimated 10 gpm that would persist over a 24-hour period) was encountered, MMC would implement grouting. When grouting was determined to be necessary, MMC would drill a series of holes around the perimeter of the working face to intersect the water. Grout would be pumped into the holes until the water was sealed off, as measured by a reduction in groundwater flow below significance levels from the pilot hole, which would allow drilling to continue. Grout would be mixed with water and injected into the hole under appropriate pressures that would allow the grout mixture to

penetrate fractures and develop a seal that limits the amount of groundwater that can flow into the adit or drift.

If the grouted adit and drifts had substantial groundwater inflows in the vicinity of the Rock Lake Fault or Rock Lake, MMC would notify the KNF within 5 business days. "Substantial groundwater inflows in the vicinity of the Rock Lake Fault or Rock Lake" means a flow from any individual fracture within 1,000 feet of either the Rock Lake Fault or Rock Lake with total flow greater than an average of 50 gpm over a 24-hour period. The KNF would evaluate the inflow data and direct MMC to take appropriate actions. MMC would then evaluate the possible effect on Rock Creek and Rock Lake and provide an evaluation report to the KNF within 30 days after initial agency notification.

2.5.4.1.5 Water Use and Management

The Libby Adit would be dewatered completely, and water would be treated at the existing Water Treatment Plant, which uses ultrafiltration to remove metals sorbed onto particulates suspended in the water, thereby reducing total suspended sediments and metal concentrations. The Water Treatment Plant has a current design capacity of 500 gpm, which would be adequate for anticipated discharges. MMC anticipates and the KNF concurs that proper management of explosives and use of emulsions would reduce nitrate concentrations from those detected during the initial Libby Adit construction in the late 1980s. MMC would complete monitoring required by the MPDES permit. MMC currently samples and analyzes untreated water monthly for both total and dissolved metals. MMC would continue to maintain a detailed water balance and report inflows and discharges in an annual report. The Water Treatment Plant would be upgraded if necessary to treat parameters such as dissolved metals to meet MPDES permitted effluent limits.

DEQ renewed MMC's existing MPDES permit MT0030279 in 2017 (DEQ 2017a), which regulates wastewater discharges from the Libby Adit and sets effluent limits for discharges to both surface water and groundwater. Adit dewatering rates of up to 500 gpm could be used initially over a 3- to 4-week period and would be reduced to maintenance levels after initial dewatering. Once water was processed through the treatment plant, it would flow to the distribution box at the percolation pond (Outfall 001). MMC would use Outfall 001 for all discharges from the Libby Adit Site in Alternative 3. Outfall 002 would be covered by expanding the waste rock storage area, and MMC has no plans to develop an infiltration gallery at the site. Outfall 003 has not been constructed (EPA 2003; MMC 2009b). MMC has no plans to install a pipe from the percolation pond to Libby Creek during the Project, and Outfall 003 could not be used unless a pipe was installed between the pond and Libby Creek (MMC 2017d).

MMC has not applied for and is not authorized to discharge stormwater from any areas other than those described for Outfalls 001 through 008. The KNF anticipates MMC would require additional outfalls for the geotechnical investigations described in Section 2.5.4.2, *Geotechnical Investigations*, and for road improvements listed in Table 311 for the following reasons. A "stormwater discharge associated with construction activity," as defined in ARM 17.30.1102(28), requires permit coverage. Construction activity that results in the disturbance of equal to or greater than 1 acre of total land area would need to obtain permit coverage. Construction activity includes the disturbance of less than 1 acre of total land area that is part of a "larger common plan of development or sale" if the larger common plan would ultimately disturb 1 acre or more. Before the KNF would allow MMC to start the geotechnical investigation, MMC would obtain a permit to discharge stormwater from disturbances associated with the geotechnical investigations or any other activity, if DEQ determined those activities were construction activity that could

result in a discharge. MMC could either amend its MPDES permit or obtain coverage under Montana's General Permit for Storm Water Discharges Associated with Construction Activity if the geotechnical investigations or any other activities were eligible for coverage under the General Permit. DEQ would determine if stormwater discharges associated with the geotechnical investigation activities were eligible for a general permit.

MMC submitted a final SWPPP to DEQ in 2017 as required by the permit (MMC 2017a). The SWPPP describes stormwater management at the Libby Adit Site, BMPs, control measures, and monitoring procedures that would ensure compliance with the terms and conditions of the MPDES permit. MMC would update the SWPPP to cover all permitted discharges. The SWPPP would describe and locate all structural and non-structural BMPs implemented at the site to minimize erosion and sediment transport.

MMC holds two 1902 surface water rights on Libby Creek, one for mining near the Libby Adit Site in Section 15, T27N, R31W (with a maximum diversion of 44.9 gpm between April 1 and December 19, and a 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 groundwater right near the Libby Adit Site in Section 15, T27N, R31W (with a total diversion of 40 gpm year-round). MMC would use either its groundwater right with a year-round diversion or its surface water right with a diversion between April 1 and December 19 for any required water usage. MMC would not appropriate any adit water for beneficial use during the Project. Dewatering of the adit and drifts is not a beneficial use, and a beneficial water use permit would not be required (DNRC 2012). If any adit water was used for any beneficial use, such as drilling or dust suppression, MMC would need to obtain a beneficial water use permit. Water used for drilling would be reused or sent to the Water Treatment Plant for treatment before discharge.

2.5.4.1.6 Waste Rock and Ore Management

An estimated 281,000 tons (135,000 cubic yards) of waste rock and 6,000 tons of ore (mineralized rock that may be economic to mine) would be generated during the Project from development drifts, muck bays, underground sumps, and underground drill hole stations (Table 313). Waste rock and ore would be hauled to the surface and stored at one of two lined storage areas on private land at the Libby Adit Site (Figure 310).

During the Project, MMC would expand an existing waste rock storage area and develop a second lined storage area on the main portal pad site (MMC 2017b). The existing waste rock storage area would be expanded to the north and west, increasing the footprint to 2.5 acres (an expansion of 1.3 acres). The expansion would include a PVC liner that would tie into an existing PVC liner. In addition, a second storage area would be constructed to the northeast of the existing one, with a footprint of 2.7 acres. The new storage area would use a HDPE liner. MMC would cover stockpiles of alteration-zone waste rock and ore with an impermeable material to minimize infiltration from precipitation. The combined capacity of both storage areas would be 164,000 cubic yards. Waste rock would remain in the lined storage areas until closure. Some waste rock would be used to backfill the Libby Adit as described for Alternative 2, and the remainder would be regraded and covered with soil as part of reclamation activities. Alteration-zone waste rock would be returned underground west of the easternmost bedrock plug. Ore encountered outside of MMC's extralateral rights for which removal was reasonably incident for access or other evaluation activities either would be stored underground or, if operations required its removal to the surface, would be stored separately in the lined surface storage areas. It would remain on the surface until adit closure, when it would be returned underground west of the easternmost

bedrock plug along with the alteration-zone waste rock (see Section 2.4.4.1, *Closure of the Libby Adit and Site Reclamation*).

Table 313. Estimated Schedule for Waste Rock Production and Disposal, Alternatives 3 and 4.

Formation	Current (tons)	Evaluation (tons)	Storage[1]
Prichard	377,700	0	Libby Adit Site pad (1989–1991); 66,000 tons lined storage area (2007)
Burke	42,500	0	Libby Adit Site pad (1989–1991)
Revett (non-lead)	4,200	0	Libby Adit Site pad (1989–1991)
Revett barren lead		3,000	Lined Libby Adit Site pad
Revett combined		278,000	Lined Libby Adit Site pad
Ore (mineralized rock that may be economic to mine)	0	6,000	Lined Libby Adit Site pad
Total	424,400	287,000	

[1]15.5 tons would be placed underground adjacent to portal plug at closure.
Alteration-zone waste rock and all ore would be placed underground west of the easternmost bedrock plug at closure.
All units are tons; conversion from bank cubic yards presented in MMC 2009a based on a density of 12.18 cubic feet/ton.
Prichard includes Prichard-Burke transition rock.
Revett waste reported as combined when data do not distinguish barren lead from other altered zones.
Source: MMC 2009a; MMC 2017b.

Developing a new storage area would require disturbing existing revegetated slopes on the south side of the Libby Adit Site, disturbing an existing soil stockpile, and reducing the size of the percolation pond at the site. Before disturbing existing revegetated slopes, MMC would remove coniferous vegetation and, where feasible, remove available soil materials. MMC would develop a new soil stockpile and move the soil stockpile and available soils to the new stockpile.

During the Project, a new 360,000-gallon-capacity waste rock sump would be constructed to replace the existing 75,000-gallon-capacity sump (MMC 2017b). It would be double-lined with an 80-mil HDPE liner and would include a leak detection system. All precipitation falling on the waste rock and ore stockpiles would be captured in the sump and then pumped to the Water Treatment Plant before discharge at Outfall 001. The expanded capacity would be sufficient to manage runoff that reports to the sump from a 100-year, 24-hour design storm event.

DEQ's approval of revision 06-002 contained two conditions regarding testing of waste rock: analysis of water that infiltrated and ran off the waste rock storage area and nitrate column leaching tests. MMC completed both testing requirements. In 2008, MMC excavated 66,000 tons of rock for sumps in the Libby Adit; waste rock was placed onto a lined area. A stormwater pond (a sump) was constructed that collected runoff and seepage from the waste rock storage area. Collected water was pumped to the Water Treatment Plant and discharged to MPDES permitted Outfall 001. Runoff and seepage from the waste rock pile was analyzed for metals, nutrients, and other parameters. Data from water in the sump at the Libby Adit waste rock storage area

(Appendix K-10) were used to represent changes in water quality related to waste rock. The available results of metal and nutrient release testing on the Prichard Formation as waste rock, particularly for arsenic, copper, lead, antimony, and nitrate, confirm that additional monitoring would be required (see geochemistry sampling and analysis plan in Appendix C.6). As part of the nitrate column leaching test, MMC completed three blasts of waste rock and collected the blasted rock for column leach testing for nitrogen compounds. Nitrate concentrations ranged from 5.5 mg/L to 25.5 mg/L, and ammonia concentrations ranged from 2.8 mg/L to 14.1 mg/L. Nitrogen values decreased with each shot, which may reflect a refinement of the loading or explosive handling technique (MMC 2015a; Apex Engineering, PLLC and Morrison-Maierle, Inc. 2008).

Limited existing access to subsurface portions of the Montanore deposit makes additional sampling of waste and ore during the Project necessary. During the Project, MMC would:

- 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 estimated in Appendix C.
- Collect representative samples from previously unexposed zones of waste rock. Specifically, these zones should include any unsampled, altered waste zones within the Revett and Burke formations, as well as portions of the Prichard Formation to be exposed during extension of the Libby Adit and drift. Samples would 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 or kinetic testing. The number of samples required to be collected during the Project and an approach to assessing sample adequacy are described in Appendix C.
- Collect a bulk ore sample for metallurgical test work, to obtain simulated tailings for additional geochemical analysis using ABA, whole rock, synthetic precipitation leaching procedure (SPLP), and mineralogy methods. Analysis of five simulated tailings samples is required in the monitoring plan (Appendix C), but the number required would be contingent on the metallurgical test design.

RC Resources, Inc. (RCR) will be the operator of the Rock Creek Project, a proposed mine on the west side of the Cabinet Mountains. RCR 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, Prichard, 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 RCR continue the development of the Rock Creek Project, funding for the maintenance and updating of the database could be shared equally by MMC and RCR.

2.5.4.1.7 Waste Management

MMC would use an on-site sewage treatment and disposal system at the Libby Adit Site. The system consists of four components: four 1,000-gallon septic tanks, a two-pod treatment unit and combination recirculation tank/drainfield dosing tank, an effluent distribution system, and infiltrator trenches. Expected discharge is 585 gallons per day (Geomatrix 2010).

2.5.4.1.8 Explosives Management Plan

The primary goal of explosives management would be to limit introducing nitrate compounds from blasting into waste rock and adit drainage, which, in turn, could affect stormwater and adit discharge. This would be accomplished by limiting the type of explosive used, underground storage of explosives, blast design, water management, and water quality monitoring.

MMC would use emulsion as the primary explosive and not the more common ammonium nitrate and fuel oil (ANFO). Nitrate in the emulsion type of explosives would be less soluble in water than nitrate in ANFO. Explosives would be stored primarily underground in powder magazines and shipping/storage containers delivered directly to the Libby Adit Site by the explosives supplier. Transfer of explosive to containers on the surface would be limited, minimizing spills. When emulsion does need to be transferred, hoses and pumps would be used to minimize spills. Spill contingency plans would be developed by the explosives supplier to address unlikely spills that may occur off the property.

Blast designs would be developed to address explosive quantities required for each hole. Strict quality control would be maintained to ensure the exact amount of explosives and type of explosives are used for the specific conditions. This would assist in ensuring complete detonation and consumption of explosive product, minimizing product loss and increased nitrate levels in adit water.

MMC would be responsible for the regular inspection and audit of the blasting operation to ensure compliance with the plan, blast designs, and implementation. Employee training would be an important aspect of compliance, ensuring all applicable employees understand the importance of proper explosives management.

Water management also would be an important aspect of nitrate loading. The use of diversions, grouting, and other means to control water flow contact with blasted rock would reduce nitrate loading. Monitoring of nitrates in adit water in compliance with MMC's MPDES permit would assess the effectiveness of the explosives management plan.

2.5.4.1.9 Weed Control

MMC has a Weed Control Plan approved by the Lincoln County Weed Control District that would need to be modified in Alternative 3 before surface disturbances (road construction and geotechnical investigations). MMC would implement all weed BMPs identified in Appendix A of the KNF Invasive Plant Management Final EIS (KNF 2007b) 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 weed 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 and on site factors (such as soil types and distance to water), with the objective to minimize impacts on non-target species. MMC would coordinate with the KNF Weed Specialist for use of biocontrol agents as they become

available. MMC would survey the disturbance area in the geotechnical investigation area for noxious weeds before initiating disturbance. Where noxious weeds were found, MMC would treat infestation the season before the investigations were planned. For example, if geotechnical work was planned to be in the summer, the survey and control would be implemented the previous fall. The proposed survey and treatment approach would be a part of the final Weed Control Plan, to be reviewed and approved by the KNF.

MMC would include road-related weed mitigation in any road access that was approved for the Project. MMC would treat noxious weeds along all access roads yearly with the appropriate herbicide mix for the target species. MMC would broadcast treat every other year and spot treat in alternate years.

MMC would minimize soil disturbance and mineral soil exposure during ground-disturbing activities. MMC would prevent road maintenance machinery from blading or brushing through known populations of new invading noxious weed species. In areas where noxious weeds are established and activities require blading, MMC would brush and blade areas with uninfested road segments to areas with noxious weed–infested segments. 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 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 the Project area for existing and new invader weed species and populations annually. MMC would treat weed infestations as needed. In areas where timber was to be removed, MMC would consider winter vegetation clearing to reduce mineral soil exposure and the chance of spreading existing noxious weeds.

MMC would develop and 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.

MMC would submit with its annual report a description of 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.

2.5.4.2 Geotechnical Investigations

MMC would conduct geotechnical investigations between Poorman Creek and Little Cherry Creek (Figure 311; MMC 2017b) to collect sufficient field data to support lab testing and geotechnical analysis. Work on National Forest System lands required to complete the geotechnical investigations would include reconstruction of existing roads, construction of new access roads and drill pads, testing, and reclamation of all disturbed areas as soon as practical after test work completion. These steps are described in the following sections. Design features intended to minimize environmental impacts are also described. Reclamation of disturbed areas is described in Section 2.5.5.2, *Reclamation of Geotechnical Investigation Disturbances*.

2.5.4.2.1 Objectives

Geotechnical investigations would focus primarily on conditions that affect stability and capacity of a tailings impoundment, a facility needed for the Montanore Project. The possible tailings impoundment site evaluated in Alternative 3 is between Little Cherry Creek and Poorman Creek. Assessment of subsurface hydrogeologic characteristics at the site would be limited to activities that support the overall objective, including groundwater potentiometric surface and possibly limited pump testing. Specific objectives of the geotechnical investigations are:

- Characterize the subsurface hydrogeologic conditions of the site
- Quantify the depth and subsurface characteristics of a large rock outcrop at the site and the extent of the bedrock "ridge" separating the Poorman and Little Cherry Creek drainages as described in Section 3.10.4.2.1, *Evaluation through Operations Phases*, in the JFEIS
- Characterize the foundation soils and hydrogeologic conditions in the footprint of a seepage collection pond, a facility needed for the Montanore Project
- Possibly install wells to allow for future testing and characterization of the groundwater system

Samples taken during geotechnical investigations would be used for comprehensive lab testing to estimate the geotechnical properties of the underlying soils. Details of the lab testing and geotechnical analysis would be finalized with the KNF before starting fieldwork. Testing would focus on material properties needed to design a tailings storage facility. The geotechnical analyses would provide information needed to design a tailings facility that would conform to the requirements of the Metal Mine Reclamation Act for tailings storage facilities (82-4-301 et seq., MCA; specifically, 82-4-375 through 82-4-381, MCA).

2.5.4.2.2 Timing and Duration

Timing of the geotechnical investigations would be driven by ground conditions at the site combined with input from KNF personnel. Work would last about 12 weeks, including reclamation (described in Section 2.5.5.2, *Reclamation of Geotechnical Investigation Disturbances*). Work would be restricted to the period between June 16 and October 14 to reduce impacts on grizzly bears and on ungulate winter range. MMC would work closely with KNF personnel to develop a work schedule that minimized impacts on wildlife while allowing for timely work completion. The contract work crew is estimated to consist of six individuals on-site at any given time working up to 7 days per week, 10 hours per day over the 12-week period. On an annualized basis, employment is estimated to be 2.5 man-years. Direct labor income for the contract individuals would range from $200,000 to $250,000.

2.5.4.2.3 Permits and Resource Avoidance

Before starting the Project, MMC would acquire all necessary state and local permits, including a stormwater permit, if DEQ determined that such a permit was required (see Section 2.5.4.1.5, *Water Use and Management*). All surveys described in Section 2.5.3.2, *Surveys and Plans*, would be completed. No work would be completed in delineated wetland areas (see Section 2.5.3.2.3, *Wetlands and Other Waters of the U.S.*), and new access roads would be designed to avoid crossing perennial streambeds. Proposed new roads and drill pads would be relocated around any cultural sites that could not be mitigated in accordance with SHPO and Forest Service requirements (see Section 2.5.3.2.1, *Intensive Cultural Resource Inventories*).

Except a 185-foot section of one proposed access road, MMC would locate facilities (drill pads, wells, etc.) and roads outside RHCAs (see Section 2.5.3.1.2, *Road Management Plan*, and Section 2.5.3.2.4, *Vegetation Removal and Disposition Plan*). MMC would review the road alignment proposed through a RHCA with a KNF representative to ensure the road is the minimum necessary to provide the needed access. MMC also would review sediment controls on existing gated, barriered, or impassable roads that pass through a RHCA to ensure sediment delivery from the road was minimized.

The KNF Food Storage Order would be followed by all field personnel, including keeping food in locked vehicles during the day if personnel were not present. Trash would be removed from the site investigation area each day at the end of shift and disposed of in Libby.

2.5.4.2.4 Road Construction or Reconstruction

Work would start with inspection of existing access roads to confirm available width and surface conditions. Borehole locations accessible from the existing roads would be staked using a GPS concurrent with the inspections. Layout and flagging of new access roads would immediately follow along with the marking of the remaining borehole sites. BMP requirements would be assessed and documented, concurrent with inspection of existing access and layout of new access roads. Silt fence would be installed in areas where sediment could enter surface waters. Major equipment used would include a bulldozer, a tracked excavator, and an all-terrain tractor fitted with a brush cutter (MMC 2017b).

MMC would construct 11 new temporary roads totaling 2.6 miles (Table 314; Figure 311). Temporary gates would be installed during use on new roads where they connected to NFS roads #278 and #6212. New road construction would consist of removal of trees and brush along the alignment, removal of stumps in the road surface, grading of shoulder ditches or berms to control runoff, and implementation of BMPs. Clearing for new roads would be up to a width of 20 feet, would be cut along contour, and would have gradients of 10 percent or less. Roadway width would be 14 feet. Total disturbance for new road construction would be 6.3 acres. All vegetation removal would be done in accordance with the Vegetation Removal and Disposition Plan described in Section 2.5.3.2.4; vegetation and suitable soils would be temporarily stockpiled adjacent to the alignments for use in subsequent reclamation activities (see Section 2.5.5.2, *Reclamation of Geotechnical Investigation Disturbances*). In addition, MMC would use a chemical stabilizer or groundwater appropriated using its existing water right to control dust on all roads used for geotechnical investigations. Sediment and runoff from all disturbed areas in the geotechnical investigation area 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) and the BMP requirements in a stormwater permit if one was needed for the geotechnical investigations. All BMPs would be monitored (see Appendix C) and remain in place until DEQ approved MMC's Notice of Termination, if a stormwater permit was needed for the geotechnical investigations, or until bond release.

Table 314. New Roads Used for Geotechnical Investigations.

Road Name	Length (miles)	Roads Used to Access and Current Status	Proposed Closure Device and Access Status for Motor Vehicles
Temp Rd A	0.136	#6212 open	Temporary gate installed at intersection with road #6212 while new road was used for drilling; MMC authorized traffic only
Temp Rd B	0.479		
Temp Rd C	0.197		
Temp Rd D	0.126		
Temp Rd D	0.038		
Temp Rd F	0.234		
Temp Rd E	0.146	#5187 gated	MMC authorized traffic only; current gate remains in place and locked after ingress and egress
Temp Rd G	0.098	#6212M gated	
Temp Rd H	0.327		
Temp Rd I	0.052		
Temp Rd J	0.036	#6212D and #5181 gated #1408 open but impassible	
Temp Rd K	0.733	#278 open	Temporary gate installed at intersection with road #278 while new road is used for drilling; MMC authorized traffic only
Total	2.602		

Source: MMC 2017b

2.5.4.2.5 Drilling and Testing

One 16-foot-by-34-foot drill pad would be needed for each borehole (MMC 2017b). Drill pads for boreholes that would be completed as test wells or piezometers would be cleared adjacent to the access road (Figure 311). Drill pad construction for test wells and piezometers would disturb 0.1 acre. Boreholes that would be sampled and then backfilled would be drilled in the road alignment and would not create additional disturbance. Pad construction for these holes would be widening of the road surface to at least 16 feet. The cone penetration testing would be done from the borehole pads, and no additional pad construction or disturbance would be required for cone penetration testing. Test pits would be excavated within the access roads; no additional pad construction or disturbance would be needed.

All drilling and cone penetration testing would be done with equipment mounted on all-terrain, moderate-ground-pressure carriers. Two drill rigs would be used. One rig would work on the piezometer boreholes, while the other rig would work solely on the boreholes that would not be completed as piezometers. Noise from the drill rigs would be from 75 to 85 dB (similar to dozers and excavators). No drilling muds would be used. Drip mats would be placed under drilling equipment, and fuel would not be stored at the drill sites. Any lubricant or fuel drippings would be promptly cleaned up and disposed of at an authorized waste-handling facility.

Drilling would be done with hollow stem augers. Soil samples would be taken at standard intervals using a split spoon sampler. Logging would include classification of soil horizons, noting of water levels, and documenting blow counts (Standard Penetration Test) as the sampler is advanced. Based on the historical monitoring well logs, the boreholes would range in depth from 80 to 120 feet and would be advanced to refusal.

Existing but closed access roads would be opened and reconstructed where necessary to a condition sufficient for the geotechnical investigations. Table 315 lists existing impassable or closed roads that would be used for the work. MMC would lock the gate during use. Reconstruction of existing roads would be minimized and would include brush removal to yield a width of at least 16 feet. If culverts or bridges have been removed from an existing road and cannot be replaced with temporary crossings, alternative access would be developed in consultation with KNF personnel. Road surface preparation would be limited to only that necessary for safe access of all-terrain equipment.

Piezometers would be completed as open hole types. The location of the slotted interval would be determined during drilling and would target the uppermost aquifer. Should drilling indicate multiple shallow but isolated vertical aquifers, nested piezometers may be developed on the same drill pad. Piezometer construction would comply with DNRC well construction regulations (ARM 36.21.634 et seq. or 36.21.801 et seq., as applicable). Water for field permeability testing of piezometers would be from potable sources and brought to site with a water truck or from nearby piezometer wells developed in the same aquifer to be tested. A beneficial water use permit is not required if the intent is to conduct aquifer tests, water quality tests, water level monitoring, or other testing or monitoring of a water source (85-2-369, MCA).

Weed-free hay bales or similar would be installed downgradient of piezometers to filter any water that may be discharged from the hole during well development or aquifer testing. MMC would ensure that all water infiltrated into the ground and that no water from piezometers reached surface water or a wetland.

The piezometers would be equipped with data collection and storage devices, steel collar pipes, and locking caps. Field permeability of the water-bearing horizon would be estimated by either air-lift testing or slug testing depending on conditions. Groundwater elevation data would be downloaded from the piezometers quarterly or semiannually.

Cone penetration testing would be completed at each borehole site after drilling and logging. The probe would be advanced to refusal. Field data would be correlated with the Standard Penetration Test data to provide an accurate assessment of subsurface undrained soil strength.

Five of the proposed boreholes would be completed in weathered to fresh rock. For these holes, a tri-cone bit or down-hole hammer would be used and the chips collected using reverse circulation. Field logging would focus only on identifying rock type and weathered condition. Test pits would be a minimum of 6 feet deep and up to 10 feet deep depending on subsurface conditions. An excavator would be used for excavation and backfill of the pits. Soil horizons would be photographed and classified in the field logs. Soil samples for testing would be collected. Test pit locations would be surveyed with GPS. Each pit would be backfilled immediately after completing logging and sampling (see Section 2.5.5.2, *Reclamation of Geotechnical Investigation Disturbances*).

Table 315. Proposed Road Use for Geotechnical Investigations, Alternative 3.

Road Number	Road Name	Total Length (miles)	Current Closure Device and Access Status for Motor Vehicles	Proposed Closure Device and Access Status for Motor Vehicles	Length Proposed for Use (miles)
1408	Libby Creek Bottom	2.28	Open; impassable	Gated; MMC authorized traffic only	0.51
5181	Little Cherry Loop H Cowpath	0.54	Gated yearlong to motor vehicles except over-snow vehicles, open to over-snow vehicles 12/1–4/30	No change in public access; MMC authorized traffic only	0.53
5181A	Little Cherry Loop H Cowpath A	0.19			0.20
5185	S Bear Little Cherry	0.85			0.85
5185A	S Bear Little Cherry A	0.33			0.33
6212H	Little Cherry Loop H	0.62			0.51
6212P	Poorman Pit	0.23			0.25
6212M	Little Cherry Loop M	1.10			0.43
5187	Little Cherry Loop L Clearing	0.21	Barriered yearlong to motor vehicles except over-snow vehicles, open to over-snow vehicles 12/1–4/30	Gated; MMC authorized traffic only	0.20
6212L	Little Cherry Loop L	0.44			0.11

Source: MMC 2017b; JFEIS Table 23

2.5.4.3 Design Features

The following sections describe design features that would be implemented during the Project to avoid or minimize adverse impacts on wildlife, fisheries, and other resources.

2.5.4.3.1 Grizzly Bear

The mitigation plan will be presented in its entirety in Appendix A of the terrestrial BA that the KNF will submit to the USFWS. The plan will include all of the Project's design features to minimize or avoid adverse impacts on the grizzly bear. The plan's major components, including those that would occur during the Evaluation Project, are described above in Section 2.5.3.1.4, *Grizzly Bear*.

2.5.4.3.2 Wilderness Stewardship Monitoring

CMW Wilderness Stewardship Performance wilderness character monitoring would be funded, in part, by MMC and conducted every 5 years at the sites listed in Table 344 (see Section 3.24.1.2.2, *CMW Baseline Solitude Monitoring*). Baseline monitoring was conducted at these sites in 2017 and reported in 2018 (KNF 2018). These sites and others may also be surveyed annually as opportunities arise (KNF 2018). Trends in each measure would be reported at 5-year intervals (see C.9, *Wilderness*, in Appendix C). At closure, MMC's funding for monitoring in the CMW would cease.

2.5.4.3.3 Noise Mitigation

MMC would operate all surface equipment so that sound levels would not exceed 55 dBA, measured 250 feet from the Libby Adit Site, for continuous periods exceeding an hour. Backup beepers may exceed 55 dBA 250 feet from the Libby Adit Site. MMC would install silencers on intake and exhaust ventilation fans in the Libby Adit so that they generate sounds less than 85 dBA measured 3 feet downwind of the portal. MMC also would locate all fans a minimum of 500 feet from the portals unless alternative locations would not increase noise levels in the CMW from the Libby Adit Site by 5 dB or more. EPA considers changes smaller than 5 dB to be insignificant (EPA 1978). The following mitigations would apply to all Project activities:

- Install high-grade mufflers on all diesel-powered equipment
- Install/use critical silencers on generators
- Combine noise-generating operations to occur for short durations simultaneously whenever possible
- Implement a semiannual maintenance and lubrication schedule to ensure that equipment is operating properly
- Keep noise-generating sources from approaching animals on a direct course where possible
- Provide safe cover near noise-generating on-site sources where possible

2.5.4.4 Monitoring

Conceptual monitoring plan requirements are summarized in Appendix C. Appendix C describes what monitoring is required during the Project. In many cases, Project monitoring would be a continuation of ongoing and pre-Project monitoring. All measures implemented to minimize effects of monitoring on the CMW and wildlife would continue during the Project.

2.5.5 Site Closure

Successful completion of the Evaluation Project is a prerequisite to development of the Montanore Project. If MMC decided to pursue approval to mine the Montanore ore body, it would update the groundwater models described in JFEIS Section 2.5.2.6.5, *Final Groundwater Model Development Process*, and provide any additional information necessary to assess effects of the Montanore Project. The Montanore Project would occur after the Evaluation Project only if (1) MMC decided to pursue Montanore Project development, (2) the KNF approved the Montanore Project after completing additional NEPA analysis and Endangered Species Act compliance, and (3) DEQ permitted the Montanore Project after completing additional Montana Environmental Policy Act (MEPA) analysis. The Montanore Project is described in detail in Chapter 2 in the JFEIS and summarized in Section 3.3, *Reasonably Foreseeable Future Actions or Conditions*.

2.5.5.1 Closure of Libby Adit and Site Reclamation

DEQ currently holds a reclamation bond to cover reclamation of 11.6 acres at the Libby Adit Site, including plugging the existing adit, associated with its approval of revision 06-002. The KNF has not approved the activities described in revision 06-002 that may affect National Forest System lands.

MMC would maintain control of the property with a fence until the site was reclaimed and the reclamation bond was released. No solid wastes would be buried underground. The KNF may require a bond for long-term monitoring and maintenance, and possible long-term, post-closure water treatment to ensure ground and surface waters would be protected from unanticipated impacts.

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. The effect of Alternative 2 indicated that a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. MMC would update the 3D model within 2 years of completing data collection from underground, assessing whether an additional plug was necessary to avoid or minimize permanent effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River. If needed, a plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure that any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. The KNF estimates the westernmost plug, if needed, would be 1,850 feet from the start of the inclined drift to above the ore body. Alteration-zone waste rock and ore would be returned underground west of the easternmost bedrock plug.

One of the easternmost plugs would be installed in bedrock near the bedrock/colluvial contact point about 600 feet from the portal opening; the KNF would confirm the location before placement. MMC would complete an engineering assessment that would assess hydrologic and geotechnical data to evaluate the water retaining plug design. Another plug would be installed near the portal entrance and serve as an access barrier to the adit. To ensure long-term stability, waste rock would be backfilled into the adit from the bedrock plug out to the surface opening.

Because no water is anticipated in the colluvial zone of the adit, the portal plug would not be a water retention feature. Once the surface plug was installed, excavated material from the patio would be placed back over the portal plug and general opening and regraded to match the surrounding topography.

After the adit was plugged, Water Treatment Plant discharges would cease. Removal of facilities at the Libby Adit Site, reclamation, and revegetation would be the same as described for Alternative 2. Water treatment would continue as long as discharge from the adit occurred, which is expected to be until all plugs were installed. Water treatment also would continue until the quality of the water from the waste rock storage areas met appropriate water quality standards or limits without treatment.

After the Libby Adit Site was reclaimed and closed, seasonal access changes on Libby Creek Road, Upper Libby Creek Road, and Midas-Howard Creek Road and its spur would no longer be required, and access on these roads would return to pre-Project status (Table 309).

2.5.5.2 Reclamation of Geotechnical Investigation Disturbances

A reclamation bond would be posted with the KNF and DEQ before starting the Project (see JFEIS Section 1.6.3, *Financial Assurance*). MMC would rehabilitate restricted NFS roads used during the activity and would decommission and revegetate all new roads no longer required as soon as practical after completion of the geotechnical investigations. The closure device on new roads would be a barrier. The closure device on existing closed roads would be a gate on all roads except NFS roads #5187 and #6212L, which would be barriered. The segment of NFS road #1408 used by the Project would not be accessible by the public because adjacent segments would be impassable and connected roads would be gated. New roads would be covered with suitable soils and any vegetation stripped during construction. Boreholes that would not be completed as piezometers would be backfilled with the material removed from the hole.

On all disturbed sites, MMC would amend the top 0 to 4 inches of soil before seeding with a KNF-approved wood-based organic amendment to raise the organic matter level in the soil to a minimum of 1 percent by volume. The disturbed sites would be reseeded using the KNF-approved seed mix (Savage 2018). JFEIS Section 2.5.5.2.1, *Revegetation Success/Bond Release Criteria*, describes proposed revegetation success criteria for the Montanore Project that included a tailings impoundment. These criteria are not applicable to the Evaluation Project. MMC would develop revegetation success criteria for disturbances associated with the geotechnical investigations. The KNF and DEQ would modify the criteria if necessary and approve them.

MMC would submit a Notice of Termination when the disturbance associated with the geotechnical investigations had achieved final stabilization. Final stabilization means the time at which all soil-disturbing activities at a site have been completed and a vegetative cover has been established with a density of at least 70 percent of the pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed. Final stabilization using vegetation must be accomplished using seeding mixtures or forbs, grasses, and shrubs that are adapted to the conditions of the site and consistent with the KNF-approved 2018 seed mix (Savage 2018). Establishment of a vegetative cover capable of providing erosion control equivalent to preexisting conditions at the site would be considered final stabilization.

2.5.5.3 Road Access Changes

After the Libby Adit Site was reclaimed and closed, seasonal access changes on Libby Creek Road, Upper Libby Creek Road, and Midas-Howard Creek Road and its spur would no longer be required, and access on these roads would return to pre-Project status (Table 309). All other road access changes shown in Table 309 and Table 310 would remain in place at the conclusion of the Project.

2.5.5.4 Monitoring Equipment

Any existing monitoring well or piezometer installed by MMC or its predecessors would be removed and plugged according to ARM 36.21.810. The well casing would be removed below the ground surface, and the well covers would be removed and disposed of off-site. The small area associated with the monitoring well would be regraded to blend with the natural surroundings. The area would be ripped if appropriate, and soil would be placed consistent with the general soils placement plans. All other monitoring equipment, such as survey stations in the CMW or data loggers in CMW lakes and in streams, would be removed before reclamation bond release.

2.5.6 Reporting

MMC would continue to submit an annual report to the KNF. The annual report would include a discussion of MMC's compliance with all the monitoring and mitigation requirements specified in the DEQ Operating Permit and the KNF's approved Plan of Operations. Each Project monitoring and mitigation requirement would be listed in the report.

2.6 Alternative 4

Alternative 4 would incorporate modifications and design features proposed by the KNF to avoid or minimize adverse environmental impacts. These measures are in addition to or instead of the mitigations proposed by MMC as part of Alternative 2. The KNF's modifications and design features were developed in response to key issues identified during the Montanore Project scoping process (ERO Resources Corp. 2005 and ERO Resources Corp. 2006) and determined to be applicable to the Project (see Section 2.1.2, *Issues*).

2.6.1 Permit and Disturbance Areas

In Alternative 4, Project activities would occur at the existing Libby Adit Site, underground in the Libby Adit and within MMC's extralateral rights, at certain monitoring locations in the CMW, between Poorman Creek and Little Cherry Creek, and along National Forest System roads used for access (Figure 315). Activity, including access changes, also may occur on 742.3 acres to be protected for grizzly bear habitat (see Section 2.5.3.1, *Design Features*). Permit and disturbance areas would be similar to those described in Section 2.5.1 for Alternative 3 (Figure 310); geotechnical investigations would be located in Sections 23 and 24, T28N, R34W and Section 19, T28N, R30W, and would disturb 1.5 acres between Poorman and Little Cherry Creeks (Table 316; Figure 316). The Project duration would be as described in Alternative 3.

Table 316. Surface Disturbance and DEQ Operating Permit Areas, Alternative 4.

Facility	Disturbance Area (acres)	DEQ Operating Permit No. 00150 Permit Area (acres)
Existing Libby Adit Site	11.6	219
Geotechnical Investigations[1] New Roads Drill Pads	 1.4 0.1	 0 0
Total	13.1	219

[1]Most of the Alternative 4 geotechnical investigation area is encompassed by the Operating Permit No. 00150 permit area of Alternative 2.

2.6.2 Access and Road Access Changes

Access and road access changes would be the same as Alternative 3.

2.6.3 Activities before Starting the Project

In Alternative 4, certain activities such as implementation of design features to reduce or avoid impacts on wildlife and fisheries and completion of pre-disturbance surveys and monitoring would be required before starting the Project. These requirements would be the same as those for Alternative 3 and are described in Section 2.5.3, *Activities before Starting the Project*.

2.6.4 Project Activities

In Alternative 4, the Project, including design features, would be the same as described for Alternative 3 apart from geotechnical investigations. Alternative 4 geotechnical investigations are described below.

2.6.4.1 Geotechnical Investigations

The type of geotechnical investigations would be the same as described for Alternative 3 in Section 2.5.4.2, *Geotechnical Investigations*, but the work would be less extensive and confined to a smaller area (Figure 316). Existing roads proposed for use during the geotechnical investigations are listed in Table 317. Data to be collected would include an assessment of a subsurface bedrock ridge between Little Cherry Creek and the effect it may have on pumpback well performance, and aquifer pumping tests to refine the impoundment groundwater model.

The geotechnical investigation would be completed by contractors and last an estimated 4 weeks, including completing reclamation of drill pads and access roads. On an annualized basis, employment is estimated to be 0.75 man-years. Direct labor income for the contract individuals is estimated to range from $60,000 to $75,000.

2.6.5 Site Closure

Site closure would be the same as Alternative 3.

2.6.6 Reporting

Reporting requirements would be the same as Alternative 3.

Table 317. Proposed Road Use for Geotechnical Investigations, Alternative 4.

Road Number	Road Name	Total Length (miles)	Current Closure Device and Access Status for Motorized Vehicles	Proposed Status for Evaluation Project	Length Proposed for Use (miles)
1408	Libby Creek Bottom	2.28	Open; impassable	Gated; MMC authorized traffic only	0.51
5181	Little Cherry Loop H Cowpath	0.54	Gated yearlong to motor vehicles except over-snow vehicles, open to over-snow vehicles 12/1–4/30	No change in public access; MMC authorized traffic only	0.54
5181A	Little Cherry Loop H Cowpath A	0.19			0.17
5185	S Bear Little Cherry	0.85			0.85
5185A	S Bear Little Cherry A	0.33			0.33
6212H	Little Cherry Loop H	0.62			0.51

Source: JFEIS Table 23

2.7 Forest Plan Consistency

The KFP (USDA Forest Service 2015a) provides a framework and text that guides resource management on National Forest System lands. It describes goals, desired conditions, objectives, standards, guidelines, and suitability for various resources including recreation, wildlife and fish, vegetation, soils, water, air, minerals and geology, and land use. This direction applies at three scales: forestwide, within specific management areas, and within specific geographic areas. The KFP management framework is described in Section 3.15.1.1, *Kootenai Forest Plan*.

Forest Service approval of mineral operations must comply with applicable forest plan direction, in this case the KFP, and the Forest Service cannot prohibit locatable mineral operations on lands subject to the United States mining laws either directly or by regulation. This means that if the operations would not comply with any applicable forest plan component after all reasonable stipulations to minimize adverse environmental impacts on National Forest surface resources have been included per 36 CFR 228, a forest plan amendment would be required.

The KNF reviewed all Evaluation Project action alternatives, including its preferred alternative (Alternative 3), for consistency with pertinent KFP components. The *Regulatory Framework* subsection of each Chapter 3 resource section provides the pertinent KFP components, and KFP compliance is discussed for each alternative in the *Regulatory/Forest Plan Consistency* subsections. An evaluation of Alternative 3 compliance with the KFP is included in the administrative record for the Project.

Alternatives 3 and 4 would be consistent with all pertinent KFP direction. With project-specific plan amendments suspending the following guidelines, Alternative 2 would be consistent with all pertinent KFP direction:

- RF-2 – Aquatic Life and Fisheries
- RF-4 – Aquatic Life and Fisheries
- MM-1 – Aquatic Life and Fisheries
- FW-GDL-RIP-01 – Aquatic Life and Fisheries
- FW-GDL-WL-01 – Wildlife
- FW-GDL-WL-15 – Wildlife
- Guideline HU G8 – Wildlife (Lynx)

The guidelines listed above are discussed in Section 3.6, *Aquatic Life and Fisheries*, and Section 3.25, *Wildlife.*

2.8 Alternatives Analysis and Rationale for Alternatives Considered but Eliminated

The alternatives development process and rational for alternatives considered but eliminated are described in detail in JFEIS Section 1.13, *Alternatives Analysis and Rationale for Alternatives Considered but Eliminated*. No additional alternatives were considered or dismissed during preparation of the SEIS.

2.9 Comparison of Alternatives

The alternatives analyzed in the SEIS were developed in response to significant issues identified during scoping process for the Montanore Project (ERO Resources Corp. 2005; ERO Resources Corp. 2006). The KNF determined that these significant environmental issues are relevant to the Project as well (see Section 2.1.2, Issues). A detailed discussion of impacts for the Project and each alternative is presented in Chapter 3.

2.10 Rationale for Preferred Alternative

The federal action analyzed in the SEIS is approval of an amended Plan of Operations for the Project consistent with the Organic Administration Act, Locatable Minerals Regulations 36 CFR 228 Subpart A, and the Multiple Use Mining Act. Alternative 3 is the most environmentally preferable of the action alternatives and fulfills the Project's purpose and need. The KNF Supervisor based the selection of the preferred alternative on a thorough review of the effects analysis in the SEIS, review of public and agency concerns received on the Project, consultation with regulatory agencies, consultation with interested tribes, and the Project record.

Chapter 3. Affected Environment and Environmental Consequences

This chapter describes the environment (including its human elements) in the analysis area and discusses the environmental consequences by resource that may result from implementation of each alternative. It provides the scientific and analytic basis for the comparison of alternatives presented in the *Summary* section.

3.1 Terms Used in the SEIS

3.1.1 Direct, Indirect, and Cumulative Effects

Environmental effects can be direct, indirect, or cumulative and long or short in duration. Direct effects are those that are caused by the action and occur at the same time and place. Indirect effects are those that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR 1508.8). Short-term impacts are those that would occur during the Project and, if MMC decided not to pursue Montanore Project development, during closure of the Libby Adit Site. Long-term impacts of the Evaluation Project are those that would persist beyond closure of the Libby Adit Site and final reclamation. Project activities would take 18 to 24 months, and data evaluation would take 2 to 3 years. If MMC decided not to pursue Montanore Project development, closure of the Libby Adit Site would take 2 to 3 years. Because Project activities, data evaluation, and reclamation could overlap, the total duration of the Evaluation Project may be up to 5 years. MMC would maintain and operate water management and treatment facilities until BHES Order limits or applicable nondegradation criteria were met in all receiving waters from any specific discharge. MMC also would continue water monitoring as long as the MPDES permit was in effect. As long as post-closure water treatment operated, the KNF would require a bond for the operation and maintenance of the Water Treatment Plant. The level of human activity associated with facility operation, maintenance, and monitoring would be similar to current levels. Although rock formations not currently exposed in the Libby Adit would be exposed to a limited degree in the adit extension and drifts, adit water quality after underground evaluation activities were completed is not expected to be substantially different from existing water quality. Existing metal concentrations in adit water are near or below the detection limit (MMC 2017c, 2018b). The KNF does not expect that long-term water treatment would be needed as a result of the Project.

Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Past and current activities and natural events have contributed to creating the existing conditions and trends. The KNF conducted the cumulative effects analysis by focusing on the current aggregate effects of past actions (Council on Environmental Quality 2005), as described in the *Affected Environment* sections of this chapter. Additionally, some of these activities may continue to produce environmental effects on issues or resources relevant to the proposal. The list of activities considered in the cumulative effects analysis was based on the KNF's Schedule of Proposed Actions and judgment of KNF program managers (the list of past

and current actions considered in the cumulative effects analysis is in the Project record). Figure 317 shows reasonably foreseeable actions considered in the cumulative effects analysis.

Activities on public and private lands have been considered in the cumulative effects analysis and are described in the *Cumulative Effects* section for each resource. Data on private lands are the best available information derived from landowners and field verification, and are generally more limited than data on public lands. The types of actions (past and current or reasonably foreseeable) analyzed in the cumulative effects analysis are grouped into four categories:

- Mining activities
- KNF land management activities
- Private land activities
- Other government agency activities

3.1.2 Irreversible or Irretrievable Commitment of Resources

As required by NEPA, this chapter also includes a discussion by resource of any irreversible or irretrievable commitment of resources that would result from implementing the alternatives. An irreversible commitment of resources means that nonrenewable resources are consumed or destroyed. These resources are permanently lost due to Project implementation. An irretrievable commitment of resources is the loss of resources or resource production, or use of renewable resources, during the Project.

3.1.3 Incomplete or Unavailable Information

Underground activities would occur in rock formations that are hundreds to thousands of feet in the subsurface, hidden from view, and inaccessible other than through evaluation activities such as underground development of drill stations, drifts and other workings, or extensive drill holes from the surface. This limits the amount of data initially available and means there is a degree of uncertainty inherent in evaluating the specific impacts on groundwater and its connected resources such as groundwater-dependent ecosystems (GDEs) and surface water.

NEPA regulations describe how the KNF must handle instances where information relevant to evaluating reasonably foreseeable adverse impacts of the alternatives is incomplete or unavailable (40 CFR 1502.22). “Incomplete information” refers to information that the agency cannot obtain because the overall costs of doing so are exorbitant. The term “unavailable information” refers to information that cannot be obtained because the means to obtain it are not known. “Overall costs” encompasses financial costs and other costs such as costs in terms of time (delay) and personnel (51 *Federal Register* 15621). As a federal agency, the KNF is to obtain information for an EIS if (1) it is needed for evaluating reasonably foreseeable significant adverse effects, (2) it is essential to make a reasoned choice among alternatives, and (3) the overall costs of obtaining it are not exorbitant. In the following resource sections, the SEIS discloses the adequacy of the baseline information, additional data collection that would occur in the future, and its relevance to making a reasoned choice among alternatives.

3.1.4 Mine Area

In the JFEIS, the KNF and DEQ used the term “mine area” to describe a geographic area potentially affected by the underground mine and associated adits. The area generally was in the upper watersheds of Libby Creek, Ramsey Creek, Poorman Creek, East Fork Rock Creek, and the

East Fork Bull River. Although the Project would not include an underground mine, the existing Libby Adit, the adit extension, and drifts have the potential to affect the same geographic area described as the mine area in the JFEIS. The KNF is using the term “mine area” to describe that area in the SEIS even though the Project would not include a mine.

3.2 Past and Current Actions

3.2.1 Mining Activities

3.2.1.1 Troy Mine

ASARCO leased the Troy Project from Kennecott in 1973 with plans to build a mine. Underground production began in 1981 and lasted for 12 years, ending in 1993. The mine was subsequently in care and maintenance status. Revett Mining Co., Inc. (Revett) acquired the Troy Mine in 1999 and operated it between 2004 and 2012. In 2015, Hecla Mining Company (Hecla) purchased Revett, including the Troy Mine. Revett is reclaiming the Troy Mine in accordance with the Forest Service’s and DEQ’s Agency Mitigated Alternative selected in the 2012 ROD for the Troy Mine Revised Reclamation Plan (USDA Forest Service and DEQ 2012) and any subsequent amendments to the mine’s approved Plan of Operations and Operating Permit.

3.2.1.2 Other Minerals Activities

Numerous placer and lode mining claims exist within the Crazy, Silverfish, and Rock planning subunits (PSUs) (list is in the Project record). Some of these claims are the site of active mines, and several plans of operations have been approved for instream suction dredging and exploratory digging in these PSUs. Other claims show evidence of having been mined in the past and are currently inactive. In some cases, the mines are abandoned and the minerals are not currently under claim. Closure of abandoned mines, and in some cases inactive mines, for safety purposes is ongoing in the KNF. Grates, which allow bat ingress and egress, are the most common and preferred closure type. Common variety type mineral material resources include numerous gravel pits on National Forest System lands, which provide mineral material for Forest Service road projects.

3.2.2 KNF Management Activities

Past and current KNF management actions are listed in the Project record. A hunting camp is permitted near but outside the CMW. This camp is accessed by a trail using foot or saddle and pack stock.

3.2.3 Private Land Activities

3.2.3.1 Libby Placer Mining Company Timber Harvest

Libby Placer Mining Company removed 50,000 to 100,000 board feet of timber annually (except in 2007) from its private property. About 20 loads or less were removed from the property per year for 3 years beginning in 2007.

3.2.3.2 Avista-Funded Bull Trout Recovery Activities

Avista Corp. is funding ongoing fish trapping and monitoring activities in Rock Creek and the East Fork Bull River. Both drainages have screw traps and weirs for capturing out-migrating

juvenile trout. In addition, adult bull trout are being captured below Cabinet Gorge Dam and, based on their genetic assignment, are transported above and afforded access to both Rock Creek and the East Fork Bull River. In the East Fork Bull River, Avista and FWP are implementing a nonnative suppression program that involves active and passive methods to remove and exclude nonnative fish from the river. Bull trout greater than 151 mm in length are moved to other areas of the Bull River. In cooperation with FWP, bull trout spawning surveys are conducted annually, and overall fish population surveys are conducted on a predetermined schedule. The most recent channel restoration in the East Fork Bull River occurred in 2007. Avista and others funded the KNF to complete 1,100 feet of channel restoration to route the stream back into a historical channel to avoid a newly created chronic sediment source. Most of the work occurred on National Forest System land.

3.2.4 Other Government Agency Activities

3.2.4.1 DNRC Habitat Conservation Plan

The DNRC Trust Land Management Division developed a voluntary multi-species habitat conservation plan (HCP) with technical assistance from the USFWS (DNRC 2011). The HCP intends to sustain DNRC management practices over time while conserving habitat for five fish and wildlife species, three of which are listed under the ESA. The HCP was prepared to meet regulatory compliance with Section 10(a)(1)(B) of the ESA. Section 10 provides a regulatory mechanism to allow for the incidental take of federally endangered and threatened species of wildlife by private interests and non-federal government agencies during lawful land practices. The HCP permit period extends 50 years and covers forest management activities on classified forested state trust lands that provide habitat for species currently listed or having the potential to be listed under the ESA. Those species are grizzly bear, Canada lynx, bull trout, westslope cutthroat trout, and redband trout. Activities covered by the HCP are timber management activities, road construction, reconstruction, maintenance, use and associated gravel quarrying for forest road surface materials, and grazing. A state land parcel subject to the HCP is along Libby Creek Road.

3.2.4.2 Montana Department of Transportation Road Projects

Montana Department of Transportation (MDT) completed multiple projects on US 2 south of Libby over the past 5 years. The most recent project, Swamp Creek East, was completed in 2018 (MDT 2017).

3.3 Reasonably Foreseeable Future Actions or Conditions

3.3.1 Climate Change

Climate change is not a reasonably foreseeable future action but may represent a reasonably foreseeable future affected environment. The conditions related to climate change disclosed in the JFEIS have not changed since issuance of the JFEIS; see JFEIS Section 3.3.1, *Climate Change*, for a general discussion. Information on the effects of the Project on greenhouse gas emissions is discussed in JFEIS Section 3.4, *Air Quality*. The potential Project effects associated with climate change are described in the following JFEIS sections: 3.6, *Aquatic Life and Fisheries*; 3.10, *Groundwater Hydrology*; 3.11, *Surface Water Hydrology*; 3.13, *Water Quality*; and, for those wildlife species potentially affected, 3.25, *Wildlife*.

3.3.2 Mining Activities

3.3.2.1 Rock Creek Project

The Rock Creek Project is a proposed underground copper and silver mine near Noxon, in Sanders County, Montana. The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018 (USDA Forest Service 2018a); evaluation activities (Phase I) will be similar to the Montanore Evaluation Project. Rock Creek Project Phase II activities will be subject to an additional future NEPA evaluation and decision after completion and analysis of Rock Creek Project Phase I activities. RCR will be the operator of the Rock Creek Project. With the exception of beneficial effects on grizzly bear and lynx where Rock Creek Project Phase I mitigation lands would be located, Montanore Evaluation Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Phase II activities of the Rock Creek Project are described in the JFEIS; minor changes in those activities are described in the Final SEIS for the Rock Creek Project (USDA Forest Service 2018b). Cumulative effects from concurrent development of the Rock Creek Project's Phase II activities and the Montanore Project are described in the JFEIS.

3.3.2.2 Montanore Project

The Montanore Project is described in the JFEIS. Impacts analyses of the Montanore Project disclosed in Chapter 3 of the JFEIS are the best currently available estimate that can be obtained using currently available data. The groundwater modeling has uncertainty, described in the JFEIS, because it is not based on sufficient site-specific data. Such data would be obtained during the Evaluation Project. If MMC decided to pursue Montanore Project development, new information would be incorporated into an updated 3D groundwater model. Based on DEQ's 2016 ROD for the Montanore Project (DEQ 2016b), the KNF expects that another nondegradation compliance determination for construction and operation of the Montanore Project may be made after MMC collected additional information during the Evaluation Project.

3.3.2.3 Prospecting Activities

The Libby Ranger District receives proposals from time to time for small prospecting activities. The most recent proposals were for the Autumn Gold Claim (SW1/4 Sec. 12, T27, R31W), which proposes prospecting with hand tools, and the 50/50 Claim (E1/2 NW1/4, Sec. 9, T28N, R30W), which proposes instream sluicing. Similar activities are expected over the life of the Project.

3.3.3 Other KNF Management Activities

3.3.3.1 Miller-West Fisher Vegetation Management Project

The Miller-West Fisher Vegetation Management Project will consist of commercial timber harvest, pre-commercial thinning and prescribed fire, access management changes, trail construction and improvement, treatment of fuels in campgrounds, and watershed rehabilitation activities in the Miller Creek, Silver Butte Fisher River, and West Fisher Creek watersheds. The Miller-West Fisher Vegetation Management Project alternative selected in the 2017 ROD (USDA Forest Service 2017a) was modified from that described in JFEIS Section 3.3.3.2. The project will consist of the following management activities:

- Vegetation treatments on about 1,586 acres, including commercial timber harvest and associated fuel treatments including intermediate harvest on 990 acres, regeneration harvest on 596 acres, precommercial thinning on 351 acres, and prescribed burning without associated timber harvest on 2,830 acres.
- Road and access management, including access changes on 1.92 miles of road; 3.29 miles of new temporary road construction, 19.2 miles of road storage, and 1.43 miles of road decommissioning; trail tread improvements of 5.9 miles of nonmotorized trail; and removal of 20 culverts.
- Access change on Road #4782, located in the Standard Creek watershed, from gated yearlong to motorized vehicles including over-snow vehicles, to barriered.
- Fuels and hazardous tree removal in Lake Creek Campground.
- Watershed condition improvement in the form of BMP implementation, including installation of ditch relief culverts, culvert replacement, surface water deflectors, and cleaning ditches, is proposed for all haul routes. Additional BMP work on roads not used for timber removal is proposed and will be performed as funding becomes available.
- Trail and trailhead improvements.
- Creation of instream pools in Miller Creek and stabilization of streambanks in West Fisher Creek.
- Design features and mitigations to maintain and protect resource values.

The Miller Creek and Silver Butte Fisher River watersheds are outside the Evaluation Project analysis area. The Evaluation Project analysis area includes the West Fisher Creek watershed where access changes would occur in the Standard Creek and Trail Creek drainages. Cumulative effects of the Evaluation Project and the Miller-West Fisher Vegetation Management Project are discussed in the SEIS.

Cumulative effects also could occur if the project were to coincide with the Montanore Project. In the project's ROD (USDA Forest Service 2017a), the Forest Supervisor determined that the changes in the ROD to the selected alternative (Alternative 6-Modified) were minor and within the scope and context of the environmental effects disclosed in the project's NEPA (USDA Forest Service 2009a, 2017b) and ESA compliance documents. Because the changes were minor, the cumulative effects with the Montanore Project are disclosed adequately in the JFEIS's Chapter 3 resources sections.

3.3.3.2 Kootenai Forestwide Young Growth Vegetation Management Project

The Kootenai Forestwide Young Growth Vegetation Management Project would include pre-commercial harvest, commercial harvest, and burning of activity fuels within 400,000 acres of previously managed second-growth stands across all units of the KNF. The project is part of the Montana governor's Forest in Focus Initiative. The purpose of the project would be to improve the resiliency of the timber stands to insects and disease; improve wildlife habitat, especially for grizzly bear and lynx; address impacts from climate change; and decrease risk of stand-replacing wildfire. A Draft EIS was issued in 2017, and a Final EIS is expected to be issued in 2019. Project-level NEPA analysis would be required before treatment. Analysis would employ various screens across the initial proposed acreage that would eventually decrease total treatment acres from the 400,000 acres analyzed.

3.3.3.3 Hoodoo Wildfire Resiliency Project

The Hoodoo Wildlife Resiliency Project (Hoodoo Project) is a proposed project under the Healthy Forest Restoration Act. It would be located approximately 10 miles south of Libby in the Granite, Snow, No, Deep, Smearl, and Big Cherry drainages. The Hoodoo Project would be designed to maximize retention of old-growth and large trees and to promote stands that are resilient to insects, disease, and wildfire. It would include 684 acres of commercial thinning, 37 acres of clearcutting, and 1,209 acres of pre-commercial thinning of small-diameter trees. No new permanent roads would be constructed, and any necessary temporary roads would be decommissioned within 3 years of project initiation. The project is being developed through a collaborative process, allowing use of a Categorical Exclusion under NEPA. The KNF conducted a 30-day scoping period in early 2019 and hosted an open house on March 6, 2019.

3.3.3.4 Other Projects

Other projects include the Coyote Improvement Vegetation Management Project, which is currently in the planning stage, on the KNF's Libby Ranger District in Sections 13 and 18, T27N, R30W. The project will involve harvest of 240 acres to increase stand resiliency to mountain pine beetles. No new road construction is planned. The project is currently on hold.

3.3.4 Private Lands Activities

Continued development of private lands in the analysis area is expected. Development is expected to include commercial timber harvest, land clearing, home construction, road construction, septic field installation, water well drilling, livestock grazing, and stabilization of streambanks.

3.4 Air Quality

3.4.1 Regulatory Framework

Federal requirements under the Clean Air Act, the Clean Air Act of Montana, the Organic Administration Act, the Forest Service's Locatable Mineral Regulations (36 CFR 228 Subpart A), the Wilderness Act, and interagency guidance for nitrogen and sulfur deposition analysis are described in the JFEIS. The KFP includes the desired condition to "meet applicable federal, state, or tribal air quality standards" (FW-DC-AQ-01) and a guideline that "the forest should cooperate with federal, state, tribal, and local air quality agencies as appropriate in meeting applicable air quality requirements. The KNF will cooperate with the DEQ in meeting the State Implementation Plan and the Smoke Management Plan" (FW-GDL-AQ-01).

DEQ finalized MMC's air quality permit (DEQ 2016a) after issuing its ROD in 2016. All references to the supplemental preliminary determination or draft air quality permit in JFEIS Section 3.4.4.3 now apply to the final permit MAQP #3788-00.

3.4.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and air quality in the Fisher River watershed would not be affected.

3.4.3 Affected Environment

The existing air quality that may be affected by Project activities is described in JFEIS Section 3.4.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on air quality in the analysis area and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.4.4 Environmental Consequences

3.4.4.1 Alternative 1

Increased air emissions from Project activities described under the other alternatives would not occur. The ambient air quality and visibility in the CMW would not be affected by the proposed activities. Existing trends in air quality of the analysis area would continue. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, and MMC's Montana Air Quality Permit (MAQP #3788-00) would remain in effect. MMC probably would not continue with DEQ permitted activities at the Libby Adit Site. Particulate and gaseous emissions from electrical generators and vehicles accessing the Libby Adit Site would continue until the adit was plugged. Emissions would return to existing conditions after the Libby Adit Site was reclaimed in accordance with Operating Permit No. 00150.

3.4.4.3 Alternative 2

Except for changes in air quality in the geotechnical investigation area, changes in air quality in Alternative 2 would be the same as Alternative 3. No geotechnical investigations would be conducted, and air quality affected by those investigations would not occur.

3.4.4.4 Alternative 3

3.4.4.4.1 Particulate Matter and Gaseous Ambient Pollutants

In the JFEIS, the KNF assumed in Alternative 3 that the Evaluation Project would have the same generator use and emissions as Alternative 2. If Tier 4 engines were available and used in underground mobile equipment and on generators, emissions would be less than what is shown in JFEIS Table 57. The maximum $PM_{2.5}$ and PM_{10} emission rates did not exceed any standard (JFEIS Table 56). Based on these results that were lower than the corresponding 2006 results, the emission rates of CO, lead, NO_2, and SO_2 would be below applicable standards. Adding an ambient background value of 35 $\mu g/m^3$ for SO_2 and 40 $\mu g/m^3$ for NO_2, maximum concentrations would be less than 1-hour ambient air quality standards. The maximum NO_2 concentration would occur in the Construction Phase of the Montanore Project, and the maximum SO_2 concentration would occur during the Operations Phase of the Montanore Project. Because Evaluation Project emissions would be equal to or less than Montanore Project emissions, the Project would meet National and Montana ambient air quality standards.

During geotechnical investigations, vegetation clearing and drilling activities would generate particulate and gaseous emissions. The emissions would be from mobile sources not regulated by the air quality permit. The increased emissions in the area would be short-term (12 weeks or less) and would meet National and Montana ambient air quality standards.

During Montanore Project operations, anticipated emissions of greenhouse gases (GHGs) from combustion sources would be 32,500 metric tons per year CO_2-equivalent, including 250 tons per year from methane (CH_4) and nitrous oxide (N_2O) (combined), and the remainder from CO_2 (JFEIS p. 302). Assuming maximum fuel use allowed by MMC's air quality permit 3788-00 for underground equipment (1,305,279 gallons) and propane heaters (488,448 gallons), 16,174 metric tons per year CO_2-equivalent GHGs would be emitted during the Project. Consequently, emissions of GHGs during the Project would be substantially less than those allowed by MMC's air quality permit 3788-00.

3.4.4.4.2 Nonattainment Area Boundary Impact Assessment

In the JFEIS, the KNF assumed in Alternative 3 that the Evaluation Project would have the same generator use and emissions as Alternative 2. Because Evaluation Project emissions would be equal to or less than Montanore Project emissions, the Project would negligibly affect $PM_{2.5}$ concentrations within Libby's nonattainment area, and PSD Class I annual NO_2 increment would not be consumed by the NO_x emissions.

3.4.4.4.3 Cabinet Mountains Wilderness Impact Assessment

Maximum nitrogen deposition rates from the Montanore Project would be less than the Federal Land Managers (FLM) deposition analysis thresholds (USDA Forest Service et al. 2011) at Upper Libby Lake, Lower Libby Lake, and Rock Lake (JFEIS Table 60). Because Evaluation Project emissions from generator use would be equal to or less than Montanore Project emissions, nitrogen deposition rates from the Project would be less than the FLM deposition analysis

thresholds at Upper Libby Lake, Lower Libby Lake, and Rock Lake. Sulfur deposition rates are expected to be below the sulfur deposition analysis threshold for the same reason.

3.4.4.4.4 Effectiveness of the KNF's Proposed Mitigation

Alternative 3 mitigation, such as using Tier 4 engines if available on underground mobile equipment and generators and using ultra-low-sulfur diesel fuel, would be effective in minimizing nitrogen and sulfur deposition on wilderness resources.

3.4.4.5 Alternative 4

The effects of Alternative 4 on air quality would be the same as Alternative 3.

3.4.4.6 Cumulative Effects

The Project along with reasonably foreseeable future actions would not cumulatively affect air quality. If MMC decided to pursue Montanore Project development, the cumulative effects of all alternatives on air quality are described in the JFEIS.

3.4.4.7 Regulatory/Forest Plan Consistency

All action alternatives would implement emission controls at the proposed site that would constitute best available control technology, as required by ARM 17.8.752(1)(a). 36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental impacts on National Forest surface resources and comply with applicable state and federal air quality standards including the Clean Air Act. Although Alternative 2 would implement best available control technology, this alternative would not fully comply with 36 CFR 228.8. In this alternative, MMC did not propose to implement feasible measures to minimize air emissions. Alternatives 3 and 4 would incorporate additional feasible measures to minimize adverse environmental impacts on National Forest surface resources and to comply with applicable state and federal air quality standards. The proposed mitigation in Alternatives 3 and 4, such as using Tier 4 engines if available or Tier 3 on underground mobile equipment and generators and using ultra-low-sulfur diesel fuel, would substantially reduce nitrogen and sulfur emissions compared to Alternative 2. Other conditions and limitations on air emissions are described in MMC's air quality permit (DEQ 2016a).

All action alternatives have the potential to indirectly affect wilderness qualities. Mitigation measures identified in Chapter 2 for Alternatives 3 and 4 would be implemented to minimize changes in wilderness character. In Alternatives 3 and 4, potential air quality indirect impacts on wilderness lakes and wilderness character would be minimized by mitigation measures such as limiting generator use, using Tier 4 engines if available on underground mobile equipment and emergency generators instead of Tier 2, and using ultra-low-sulfur diesel fuel in those engines. Mitigation measures in Alternatives 3 and 4 are reasonable stipulations for protection of the wilderness character and are consistent with the use of the land for mineral development. Alternatives 3 and 4 would be conducted to protect the surface resources in accordance with the general purpose of maintaining the wilderness unimpaired for future use and enjoyment as wilderness, and to preserve the wilderness character consistent with the use of the land for mineral operations in compliance with 36 CFR 228.15 and the Wilderness Act. Alternatives 3 and 4 would comply with the Wilderness Act. Alternatives 3 and 4 would minimize adverse environmental impacts on surface resources in the wilderness and thereby comply with the

regulations (36 CFR 228 Subpart A) for locatable mineral operations on National Forest System lands.

All action alternatives would comply with 36 CFR 228.8(a), the KFP, and the Montana Clean Air Act because Project activities in all alternatives would not result in exceedances of any National or Montana ambient air quality standard. MMC's air quality permit (DEQ 2016a) discusses compliance with the Montana Clean Air Act in detail. Project activities would negligibly affect $PM_{2.5}$ concentrations in Libby's nonattainment area and would comply with the State Implementation Plan. 36 CFR 228.8(h) states that "certification or other approval issued by state agencies or other federal agencies of compliance with laws and regulations relating to mining operations will be accepted as compliance with similar or parallel requirements of these regulations." DEQ's permit decision and conditions on MMC's Montana Air Quality Permit (MAQP #3788-00) constitute compliance with Clean Air Act requirements.

All alternatives would maintain progress toward the desired condition to meet applicable federal, state, or tribal air quality standards (FW-DC-AQ-01). The KNF would cooperate with DEQ in meeting the State Implementation Plan and the Smoke Management Plan, and all alternatives would be designed and implemented in accordance with FW-GDL-AQ-01.

3.4.4.8 Irreversible and Irretrievable Commitments

Air pollutant concentrations would be higher throughout the analysis area and in the CMW than current levels, but below applicable air quality standards. Pollutant concentrations would return to existing levels after the Libby Adit Site was reclaimed. There would be no long-term irreversible or irretrievable commitment of resources.

3.4.4.9 Short-Term Uses and Long-Term Productivity

Air pollutant concentrations would be higher throughout the analysis area and in the CMW than current levels, but below applicable air quality standards. Pollutant concentrations would return to existing levels after the Libby Adit Site was reclaimed.

3.4.4.10 Unavoidable Adverse Environmental Effects

All action alternatives would temporarily increase air pollutant concentrations in the CMW and the analysis area. Standard control practices would minimize emissions.

3.5 American Indian Rights

Federal laws, regulations, and treaties direct the Forest Service to consult with federally recognized tribes who may have concerns about federal actions that may affect religious practice, traditional cultural uses, and cultural resource sites and remains associated with American Indian ancestors. The analysis area lies within the aboriginal territory of the Kootenai Tribe. The Confederated Salish and Kootenai Tribes (CSKT) and the Kootenai Tribe of Idaho (KTOI) are the federally recognized tribes representing the modern members of the Kootenai Tribe.

3.5.1 Regulatory Framework

The Forest Service has a government-to-government responsibility to all federally recognized tribes. Federal requirements are described in the JFEIS.

The KFP direction considered in the analysis of American Indian rights is:

> **GOAL-AI-01.** Respect Indian tribal self-government and sovereignty, honor tribal Treaty and other rights through protection or enhancement of such, and meet the responsibilities that arise from the unique legal relationship between the Federal Government and Indian tribal governments. Manage the Forest to address and be sensitive to traditional American Indian religious beliefs and practices.
>
> **FW-DC-AI-01.** The KNF recognizes and maintains culturally significant species and the habitat necessary to support healthy, sustainable, and harvestable plant and animal populations to ensure that rights reserved by Tribes in the Hellgate Treaty of 1855 are protected or enhanced.
>
> **FW-DC-AI-02.** The KNF recognizes, ensures, and accommodates Tribal member access to the Forest for the exercise of treaty rights and cultural uses consistent with laws, policies, and regulations.
>
> **FW-DC-AI-03.** The KNF recognizes and protects traditional cultural areas as associated with the traditional beliefs of a Tribe about its cultural history.
>
> **FW-GDL-AI-01.** Consult with Tribes when management activities may impact treaty rights and/or cultural sites and cultural use, according to the consultation protocol.

3.5.2 Treaty Rights

The analysis area is within lands encompassed by the Hellgate Treaty of 1855. The Hellgate Treaty was signed between the United States and the Flathead, Upper Pend d'Oreilles, and Kootenai Tribes, and the federal government has consultation responsibilities to ensure that the Tribes' reserved rights are protected. The treaty-reserved rights include the "right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land." The KNF's Libby Ranger District fits the description of "usual and accustomed places" and lies within the aboriginal territory of the Kootenai and the Salish (Flathead). Ongoing consultation with the CSKT ensures that tribal treaty rights are protected.

3.5.3 Analysis Area and Methods

The analysis area consists of the East Fork Bull River, East Fork Rock Creek, Rock Creek and Libby Creek where dewatering the Libby Adit and drifts may reduce streamflow, the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access for grizzly bear mitigation. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and cultural resources in the Fisher River watershed would not be affected.

3.5.4 Affected Environment

3.5.4.1 Historical Tribal Distributions

Historical tribal distributions in the analysis area are described in the JFEIS.

3.5.4.2 Consultation with Interested Tribes

Previous consultation with interested tribes regarding the Montanore Project is described in the JFEIS. The KNF notified the CSKT of its intention to prepare an SEIS for the Project on December 15, 2017. The KNF had a meeting with CSKT representatives regarding the proposed Project on February 14, 2018. Detailed correspondence is in the Project record.

3.5.5 Environmental Consequences

The KNF identified three scoping issues for tribal consultation: (1) rights under the Hellgate Treaty, (2) sacred places and access to those places for the exercise of religion, and (3) burials. The thresholds indicated by the three issues could not be measured, as the tribes have declined to provide the baseline data necessary to conduct effects analysis.

3.5.5.1 Alternative 1

Any previously recorded or as yet undiscovered cultural sites with tribal affiliation would remain undisturbed. No correspondence regarding the federal action considered in the SEIS has been received by the KNF from the CSKT.

3.5.5.2 Effects Common to All Action Alternatives

While the tribes previously were afforded the opportunity to provide comments on all alternatives, they declined, stating that their opposition to the Project negated the need to determine which alternatives were more preferable to them. No correspondence regarding the federal action considered in the SEIS has been received by the KNF from the CSKT.

3.5.5.3 Cumulative Effects

The CSKT considered the effects of the Montanore Project and the Rock Creek Project as one. The CSKT submitted the following comment regarding the Montanore Project: “The expansion of the Montanore Mine has the potential to impact Tribal ancestral sites, including trails, fishing and gathering areas, as well as occupation sites. Both mines have the potential to degrade water quality, thus impacting aquatic habitats that provide Tribal members with traditional plants and medicines. The degradation of the surrounding watershed should have far-reaching impacts on

culturally significant fish and wildlife, including the endangered bull trout and white sturgeon" (July 11, 2006). Because the CSKT have chosen not to identify specific effects, the KNF cannot address specific direct or indirect impacts on these undisclosed resources. Analysis of cumulative effects described in other resource sections indicates that increased access to the general Project area could increase the use of resources by the general public as well as tribal members. Potential effects on resources identified by the CSKT are outlined in the various resource sections in this document.

3.5.5.4 Regulatory/Forest Plan Consistency

The consultation process for all alternatives is consistent with all KFP direction and all other laws, regulations, and Executive Orders described in Section 3.5.1, *Regulatory Framework*. The KNF consulted with tribes when management activities may impact treaty rights or cultural sites and cultural use, according to the consultation protocol.

3.5.5.5 Irreversible and Irretrievable Commitments

The CSKT previously have stated their position that there would be irreversible and irretrievable impacts on nonrenewable cultural resources. The specific resources referred to have not been disclosed to date. No correspondence regarding the federal action considered in the SEIS has been received by the KNF from the CSKT.

3.6 Aquatic Life and Fisheries

This section describes changes to aquatic life and fisheries that may occur from the Project. Existing conditions described in Section 3.6.3, *Affected Environment*, were determined through surveys and review of existing data sources and used to develop effects analysis for the aquatic resources in each watershed. Effects on fish and other aquatic populations were assessed based on effects on habitat.

3.6.1 Regulatory Framework

Federal requirements under the Organic Administration Act, the Forest Service's Locatable Mineral Regulations (36 CFR 228 Subpart A), the National Forest Management Act, the Wilderness Act, tribal treaty rights, and the Montana Water Quality Act are described in the JFEIS. Because some alternatives may affect RHCAs, the JFEIS discussion of KFP direction regarding RHCAs is provided below. The ESA also is discussed in the following section.

The 1995 Inland Native Fish Strategy (INFS) was incorporated in the KFP. The concept of "priority watersheds" as described in INFS was refined in the KFP as a network of "conservation" and "restoration" watersheds. Accordingly, the KFP includes the desired condition that "conservation watersheds provide habitats that can support population strongholds of federally listed and sensitive species. Conditions in restoration subwatersheds improve to support population strongholds" (FW-DC-AQH-03). The conservation watersheds in the analysis area are upper Libby Creek, Rock Creek and its tributary East Fork Rock Creek, and the East Fork Bull River and its tributaries Placer Creek and Isabella Creek.

The KFP also established stream, wetland, and landslide-prone area protection zones called RHCAs. KFP standards and guidelines apply only to National Forest System lands. RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis. The KFP sets standards and guidelines for managing activities that potentially affect conditions within the RHCAs, and for activities outside of RHCAs that potentially degrade RHCAs. RHCAs are defined for four categories of streams or water bodies, depending on flow conditions and presence of fish, with different RHCA widths for each category (Table 318). The widths shown in Table 318 are minimum default widths. For fish-bearing streams, default RHCA buffers extend from the edge of both sides of the active stream channel to the outer edges of the 100-year floodplain, to the outer edge of the riparian vegetation, to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet, including both sides of the stream channel), whichever is greatest. Widths of RHCA buffers are based on current scientific literature that documents them to be adequate to protect streams from non-channelized sediment inputs

Table 318. RHCA Categories and Standard Widths.

Stream or Water Body Category	Standard Width
Fish-bearing streams	Minimum 300 feet each side of the stream
Perennial, non-fish-bearing streams	Minimum 150 feet each side of stream
Ponds, lakes, and wetlands greater than 1 acre	Minimum 150 feet from maximum pool elevation
Intermittent and seasonally flowing streams, wetlands less than 1 acre, landslides, and landslide-prone areas	Minimum 100 feet from edge

Source: USDA Forest Service 2015a.

(sediment produced from overland flow) and provide for other riparian functions. These riparian functions include delivery of organic matter, large woody debris recruitment, and stream shading. All four categories are represented by streams and water bodies in the analysis area.

In addition, INFS identifies riparian management objectives (RMOs) that guide management of key habitat variables for good fish habitat on National Forest System lands. The RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of riparian goals is measured. RMOs, as established by INFS standards and guidelines for forested streams, include pool frequency, large woody debris frequency, and width/depth ratio (Table 319). The definition of RMOs is consistent with the definition of "desired conditions" in the KFP rather than the definition of "objectives." Thus, the KFP defines the RMOs as "desired conditions." In addition to the RMOs shown in Table 319, INFS has a temperature RMO defined as "no measurable increase in maximum water temperature (7-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7-day period). Maximum water temperatures below 59°F within adult holding habitat and below 48°F within spawning and rearing habitats."

INFS recognizes that not every stream can attain every RMO. If the objective for an important feature such as pool frequency is met or exceeded, there may be some latitude in assessing the importance of the objectives for other features that contribute to good habitat conditions. For example, in headwater streams with an abundance of pools created by large boulders, fewer pieces of large wood might still constitute good habitat (USDA Forest Service 2015a).

Table 319. Riparian Management Objectives by Channel Width.

Wetted Width (ft)	Pool Frequency (per Mile)	Large Woody Debris per Mile	Width/Depth Ratio
10	96	>20 pieces	<10
20	56	>20 pieces	<10
25	47	>20 pieces	<10
50	26	>20 pieces	<10

Source: USDA Forest Service 2015a.

The KFP includes project- and site-specific standards and guidelines that apply to all RHCAs on National Forest System lands and to projects and activities outside RHCAs on National Forest System lands that have the potential to degrade RHCAs. The KFP requires that activities not retard or prevent the attainment of the RMOs. "For the purposes of analysis, to 'retard' would mean to slow the rate of recovery below the near natural rate of recovery if no additional human-caused disturbance was placed on the system. This obviously will require professional judgment and should be based on watershed analysis of local conditions" (USDA Forest Service 2015a). Section 3.6.4.6, *Regulatory/Forest Plan Consistency*, discusses compliance with the RMOs and the following RHCA standards and guidelines:

- Roads management (RF-1 through RF-5)
- Minerals management (MM-1, MM-2, MM-3, and MM-6)
- Lands (LH-3 and LH-4)
- General riparian area management (RA-2 through RA-4)
- Watershed and habitat restoration (WR-1 and WR-2)

- Fisheries and wildlife restoration (FW-1 and FW-4)
- FW-STD-RIP-03, which incorporates and clarifies the INFS
- Two additional riparian standards in the KFP, FW-STD-RIP-01 and FW-STD-RIP-02, which are designed to maintain or improve conditions where RHCAs are intact and functioning and promote a trend toward desired conditions where they are not intact and functioning

The KNF is required by the ESA to ensure that any actions it approves will not jeopardize the continued existence of a T&E species or result in the destruction or adverse modification of critical habitat. The KNF is also required to develop and carry out conservation programs for these species. The KNF will submit a BA for aquatic resources to the USFWS that evaluates the potential effect of the Project on T&E aquatic species, including measures the KNF identified as needed to minimize or compensate for effects. In its BA analysis and informal consultation with the USFWS, the KNF will also consider the programmatic *Biological Assessment on Road Related Activities That May Affect Bull Trout and Bull Trout Critical Habitat in Western Montana* (USFS and BLM 2014) and the associated Biological Opinion (USFWS 2015a).

Bull trout (*Salvelinus confluentus*) is currently listed as threatened under the ESA and occurs in the analysis area. The USFWS has designated bull trout critical habitat in the analysis area. Bull trout is discussed in Section 3.6.3.3, *Threatened and Endangered Fish Species*.

White sturgeon (*Acipenser transmontanus*) is currently listed as endangered and occurs in the Kootenai River. The white sturgeon is restricted to 168 miles of the Kootenai River between Cora Linn Dam in Canada and Kootenai Falls in Montana. All proposed activities are upstream of Kootenai Falls. The proposed activities would not affect white sturgeon or its habitat, and effects on this species are not discussed further.

3.6.2 Analysis Area and Methods

3.6.2.1 Analysis Area

The analysis area consists of the East Fork Bull River, East Fork Rock Creek, Rock Creek and Libby Creek to the US 2 bridge where dewatering the Libby Adit and drifts may reduce streamflow, the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access for grizzly bear mitigation. The methods for data collection and impact analysis are the same as described in the JFEIS. Streamflow, water quality, and aquatic habitat in Little Cherry, Poorman, and Ramsey Creeks would not be affected and are not discussed further. A transmission line would not be constructed, and fisheries and aquatic resources in the Fisher River and its tributary Sedlak Creek, West Fisher Creek and its tributary Standard Creek, Miller Creek, and Hunter Creek would not be affected.

3.6.2.2 Data Collection

3.6.2.2.1 Aquatic Habitat

MMC continued to collect aquatic data in 2016 and 2017 in accordance with the 2006 MPDES permit, the 2017 MPDES permit when it superseded the 2006 MPDES permit, and Operating Permit No. 00150 (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). In

addition, nighttime snorkel surveys and daytime underwater video were conducted in late fall 2017 of the upper East Fork Bull River in the vicinity of Placer Creek (Kline Environmental Research 2017). Streamflow conditions in the East Fork Bull River and Placer Creek were also reported during that time (Kline Environmental Research 2017).

3.6.2.2.2 Stream Temperatures

MMC collected hourly or twice-daily stream temperature data between 2005 and 2010 at aquatic monitoring sites in Libby, Ramsey, Poorman, and Little Cherry Creeks. Data from 2005 through 2007 were reported in the JFEIS (Kline Environmental Research 2007); data from 2008 through 2010 were submitted to the KNF (MMC 2018c) and are discussed in this section. Temperature data discussed in the SEIS are from sites L10, upstream of the Libby Adit; and L9, downstream of the Libby Adit. Data from L9 were collected from October 14, 2006, through October 18, 2008, and from August 5, 2009, through August 13, 2010. Data were collected from L10 from August 7, 2005, through October 18, 2008, and from August 5, 2009, through August 13, 2010 (Kline Environmental Research 2007; MMC 2018c).

In January 2008, MMC initiated discharging of treated adit water. Pumps generally operated on a 4- or 5-day basis pumping 8 to 10 hours per day. Pumping was halted and the Water Treatment Plant did not operate during the evenings and weekends. Later in the year, operation times extended to 7 days per week (day shift only). Pumping rates in the first two quarters were about 160 gpm and generally increased throughout the year to an average of 360 gpm.

MMC submitted temperature data to DEQ during the MPDES permitting process (Klepfer Mining Services 2015a). The data covered measured temperatures in Water Treatment Plant effluent and in Libby Creek at LB-200, upstream of the Water Treatment Plant outfalls; and at LB-300, downstream of the outfalls. The synoptic temperature measurements were taken between February 2014 and May 2015 (DEQ 2016c), and the effluent temperatures were taken between 2008 and 2013 (Klepfer Mining Services 2015a). MMC continues to monitor Water Treatment Plant effluent temperature. The effluent temperature is measured hourly at two ultrafiltration units before the water is sent to the discharge tank. From the discharge tank, water is sent to a distribution box and then discharged to a percolation pond (MPDES Outfall 001). Effluent temperatures discussed are from August 2008 through November 2017 and are the average of water at the two ultrafiltration units. In 2017, MMC discharged treated adit water 3 to 4 days each week at a rate of about 320 gpm. Outfall 001 discharges to groundwater at a percolation pond and not directly to Libby Creek.

3.6.2.3 Impact Analysis

3.6.2.3.1 Sediment

In support of the JFEIS, ERO prepared a memo describing an analysis of sediment delivery to streams from roads considered potential sediment sources and that would be used for the Montanore Project (ERO Resources Corp. 2015b). The analysis used the Water Erosion Prediction Project (WEPP) Forest Road Erosion Predictor Model. ERO updated the memo in 2017 (ERO Resources Corp. 2017b). The 2017 memo provided updated modeling results of estimated sediment delivery from roads as a result of changes in road use by the Evaluation Project and the Montanore Project. The 2017 memo supersedes ERO's 2015 memo. Data collection and analysis methods needed for the WEPP model are described by ERO (2017b).

3.6.2.3.2 Water Quantity

The quantitative analysis of flow-related habitat effects from the Project alternatives focuses on impacts on aquatic habitat for bull trout, the federally threatened species that occurs in the analysis area. Effects on other sensitive species (westslope cutthroat trout, interior redband trout, and western pearlshell) and macroinvertebrate communities are qualitatively assessed.

The quantitative analysis of effects on bull trout habitat is based on the methods used and described in the JFEIS. To assess habitat availability changes that would potentially occur for bull trout as a result of changes in low flows resulting from the Project, the KNF developed relationships between these parameters based on the USGS studies described in the JFEIS that indicated that for every 1 percent decrease in low flows, a corresponding 0.4 percent, 0.5 percent, and 1 percent decrease could be predicted to occur in adult, juvenile, and spawning bull trout habitat, respectively. While these relationships were not established using data specifically from analysis area streams, they were determined to be the best available method for the evaluation of aquatic habitat impacts on bull trout populations based on the information currently available.

The relationship between habitat availability and bull trout abundance is complex and reach specific (Al-Chokhachy et al. 2010), and factors such as substrate composition, species interactions, food availability, groundwater inputs, channel morphology, and stream temperatures can also significantly affect bull trout survival and reproduction (Montana Bull Trout Restoration Team 2000) but are not directly accounted for using these relationships. Based on this and a lack of studies supporting a direct linear relationship between bull trout abundance and habitat availability as estimated using PHABSIM or other related methods, the relationships derived in the BA were used to estimate the amount of habitat that would be predicted to be available under existing conditions compared to Alternative 3 rather than estimating direct loss of bull trout.

In 2012 in support of the JFEIS, ERO prepared a memo on an analysis of streamflow/wetted perimeter relationship at aquatic life impact assessment sites on the East Fork Bull River, East Fork Rock Creek, and Libby Creek in 2012 (ERO Resources Corp. 2012). ERO updated the memo in 2017 (ERO Resources Corp. 2017a). The 2017 memo provided some additional information regarding the analysis and updated the streamflows used in the analysis to be consistent with the SEIS. It also updated the estimates of changes in wetted perimeter for the Evaluation Project and will be used to support the BA. The 2017 memo replaced the 2012 memo. Additional data collection at RC-3 and EFBR-2 during low flows (proposed in the Appendix C Water Resources Monitoring Plan) would provide a more accurate estimate of the relationship between discharge and wetted perimeter. The reductions in wetted cross-sectional area predicted to occur as a result of the Project based on the data collected in 2012 from LB-2, RC-3, and EFBR-2 (Table 326) will also be assessed in the BA to determine whether the reductions indicate the same general trends in changes to habitat availability and passage as these relationships developed using the USGS data.

In 2016, MMC conducted wetted perimeter monitoring on East Fork Rock Creek at site RC-3 and the East Fork Bull River at site EFBR-2 with the objective of assessing flow depletion predicted by the numerical hydrological model on these stream systems (Klepfer Mining Services 2017a). The intent of the monitoring was to establish a relationship between stream flow and wetted perimeter. Three transects and a benchmark for elevation control were established for each site. The stream gradient at EFBR-2 was steeper, and several channels influenced water levels and the wetted perimeter. The steep gradient exacerbated the challenge of establishing a water level during low flows. The EFBR-2 site includes mostly large cobble to boulder substrate. The RC-3

site has a cobble substrate. These substrate materials are not ideal for establishing a consistent cross-sectional area for each transect. Water elevations vary because the larger cobbles separate the flow into individual channels within the transect. Under these conditions, the relationship between flow and wetted perimeter does not satisfy the assumptions of the flow measurement method used. Further, ongoing sampling has shown that significant substrate movement occurs between sampling events. For ongoing monitoring, MMC would consider modifications to the method to address the current limitations by relocating the station or adapting different techniques to measure flows and wetted perimeter. Any changes to the wetted perimeter monitoring method would require KNF's approval.

The impact assessment assumed that lower or higher habitat availability in Alternative 3 compared to existing conditions would result in adverse or beneficial impacts, respectively, on bull trout populations, and that a greater magnitude of change in habitat availability would result in correspondingly greater impact on the populations. Additionally, while changes to habitat availability were not quantified for redband trout, westslope cutthroat trout, and other fish species in the analysis area, lower flows were assumed to result in lower habitat availability for these species as well.

3.6.2.3.3 Water Quality

Projected changes in concentrations of water quality parameters during low-flow conditions were compared to existing water quality concentrations in Libby Creek in Section 3.13.4, *Environmental Consequences*, in the *Water Quality* section. Methods used in the mass balance analysis for prediction of water quality changes are discussed in Section 3.13.2.2.2, *Impact Analysis*. Information from these sections was used to qualitatively predict the effect of any such changes on the aquatic assemblages and habitat. The uncertainty and limitations associated with the water quality analysis were discussed in JFEIS Section 3.11.4.4.6, *Uncertainties Associated with Water Quality Analysis*. While the analysis results are expected to be representative of what would occur as a result of the Project, the uncertainty in the predicted changes to water quality also results in uncertainty in the qualitative interpretation of the effects of any changes in stream water quality on aquatic resources as a result of the Project. Surface water quality in the analysis area may be affected by reductions in groundwater contribution to streams, which could result in lower dissolved solids concentrations in these streams and lakes. If such a water quality change occurred, it would be detectable only during low-flow periods when bedrock groundwater is the major source of supply to surface water. Even at low flows, the changes in water quality may be difficult to measure.

In 1992, the BHES issued an Order authorizing degradation and establishing allowable changes in the quality of surface water and groundwater adjacent to the Montanore Project affected by the project (BHES 1992). The Order established a limit for total inorganic nitrogen (TIN) as 1.0 mg/L. The Order remains in effect for the operational life of the mine and as long as necessary thereafter. In issuing the Order, the BHES determined that a limit of 1 mg/L TIN would be protective of all beneficial uses (BHES 1992). In 2015, MMC requested that the general variance for both total nitrogen and total phosphorus be incorporated into the MPDES permit and indicated that the Water Treatment Plant design flow is less than 1.0 million gallons per day. DEQ did not grant a variance for total nitrogen in the 2017 MPDES permit (DEQ 2017b). Because total nitrogen would be the same as TIN expected in discharges, DEQ used the BHES Order limit for TIN of 1.0 mg/L in the development of a total nitrogen effluent limit in the 2017 MPDES permit (DEQ 2017a). DEQ set an interim total nitrogen effluent limit of 9.3 pounds per day between July

1 and September 30, which would be effective for the life of the Project. In the 2017 MPDES permit, DEQ determined that a variance for total phosphorus was not necessary because the facility did not show reasonable potential to violate this nutrient standard (DEQ 2017b).

3.6.3 Affected Environment

Updated information about fisheries and other aquatic life in East Fork Rock Creek, Rock Creek, and the East Fork Bull River is presented in this section. Except as described in this section, fisheries and other aquatic life that may be affected by Project activities are described in JFEIS Section 3.6.3, *Affected Environment*. Ongoing monitoring data collected since the JFEIS was issued include substrate/fine sediments, habitat, routine physical/chemical parameters, benthic macroinvertebrates, periphyton and benthic chlorophyll-a, salmonid populations, and metal bioaccumulation in fish tissues in Libby Creek, Poorman Creek, and Bear Creek. Monitoring data and trend analysis are available in the 2016 GDE monitoring report (Klepfer Mining Services 2017a) and the 2017 GDE monitoring report (MMC and Klepfer Mining Services 2018). Trends in fish populations and habitat quality over the past several years are described in the GDE monitoring reports. Updated information relevant to Project effects about fisheries and other aquatic life is described below.

Avista Corp. is funding ongoing fish trapping and monitoring activities in Rock Creek and the East Fork Bull River. Updated information relevant to Project effects about fisheries and other aquatic life from Avista monitoring also is described below.

3.6.3.1 Aquatic Habitat

Habitat surveys, including physical characterization of stream reaches, for Libby Creek and other creeks in the Libby Creek watershed were reported in the JFEIS. Libby Creek sites did not meet pool frequency and width-to-depth ratio RMOs, and some sites did not meet the large woody debris RMO. The causes of RMO nonattainment in Libby Creek include historical placer mining, historical timber harvest, road construction, and flooding caused by rain-on-snow events (USDA Forest Service and USFWS 2013). As the JFEIS reported, the analysis area is sometimes subjected to strong warm-frontal storms between November and mid-April that bring heavy rain, warm temperatures, and strong winds. Rain-on-snow events occur about every 6 years east of the Cabinet Mountain divide and every year on the west side of the Cabinet Mountains. Steep slopes in the middle and upper portions of many Cabinet Mountain drainages produce high bedload levels as a result of their flashy nature. In some cases, this bedload has been exacerbated by road construction and logging. These loads have exceeded the transport capacity of some streams, resulting in cobble and boulder dominated systems (USDA Forest Service and USFWS 2013). Pools in Libby Creek are affected by high peak flows from spring runoff and rain-on-snow events. These high flows coupled with high bedload and the relatively wide floodplains make pool creation and maintenance extremely difficult.

The KNF completed similar surveys in the Rock Creek drainage and East Fork Bull River in 2012; survey results were reported in the JFEIS (Kline Environmental Research and Savor Environmental Services 2012). The KNF assessed Rock Creek, East Fork Rock Creek, and the East Fork Bull River in a supplemental BA for the Rock Creek Project. Rock Creek is functioning appropriately for large pool frequency, width/depth ratio, and temperature and is functioning at risk for pool frequency and quality and large woody debris. East Fork Rock Creek is functioning appropriately for width/depth ratio and temperature and is functioning at risk for pool frequency and quality, large pool frequency, and large woody debris. The East Fork Bull River is

functioning appropriately for large woody debris, pool frequency and quality, large pool frequency, width/depth ratio, and temperature (USDA Forest Service 2017c). The causes of RMO nonattainment in Rock Creek and East Fork Rock Creek include historical timber harvest, road construction, and flooding caused by rain-on-snow events (Salmon Environmental Services 2012). The historical logging activities that removed riparian forest decreased the availability of large woody debris, particularly in mainstem Rock Creek. The loss of woody debris affects macroinvertebrate production, sediment sorting, spawning gravel retention, and the formation and stability of complex, large pools that provide important fish habitat, particularly during periods of high and low flows (Salmon Environmental Services 2012).

MMC continues to monitor aquatic habitat at seven stations: L1 (lower Libby Creek above Crazyman Creek), L2 (lower Libby Creek below Little Cherry Creek), L3 (middle Libby Creek between Poorman Creek and Little Cherry Creek), L9 (upper Libby Creek below the Libby Adit Site), L10 (upper Libby Creek above the Libby Adit Site), Po1 (lower Poorman Creek), and Be2 (middle Bear Creek above Bear Creek Road) (MMC and Klepfer Mining Services 2018). Habitat types at the seven stations have changed to varying degrees since monitoring began in 2006. Segments of station L1 are bedrock controlled and exhibit low variability in terms of habitat type and dimensions relative to other monitoring stations. Bedload movement has caused appreciable changes to some of the reaches within L1 since 2006, including the depths of some pools that are bedrock controlled laterally. Stations L2 and L3 have exhibited more habitat variability than the other Libby Creek stations due to bedload movement and a lack of riparian vegetation in some reaches. Stations L9 and L10 have exhibited the least amount of habitat variability of the seven stations. Most of station Be2 on Bear Creek displays relatively minor changes from year to year, with the exception of a side channel in the lower part of the reach, which can vary from having no flow to having a significant portion of the total streamflow during the August monitoring event. Station Po1 had significant bedload movement near the top of the reach, a major log jam in the middle of the reach, and a newly formed main channel (MMC and Klepfer Mining Services 2018).

3.6.3.2 Fisheries

3.6.3.2.1 Libby Creek Drainage Fish Populations

Fish surveys using snorkeling were conducted in 1,000-foot reaches beginning at the downstream end of stations L1, L3, L9, and Be2 during 2017 (MMC and Klepfer Mining Services 2018). Rainbow trout or rainbow trout hybrids (*Oncorhynchus* spp.) were consistently the most common fish taxon in each of the surveyed reaches, except Libby Creek station L9, which is above a permanent natural barrier to upstream fish movement. Bull trout were consistently more abundant at station L9 than at the other three reaches, followed by station Be2. Young-of-the-year salmonid counts have varied widely between reaches and years, and were abundant at stations L3 and L9 during the 2017 surveys compared to previous years. One brook trout was observed at station L1 during 2014, and what appeared to be a bull × brook trout hybrid was observed as station Be2 during 2016. These were the only brook trout observations in the monitoring reaches since 2009.

Before 2017, bull trout were the only fish species reported upstream of the natural barrier, including FWP electrofishing data. One *Oncorhynchus* species was reported at station L9 during 2017. Given the discrepancy between the snorkeling observation and the FWP electrofishing data, the presence of *Oncorhynchus* upstream of the falls will need to be confirmed through capture or photographic evidence in the future, or eventually dismissed if the species is not observed in the

next several years. It is possible that one or more *Oncorhynchus* could have been released upstream of the falls but failed to persist.

3.6.3.2.3 Lower Clark Fork River Drainage Fish Populations

Rock Creek Watershed Fish Populations and Genetics

During a 2015 survey of lower Rock Creek, the most to least abundant species in order were brook trout, westslope cutthroat trout, and bull trout. No rainbow trout were captured during 2015. Four bull × brook trout hybrids were collected and confirmed from Rock Creek during 2014 and 2015 (Moran and Storaasli 2016; DeHaan et al. 2016).

Salmonid habitat in Rock Creek is limited by extensive areas of stream channel that become dry during base streamflow conditions. During most years, a large area of seasonally dry or intermittent channel extends for about 4 miles from the mouth of Engle Creek to the vicinity of the confluence of the West Fork Rock Creek. This area of intermittency separates areas of the upper drainage (where bull trout and westslope cutthroat trout form the entirety of the assemblage) from lower areas (where brook trout are the most common species). Avista's 2015 fish surveys found that the lower segment of Rock Creek with perennial flow has an extremely low occurrence or absence of bull trout and an apparent shift from westslope cutthroat trout to brook trout as the dominant species (Moran and Storaasli 2016).

Bull trout spawning by migratory adults in lower Rock Creek has been limited and in a few instances appeared to be associated with the straying of upstream-transported adult bull trout (Hintz and Lockard 2006). It is unknown as to what extent this limited spawning contributed to juvenile bull trout abundance (Moran and Storaasli 2016). The impact of hybridization with brook trout on spawning was evident in the capture of three confirmed brook trout × bull trout hybrids in 2014 and of another confirmed hybrid captured by electrofishing during a 2015 survey (DeHaan et al. 2015, 2016).

The presence of downstream migrating juvenile bull trout, migratory-sized adult bull trout, the ongoing Avista upstream fish passage transport program, and genetic information from bull trout captured downstream of the Cabinet Gorge Dam provide evidence that migratory bull trout are present and functioning in the Rock Creek drainage (Moran and Storaasli 2016). In 2015, a total of 54 adult bull trout were captured downstream of Cabinet Gorge Dam in the Clark Fork River in Idaho. Based on genetic assignments or previous capture information, 39 of these fish were transported and released upstream in Montana. One of the 39 was released in Rock Creek (Bernall and Duffy 2016).

The principal area supporting bull trout in East Fork Rock Creek is from the confluence of the West Fork upstream to a cascade immediately downstream of Rock Creek Meadows. Redd surveys indicated that the majority of bull trout spawning occurs in this same reach. Moran and Storaasli (2016) summarized that naturally occurring seasonal intermittency during base streamflow limits the amount of available habitat, strands fish, and can restrict access to and from headwater areas by migratory bull trout. This intermittency also aids the species by limiting the establishment of nonnative salmonids. Fifteen years of monitoring data have shown variable but stable numbers of westslope cutthroat trout and bull trout in East Fork Rock Creek, with no established population of nonnative species.

East Fork Bull River Fish Populations and Genetics

The East Fork Bull River originates above St. Paul Lake in a basin containing St. Paul Peak and Elephant Peak (Figure 319). Outflow from the lake is through glacial gravels to the East Fork Bull River drainage. Two tributaries that join the East Fork Bull River within the CMW below St. Paul Lake are Isabella Creek and Placer Creek. Placer Creek drains a small watershed northeast of St. Paul Lake, and Isabella Creek drains a larger watershed north of Placer Creek. Isabella Lake is small and lies in a closed depression along the crest of the Cabinet Mountains. Isabella Lake has no defined stream channel from the lake to Isabella Creek. Isabella Creek and Isabella Lake are not occupied bull trout habitat and are not designated bull trout critical habitat.

Bull River headwaters streams have two known bull trout spawning reaches, with the majority of spawning occurring in the East Fork Bull River from the CMW boundary upstream to the confluence of Isabella Creek. Surveys of the lower East Fork Bull River conducted during 2014 found the following densities: bull trout (0.9 fish/100 meters), westslope cutthroat trout (11.2 fish/100 meters), brown trout (6.5 fish/100 meters), and brook trout (1.9 fish/100 meters) (Moran and Storaasli 2015). The proportion of nonnative salmonids decreases with distance upstream, approaching zero near North Fork East Fork Bull River, where westslope cutthroat trout and bull trout are the only salmonids (Storaasli and Moran 2011; Moran and Storaasli 2015).

Surveys indicate that the presence of bull trout in the East Fork Bull River ends somewhere between the vicinity of the Isabella Creek confluence, where bull trout redds have been observed, and below the Placer Creek confluence. A reach of the East Fork Bull River about 60 feet upstream of the Placer Creek confluence is a likely barrier to upstream movement of fish due to a steep gradient and numerous blockages. Fish habitat extends 1,030 feet above the fish barrier, possibly ending at an abrupt and substantial increase in gradient. A spring 1,090 feet above the upper extent of fish habitat was the upper extent of water in the East Fork Bull River during September 2017. Underwater video surveys conducted during 2017 captured images of 21 fish above the fish barrier, all of which were identifiable as or consistent with the appearance of cutthroat trout (Kline Environmental Research 2017). Underwater videos, nighttime snorkel surveys, and electrofishing reported only cutthroat trout in the vicinity of Placer Creek near the surface water monitoring site EFBR-300 (Young and McKelvey 2009; Kline Environmental Research 2017).

Available evidence indicates that Placer Creek supports cutthroat trout seasonally and no other fish species. Only cutthroat trout occur in the upper East Fork Bull River in the vicinity of Placer Creek (Young and McKelvey 2009; Kline Environmental Research 2017), suggesting that Placer Creek is not occupied bull trout habitat. In addition, the lower reach of Placer Creek is seasonally dry, as far as is visible from the East Fork Bull River, and is steep and boulder dominated (Kline and NewFields 2012; Kline Environmental Research 2017). USFWS's designated bull trout critical habitat extends up Placer Creek.

Bull trout are transported to and from the East Fork Bull River to mitigate for effects of the Cabinet Gorge Dam. In 2015, a total of 54 adult bull trout were captured downstream of the Cabinet Gorge Dam in the Clark Fork River in Idaho. Based on genetic assignments or previous capture information, 39 of these fish were transported and released upstream in Montana. Ten of the 39 were released in the East Fork Bull River (Bernall and Duffy 2016). The Tributary Trapping Transport Program was intended to develop and implement measures providing for the capture of juvenile bull trout from Montana tributaries with subsequent transport and release into the lower Clark Fork River in Idaho. Results from a bull trout parentage study in the East Fork

Bull River showed that of 923 juvenile bull trout captured from 2008 through 2010, 17.2 percent of these offspring assigned to at least one parent that had been transported upstream from below the Cabinet Gorge Dam (Bernall and Duffy 2012; DeHaan and Bernall 2013; McCubbins et al. 2012).

One bull × brook trout hybrid was collected and confirmed from the East Fork Bull River during 2015 (DeHaan et al. 2016). Electrofishing has been conducted annually along seven monitoring sections from 2002 through 2012, and since on an every-other-year basis, as a means to evaluate a nonnative fish suppression project. Comparison of 2014 nonnative salmonid indices to those of 2005 depicted reductions that averaged 69 percent for brown trout and 77 percent for brook trout (Moran and Storaasli 2015). Nonnative species continue to comprise sizeable proportions of total salmonid captures in fish traps and in the monitoring section downstream of the trapping site. This highlights the importance of fish trapping and removal of nonnatives for maintaining decreased densities of nonnatives and the degree of recolonization from the lower Bull River mainstem (Moran and Storaasli 2015).

The anticipated benefit to native salmonids of the suppression effort was not apparent in comparisons of 2014 indices to those of 2005, where indices averaged a decrease of 77 percent for bull trout and an increase of 1 percent for westslope cutthroat. This unanticipated outcome appeared to be largely due to decreased bull trout spawning input and perhaps an increased incidence of rain-on-snow events during the bull trout incubatory period. Even with this decline in juvenile bull trout indices, the range of density and biomass estimates for this species and for electrofishing totals show that the East Fork Bull River compares favorably to other area tributaries. A positive development observed in past monitoring was a larger-than-expected cohort of juvenile bull trout captured as two-year-olds outmigrating in 2010. Maturation of this cohort has contributed to a recent increase in adult bull trout transported to the East Fork Bull River, which in 2014 contributed to the highest number of bull trout redds observed in the previous 10 years. In light of this increase in bull trout spawning, and the ability to maintain a 70 percent reduction in nonnatives, continuation of less intensive suppression methods has been proposed (Moran and Storaasli 2015).

3.6.3.3 Threatened and Endangered Fish Species

In 2015, the USFWS issued a Recovery Plan for the Coterminous United States Population of Bull Trout (*Salvelinus confluentus*) (USFWS 2015b). The plan identified six recovery areas within the coterminous United States; the analysis area is in the Columbia Headwaters Recovery Unit. Within the Columbia Headwaters Recovery Unit, the USFWS identified 35 core areas, which contain local populations. Fifteen of the core areas are referred to as “complex” core areas because they represent spawning streams considered to host separate and largely unique genetically identifiable local populations. Twenty smaller core areas are represented by a single local population. To effectively manage the structure in the Columbia Headwaters Recovery Unit, the USFWS separated the core areas into five natural geographic units.

The following is the current hierarchy of units for the bull trout population in Libby Creek (USFWS 2015b):

- Columbia Headwaters Recovery Unit: One of six recovery units in the range of the species within the coterminous United States.
  - Kootenai Geographic Region: One of five geographic regions within the Columbia Headwaters Recovery Unit.

Kootenai River Core Area: One of two complex core areas within the Kootenai Geographic Region. The Kootenai Geographic Region also contains the simple Bull Lake core area.

Libby Creek: One of 8 local populations in the Kootenai River Core Area.

The following is the current hierarchy of units for the bull trout population in Rock Creek and the East Fork Bull River (USFWS 2015b):

Columbia Headwaters Recovery Unit: One of six recovery units in the range of the species within the coterminous United States.

Lower Clark Fork Geographic Region: One of five geographic regions within the Columbia Headwaters Recovery Unit.

Lake Pend Oreille (LPO) Core Area: One of two complex core areas within the Lower Clark Fork Geographic Region. Due to its systematic and jurisdictional complexity, the LPO core area is further broken out into three parts: LPO-A, LPO-B, and LPO-C.

LPO-A Core Area: Upstream of Cabinet Gorge Dam.

Rock Creek: One of 15 local populations in LPO-A.

East Fork Rock Creek: Tributary to Rock Creek.

Bull River: One of 15 local populations in LPO-A.

East Fork Bull River and Copper Gulch: Tributaries to Bull River.

Additional information about the subpopulation size, growth and survival, and genetic integrity of the bull trout population in Rock Creek, East Fork Rock Creek, and the East Fork Bull River is discussed in Section 3.6.3.2.3, *Lower Clark Fork River Drainage Fish Populations.*

3.6.3.4 Existing Watershed Conditions

3.6.3.4.1 Temperature

Kline data (Kline Environmental Research 2007; MMC 2018c) indicate that stream temperatures in Libby Creek, upstream of the Libby Adit (site L10) before discharges began, typically were the lowest in January (in the low 30s°F) and were highest in July or August (in the low to mid-50s°F). Stream temperatures in Libby Creek below the Libby Adit Site (site L9) typically were the lowest in January (in the low 30s°F) and were highest in July or August (at or below 51°F). Upstream site L10 had higher average maximum temperatures than site L9 in all months except January, October, and November. Both sites had narrower temperature ranges during the winter than in the summer and fall. Temperature ranges were wider at L10 than at L9. Average monthly temperatures at L10 were warmer than at L9 during July and August (Table 329). Temperatures at both sites were below 59°F throughout the year and were below 48°F beginning in the 2nd week of September. Seven-day average daily maximum temperatures typically occur in early August and ranged from 50.5°F in 2008 to 52.8°F in 2017. Available temperature data in upper Libby Creek are discussed in more detail in a technical memo (ERO Resources Corp. 2018a).

3.6.3.5 Data Adequacy

The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on aquatic life in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

Appendix C describes the additional aquatic life data that would be collected during the Project. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.6.4 Environmental Consequences

3.6.4.1 Alternative 1

In Alternative 1, any existing evaluation-related or data collection disturbances by MMC would be reclaimed in accordance with Operating Permit No. 00150. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed.

With no action, aquatic populations and stream habitat would remain unchanged from existing conditions. Productivity of fish and other aquatic life in analysis area streams would continue to be limited by past natural and human-caused adverse habitat changes, by naturally low nutrient concentrations, and by natural habitat limitations from climatic and geologic influences. Avista Corp. would continue to fund ongoing fish trapping and monitoring activities in Rock Creek and the East Fork Bull River.

Bull trout populations would continue to be marginal and the habitat in need of restoration work. They would be susceptible to decline or disappearance due to hybridization with introduced salmonids, competition with brook trout and other trout present in the analysis area, or land use disturbances. Redband trout and westslope cutthroat trout also would continue to be subject to population declines, mainly due to the threat of hybridization from introductions of nonnative salmonids. Improvements in habitat quality and productivity due to natural processes over time would potentially be adversely affected by the cumulative effects of continued forestry activities. Past, current, and future placer mining, continued recreational use, and other reasonably foreseeable actions would continue to affect fish populations.

3.6.4.2 Alternative 2

3.6.4.2.1 Water Quality and Water Quantity

The effects of discharges on water quality and streamflow (water quantity) in Alternative 2 on fisheries and other aquatic life would be similar to Alternative 3 and are discussed in Section 3.6.4.3, *Alternative 3*.

No geotechnical investigations would be conducted, and aquatic resources affected by those investigations would not occur. Alternative 2 would not affect RHCAs. MMC did not propose any access changes or improvements to Libby Creek Road and Upper Libby Creek Road, and negligible short-term sediment effects from these activities proposed in Alternatives 3 and 4 on bull trout in analysis area streams and on bull trout critical habitat in Libby Creek and East Fork Rock Creek watersheds would not occur. Long-term beneficial reduction in sediment delivery also would not occur. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 306 and sediment conditions would return to pre-Project conditions on the roads.

3.6.4.2.2 Threatened and Endangered Species

Alternative 2 would have no effect on bull trout and bull trout critical habitat. The effect of Water Treatment Plant discharges on stream temperatures and streamflow and the subsequent effect on bull trout would be the same as Alternative 3 and are discussed in Section 3.6.4.3, *Alternative 3*.

3.6.4.2.3 Forest Service Sensitive Species

Alternative 2 would have no impact on redband trout, westslope cutthroat trout, or western pearlshell. Alternative 2 would not affect streamflow or pure redband trout habitat in Little Cherry Creek. The effect of Water Treatment Plant discharges on stream temperatures and streamflow and the subsequent effect on sensitive species would be the same as Alternative 3. Streamflow reductions in East Fork Rock Creek, Rock Creek, and the East Fork Bull River are predicted to be negligible. Similarly, groundwater flow changes into Rock Lake are predicted to be negligible. Streamflow changes and effects on Rock Lake would have no impact on westslope cutthroat trout. The primary risk to both the redband and the westslope cutthroat populations would remain hybridization, which is unrelated to Project activities.

3.6.4.3 Alternative 3

3.6.4.3.1 Sediment

Project Activities

Effects on Riparian Habitat Conservation Areas

RHCAs are portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific guidelines under the KFP (USDA Forest Service 2015a). A literature review associated with the development of the INFS, which was incorporated into the KFP, concluded that non-channelized sediment flow rarely travels more than 300 feet, and that 200- to 300-foot riparian buffers are generally effective at protecting streams by preventing sediment movement via non-channelized overland flow (Belt et al. 1992). Except for a 185-foot section of a proposed new access road, all new access roads and drill pads would be outside of an RHCA. Except for this one location, sediment from roads, culvert outlets, or other types of cross drains, all of which would be more than 300 feet from a stream channel, would not reach a stream, based on research cited by Belt et al. (1992) and Dubé et al. (2004). The unavoidable construction of a new access road through a RHCA would be west of Little Cherry Loop Road and would affect 0.09 acre of one RHCA. The RHCA is between two isolated wetlands. Isolated wetlands are not connected by surface flow to jurisdictional waters of the U.S. or to state waters. The location where the RHCA would be crossed is relatively flat. Implementation of BMPs would minimize or avoid sediment delivery to the adjacent wetlands; sediment delivery to a stream would be avoided. It is unlikely that any sediment that did reach the adjacent wetlands would reach Libby Creek or Poorman Creek, the nearest fish-bearing streams.

MMC would use roads currently gated, barriered, or impassable to access drill locations. Except for one segment of each of two roads (roads #1408 and #6212H), all existing roads proposed for use would avoid and would not intersect an RHCA. Both RHCAs that would be crossed are adjacent to a non-fish-bearing tributary of Libby Creek (Drainage 10). During a 2012 survey, Drainage 10 was unchannelized across a flat area leading to two culverts under road #1408. The flow dispersed and infiltrated in this flat area and did not always reach the culverts. In 2001, Drainage 10 had surface flow to Libby Creek below the culvert only in April (Kline Environmental Research 2012). Geotechnical investigations would be conducted between June 16 and

October 14. Use of NFS roads #1408 and #6212H would not increase sediment delivery to fish-bearing streams and would not affect any aquatic life.

Increased traffic on unpaved roads can generate or expose fine, easily detached sediment; prevent plant growth on road surfaces; and form ruts to channelize water on the road surface (Elliot et al. 1999). Traffic use would be high for a very short period on any individual road used for the geotechnical investigations, likely a month or less. 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) and the BMP requirements in the stormwater discharge permit. BMPs described would be implemented to minimize sediment delivery. It is unlikely that any sediment that did reach Drainage 10 would reach Libby Creek, the nearest fish-bearing stream.

Access changes on 742.3 acres of mitigation lands may allow the reestablishment of RHCAs along mitigation land roads.

Effects of Access Road Use

MMC would use Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) for year-round access to the Libby Adit Site. The KNF identified six locations where Libby Creek Road crosses or intercepts a RHCA. The WEPP:Road Batch model predicted an existing average annual sediment load of 128 pounds leaving the buffer at the six assessed crossings (Table 332). MMC would reduce the contributing road surface lengths at the six crossings to 150 feet where the existing lengths were currently greater than 150 feet. The model predicted this mitigation would reduce the average annual sediment leaving the buffer to 87 pounds, a 32 percent reduction from existing conditions. This activity would be implemented before implementing the BMPs shown in Table 311.

MMC would implement the BMPs shown in Table 311 in Chapter 2, such as installing, replacing, or upgrading culverts, to bring NFS road #231 up to KFP standards and guidelines and Forest Service guidance (USDA Forest Service 2008, 2015a). Brief effects (2 days or less) of these mitigations would be increased turbidity and sediment concentrations downstream of the activity during implementation. Placing straw bales in the stream below the construction area would significantly reduce sediment concentrations in the stream below the bales (Foltz et al. 2008). One potential BMP to prevent brief turbidity and sediment concentration increases, if practicable, would be to route stream water around the construction area until completion (Wegner 1999). When completing instream work within 0.25 mile of a bull trout occupied stream, MMC would place straw bales in the stream where practicable, minimize the duration of instream work to the extent practicable, and conduct all instream work between July 15 and September 1. Work could be completed outside of that period if it could be implemented in a dry portion of the stream channel and all other potential impacts were fully mitigated. Longer-term effects on the streams would be beneficial. Fine sediment in streams below mitigation sites has been shown to decrease, spawning areas have been shown to increase, and monitoring of instream aquatic macroinvertebrate communities for several years after culvert removals showed increases in their populations and number of species (Wegner 1999). The road improvements would reduce sediment and improve aquatic habitat in Libby Creek and Hoodoo Creek.

Effects of Road Access Changes

In Alternatives 3 and 4, MMC would implement or fund yearlong access changes on National Forest System and private roads before the Project (Table 309 and Table 310 in Chapter 2). The roads with access changes would be covered by a Road Management Plan. The plan would describe requirements for pre-, during-, and post-storm inspections and maintenance; implementation and effectiveness monitoring plans for road stability, drainage, and erosion control; and mitigation plans for road failures.

Three mitigation roads, which are currently open and assumed to have low traffic use, would be barriered with an earthen berm and traffic use eliminated. These roads were assessed using the WEPP model. The model predicted that closing NFS roads #4776A, #4778C, and #14458 for mitigation before the Project would reduce the average annual sediment leaving the buffers from 298 pounds to 204 pounds, a 32 percent reduction from existing conditions (Table 333). The road access changes would reduce sediment and improve aquatic habitat in Libby Creek and Midas Creek or their tributaries.

MMC would transfer fee title to or place a conservation easement on 742.3 acres of private land and change access on roads listed in Table 310. Roads would be monitored for stability, drainage, and erosion control. In accordance with KFP guideline FW-GDL-WTR-02, hydrologic stability would be ensured before storing or decommissioning roads. The removal of stream crossing structures on barriered roads would occur prior to barrier construction so as to avoid future adverse effects on streams. The need for culvert removals to avoid culvert failure and stream effects that would result from failures on barriered roads would be determined before barrier construction. Negligible and short-term (2 days or less) sediment increases may occur in Big Cherry Creek, Bear Creek, Cable Creek, Midas Creek, Poorman Creek, Trail Creek, and East Fork Rock Creek if instream work was conducted in these drainages. BMPs described in the previous section would be implemented where instream work was conducted.

Permitting, Mitigation, and Monitoring

Proposed instream activities could be subject to three permitting processes: (1) a MPDES permit or a 318 authorization if the instream activities were not covered by a MPDES permit, (2) a 310 permit, and/or (3) a 404 permit. MMC submitted a final SWPPP in 2017 (MMC 2017a). The SWPPP describes stormwater management at the Libby Adit Site, BMPs, control measures, and monitoring procedures that would ensure compliance with the terms and conditions of its MPDES permit. The SWPPP addressed stormwater runoff from the Libby Adit Site. Sediment and runoff from the site would continue to be minimized. MMC would update the SWPPP to cover all permitted discharges. The SWPPP would describe and locate all structural and non-structural BMPs implemented at the site to minimize erosion and sediment transport.

Installation, replacement, or upgrades of culverts, bridges, or other structures at perennial stream crossings would be completed in accordance with a 310 permit after on-site inspections with DEQ, the Forest Service, FWP, landowners, and the local conservation district. Installation or removal of culverts or other structures in a water of the U.S. would be in accordance with DEQ 318 authorization conditions, or MPDES permit conditions if the activity was covered by a MPDES permit. MMC may request and DEQ may approve a 318 authorization for short-term increases in turbidity and total suspended solids discussed on p. 171. All installations or removals of culverts or other structures in a water of the U.S., if they resulted in a discharge of fill, would

be in accordance with the Corps' 404 permit conditions and with DEQ 318 authorization conditions or MPDES permit conditions if the activity was covered by a MPDES permit.

Monitoring of BMPs would be completed in accordance with one or more of the possible required permits or authorizations. Section C.7, *Aquatic Biology*, in Appendix C discusses the required instream monitoring. The monitoring would increase the effectiveness of stormwater and sediment controls. Sediment (as percent fines) would be monitored within the Libby Creek drainage to detect any potential sediment increases. Sediment sampling would occur at a station on Libby Creek downstream of the Little Cherry Creek confluence. Based on the sampling schedule, any increases in sediment within the Libby Creek watershed would be detected promptly, allowing for corrective actions and remediation.

Effects Summary

It is anticipated that the levels of sediment generated through Alternative 3 would be small, if any, in volume and duration based on implementation of the BMPs and design features of the Project activities. Any introduction of limited amounts of additional small gravels and fine sediment would likely have few if any effects on macroinvertebrate and fish populations, and annual snowmelt runoff would likely flush any accumulation of fine sediments downstream each spring. MMC's point source and nonpoint source discharges containing sediment would be a small contribution to the estimated existing sediment load and the estimated future sediment load in the upper Libby Creek watershed (JFEIS Table 123). These factors make it unlikely that effects from Alternative 3 would result in detectable adverse changes in existing levels of sediment, quality of fish habitat, or sustainability of aquatic populations over the long term. MMC would monitor all discharges to surface water for sediment, report sediment concentrations to DEQ monthly (see Appendix C) and implement corrective measures for any failures of the sediment BMPs.

Libby Adit Site Closure and Reclamation of Geotechnical Investigation Disturbances

All BMPs would be monitored throughout the Project (see Appendix C) and remain in place until DEQ approved MMC's Notice of Termination. MMC could submit a Notice of Termination when the disturbance associated with the construction activity had achieved final stabilization. Final stabilization means the time at which all soil-disturbing activities at a site have been completed and a vegetative cover has been established with a density of at least 70 percent of the pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed. Final stabilization using vegetation must be accomplished using seeding mixtures or forbs, grasses, and shrubs that are adapted to the conditions of the site and consistent with the KNF-approved 2018 seed mix (Savage 2018). Establishment of a vegetative cover capable of providing erosion control equivalent to preexisting conditions at the site would be considered final stabilization. After the Libby Adit Site and geotechnical investigation disturbances were reclaimed, sediment delivery would return to existing conditions within an estimated 4 to 5 years. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 309 and sediment conditions would return to pre-Project conditions on the roads.

3.6.4.3.2 Water Quantity

Project Activities

East Side Streams

The analysis of effects on aquatic life from changes to water quantity in Alternative 3 used the same approach as that used in the JFEIS. The KNF used data from USGS studies (Maret et al. 2005, 2006; Sutton and Morris 2004, 2005) to establish passage criteria for adult migratory bull trout in riffle areas that could be applied to analysis area streams. It also used these data to evaluate the relationship between habitat availability and flow for bull trout at different discharges to assess possible impacts on bull trout populations as a result of the changes in low flows projected to occur in Alternative 3.

The criteria used to determine whether decreases in low flows would result in restrictions on adult migratory bull trout passage were a minimum depth of 0.6 feet for at least 25 percent of the stream width, with 10 percent of this stream width of at least this minimum depth being contiguous habitat. Upstream of the Water Treatment Plant discharges, streamflow and habitat availability would not be affected. Flows in the reaches of Libby Creek downstream of the Water Treatment Plant discharges are predicted to increase under all alternatives, which could increase the likelihood of bull trout being capable of moving into and out of this reach or the period in which they could do so. Water Treatment Plant discharges would continue to increase flows downstream of LB-300, which would lessen farther downstream near the Bear Creek confluence. These discharges would increase available adult, juvenile, and spawning habitat within a small portion of the Libby Creek reach used by the resident bull trout population (Table 320). Predicted changes may be greater than shown in Table 320 for a 3- to 4-week period if MMC discharged at rates up to 500 gpm during initial adit dewatering. Predicted changes would be less if the average annual discharge was less than the 365 gpm used in the analysis. While the resident bull trout population is limited in distribution to the portion of Libby Creek above Libby Falls, the increased flows and corresponding habitat availability would continue for some distance downstream, with smaller increases estimated to occur further downstream. These increases would benefit the bull trout and other fish species in this section of Libby Creek, including the redband trout population. Higher flows resulting from the Water Treatment Plant discharges would continue to increase the depth of the pool habitat and provide more thermal refuge areas for salmonids and other fish during the times of year when flows are lowest. Macroinvertebrate populations may also be beneficially affected, as the increased flow would result in greater wetted perimeter and thus potential habitat in the affected reaches of Libby Creek.

West Side Streams and Lakes

Habitat changes in west side streams would be minimal (Table 320) and would not affect habitat availability. For all stream reaches likely to be affected by decreased water quantity during low flows, the existing $7Q_{10}$ flows ($7Q_{10}$ flow is defined as the lowest streamflow averaged over 7 consecutive days that occurs, on average, once every 10 years) were determined to be unlikely to allow passage by adult migratory bull trout through riffle habitat based on the minimum depth criteria and habitat data from the analysis area streams. Therefore, under all action alternatives, these reaches would continue to potentially act as low-flow barriers to adult migratory bull trout. Changes in Rock Lake levels would be negligible, and any effect on aquatic habitat and populations would be minimal. St. Paul Lake would not be affected.

Table 320. Estimated Impacts on Bull Trout Habitat Availability, All Alternatives.

Stream Site Location	Percent Change in Habitat Availability at Low Flow		
	Adult	Juvenile	Spawning
Libby Creek Watershed			
LB-100	0	0	0
LB-300	+10	+13	+26
LB-2	+4	+5	+9
LB-2000	+4	+5	+9
Rock Creek Watershed			
RC-3	>-1%	>-1%	>-1%
RC-2000	>-1%	>-1%	>-1%
East Fork Bull River Watershed			
EFBR-2	0	0	0
EFBR-500	0	0	0
EFBR Near Mouth	>-1%	>-1%	>-1%

">-1%" = percent change is between 0 and -1%
Site locations are shown on Figure 319.

Libby Adit Site Closure and Reclamation of Geotechnical Investigation Disturbances

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. If needed, a third plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. After the adit was plugged, Water Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. If an additional plug was needed and installed to minimize post-closure effects, the time to fill the adit and drifts would be about half of what it was with two plugs. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. Aquatic habitat in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. Aquatic habitat in Rock Lake also would return to existing conditions.

3.6.4.3.3 Water Quality—Nutrients, Metals, and Temperature

Project Activities

The surface waters of the Libby Creek watershed have generally low nitrate+nitrite, ammonia, and phosphorus concentrations. Low nutrient concentrations contribute to limited aquatic productivity. Alternative 3 would not affect the existing water quality in Libby Creek upstream of LB-300 and would have no effect on aquatic life upstream of LB-300 due to changes in water quality. All inflows into the adit and drifts would be treated at the Water Treatment Plant and discharged to groundwater at MPDES permitted Outfall 001. Discharges would meet MPDES

permitted effluent limits designed to meet aquatic life standards, BHES Order limits, and nondegradation limits at the end of the mixing zone in Libby Creek (Table 331).

The mass balance analysis completed to evaluate effects on water quality predicted increases in nitrate, ammonia, total nitrogen, and total phosphorus above ambient concentrations during periods of low flow in Libby Creek downstream of the discharge at LB-300 (Table 331; Appendix G). DEQ determined that the discharge did not currently demonstrate reasonable potential to violate the total phosphorus numeric nutrient standard. Consequently, DEQ did not set an effluent limit for total phosphorus in the MPDES permit. Although phosphorus concentrations are predicted to increase above ambient concentrations, phosphorus concentrations are predicted to remain below the total phosphorus aquatic life standard of 0.025 mg/L (Table 331; Appendix G).

TIN and total nitrogen concentrations in Libby Creek downstream of the percolation pond would increase over ambient conditions but remain less than the 1.0 mg/L limit set in the BHES Order. In the mass balance analysis, the KNF used the interim total nitrogen effluent limit of 9.3 pounds per day to determine the Water Treatment Plant effluent concentration. An estimated effluent concentration of 1.5 mg/L was based on a discharge rate of 500 gpm used in the mass balance analyses. Because the interim total nitrogen effluent limit is a daily load (9.3 pounds) applicable between July 1 and September 30, the effluent concentration could increase with a reduced discharge rate. Regardless of the effluent concentration or discharge rate, a daily load limit of 9.3 pounds would result in total nitrogen concentrations less than the 1.0 mg/L limit set for TIN in the BHES Order.

Effluent total nitrogen concentrations also could be higher between October 1 and June 30. The BHES Order limit for TIN and nitrate+nitrite would be applicable year-round. Higher total nitrogen concentrations between October 1 and June 30 would not lead to nuisance algal growth. Low temperatures in winter and high-flow events during spring runoff tend to mute the local effects of eutrophication. Plant growth slows dramatically in the fall and winter, and spring high-flow events prevent nuisance algal mats from developing (Suplee et al. 2008).

Increases in algal growth may not occur in response to an increased total nitrogen concentration because phosphorus concentrations may limit algal growth when nitrogen is already present in surplus supply (Allan 1995; Steinman and Mulholland 1996). Co-limitation is also common in flowing waters, with additions of both total nitrogen and total phosphorus resulting in increases in algal growth of a larger magnitude than either nutrient separately (Suplee and Watson 2013). Other factors such as light, temperature, and length of the growing season can be important factors determining algal growth (Suplee et al. 2008; Lewis and McCutchan 2010). In streams with heavy canopy cover, systems become “light limited” and can attenuate algal growth, and elevation often controls stream temperature and length of the growing season in unpolluted or minimally polluted streams. High-flow events can also affect algal growth by scouring algae from the streambed by high stream velocities alone or in combination with bedload movement. The effects of scouring depend on the timing, magnitude, and frequency of the high-flow event (Suplee et al. 2008). Total nitrogen and total phosphorus concentrations can also vary seasonally based on stream discharge or the proportion of groundwater discharge contributing to streamflow, and can increase following storm events (Suplee and Watson 2013). How these site-specific factors would combine with nutrient concentrations to affect algal assemblages in stream reaches in the analysis area has not been quantified. If significant increases in algal growth occurred as a result of Project activities, dissolved oxygen concentrations could decrease in streams as a response, particularly during early fall low-flow periods, and aquatic life would be adversely

affected. Increased algal growth may also result in higher instream pH values, but it is difficult to determine whether the pH standard would be exceeded due to instream factors such as chemical buffering and re-aeration rates (Suplee, pers. comm. 2014).

The BHES Order discussed protection of beneficial uses. On page 5, the Order states "surface water and groundwater monitoring, including biological monitoring, as determined necessary by the Department [DEQ], will be required to ensure that the allowed levels are not exceeded and that beneficial uses are not impaired." Further, on page 7, the Order indicates that the limit of 1.0 mg/L for TIN "should adequately protect existing beneficial uses. However, biological monitoring is necessary to insure protection of beneficial uses and to assure compliance with…applicable standards." The applicable standards include the existing narrative standard prohibiting undesirable aquatic life, such as nuisance algal growth. According to the reopener provisions of MPDES permits described in ARM 17.30.1361(2)(b), permits may be modified when "the department [DEQ] receives new information that was not available at the time of permit issuance…[which] includes any significant information derived from effluent testing after issuance of the permit." The specific reopener provisions included in MMC's MPDES permit are consistent with the various provisions of ARM 17.30.1361 (DEQ 2016c). Consequently, the effluent limits in the MPDES permit could be modified if MMC's discharge created conditions that produced undesirable aquatic life (ARM 17.30.637(1)(e)). To address the uncertainty regarding the response of area streams to increased nutrient concentrations, MMC would implement the water quality and aquatic biology monitoring described in Appendix C. These plans include monitoring for periphyton and chlorophyll-a monthly between July and September. The KNF would continue to rely on DEQ to issue and enforce a valid MPDES permit.

Increases in stream temperature could occur as a result of Water Treatment Plant discharges to groundwater, riparian disturbance, and decreased groundwater inflow to streams. Water Treatment Plant effluent temperature averaged 56.5°F based on the 2,052 samples taken daily between March 2008 and December 2017. The monthly average over the period did not vary by more than 1°F. All of the average effluent temperatures at the two ultrafiltration units were less than 59°F. Maximum effluent temperature was 58.1°F from December through February and 58.6°F from July through September (ERO Resources Corp. 2018a).

The KNF analyzed available data from 2007 through 2017 on effluent discharge rates and temperature, stream temperatures and flow, and air temperatures near the Water Treatment Plant discharges at the Libby Adit Site (ERO Resources Corp. 2018a). The effect that Water Treatment Plant groundwater discharges had on temperature differences of more than 1°F between a site upstream of the discharge and a site downstream of the discharge appears to be negligible and would continue to be negligible during the Project. Libby Creek stream temperature differences between sites upstream of the Water Treatment Plant groundwater discharges and downstream of those discharges appear to be influenced by a variety of factors including streamflow and air temperatures. Poole and Berman (2001) noted that interactions between external drivers of stream temperature (groundwater temperature and discharge, local weather, and solar angle) and the stream's physical structure (channel and floodplain morphology, riparian vegetation structure, and the alluvial aquifer stratigraphy) determine channel water temperature. Because of factors besides MMC's discharge that influence stream temperatures, the difference between the temperatures of the upstream and downstream Libby Creek sites during Water Treatment Plant discharges is not a useful surrogate for the potential effect of discharges on stream temperatures. The MPDES permit requires MMC to monitor and report the temperature of Libby Creek at LB-200 (upstream of the Libby Adit) and LB-300 (downstream of the Libby Adit) as well as the temperature of the

effluent. DEQ will use the monitoring data to evaluate the need, if any, for a temperature limit in a future MPDES permit action (DEQ 2016c). MMC would use Outfall 001 for all discharges from the Libby Adit Site in Alternative 3. Outfall 002 would be covered by expanding the waste rock storage area, and MMC has no plans to develop an infiltration gallery at the site (MMC 2017d). A direct discharge to Libby Creek (Outfall 003) has not been constructed (EPA 2003; MMC 2009b). MMC has no plans to install a pipe from the percolation pond to Libby Creek during the Project, and Outfall 003 could not be used unless a pipe was installed between the pond and Libby Creek (MMC 2017d).

Any stormwater-related discharges in the geotechnical investigation area would have similar temperatures as the precipitation flowing to the receiving water. Clearing of 185 feet of a RHCA in the geotechnical investigation area would have a negligible effect on the temperature of an unnamed tributary of Libby Creek. Small changes in baseflow or Rock Lake inflow would not affect water quality or aquatic habitat in any stream or Rock Lake.

The KNF disclosed the risk and potential effects of water collection and treatment system failure in the JFEIS (ERO Resources Corp. 2015a). During the Project, MMC would not operate a pumpback well system discussed in the JFEIS and in the ERO memo (2015a). MMC would use the Water Treatment Plant to treat all discharges from the Libby Adit Site. The only plausible Water Treatment Plant failure scenario for which credible scientific evidence exists is a short-term failure of the Water Treatment Plant to operate as designed (ERO Resources Corp. 2015a). The MPDES permit requires weekly sampling and analysis of some parameters and monthly sampling and analysis for metals. Because of the monthly sampling, unrecognized failure of the Water Treatment Plant to operate as designed would not last longer than 1 month. The KNF concluded that two other scenarios—discharge of untreated water because of a loss of all power and discharge of untreated water because of inadequate capacity—are not supported by credible scientific evidence (ERO Resources Corp. 2015a). In the event of a prolonged power outage or equipment failure, the predicted concentrations of all metals in Libby Creek would be below acute and chronic aquatic life standards. Total nitrogen and phosphorus standards in Libby Creek also are predicted not to be exceeded (ERO Resources Corp. 2015a).

Libby Adit Site Closure and Reclamation of Geotechnical Investigation Disturbances

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. If needed, a third plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates that installing a third plug would ensure that water quality and aquatic habitat in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. The KNF also expects that installing a third plug would ensure that groundwater discharge into Rock Lake and Rock Lake water quality and aquatic habitat also would return to existing conditions.

3.6.4.3.4 Metals in Fish

Any increased metal concentrations in surface water would potentially increase metal concentrations in fish. All metal concentrations in Libby Creek would be estimated to remain

below the acute and chronic criteria for aquatic life, including the chronic aquatic life standard for manganese adopted in Colorado. Changes in metal concentrations in fish within the Libby Creek above LB-300, the East Fork Bull River, and the East Fork Rock Creek drainages are not predicted in any alternative. After the Libby Adit was plugged, discharges from the Water Treatment Plant would cease, and the risk of increased metal concentrations in fish would return to existing conditions.

3.6.4.3.5 Fish Passage and Fish Loss

The effects on bull trout passage due to changes in low flows were discussed in Section 3.6.4.3.2, *Water Quantity*.

3.6.4.3.6 Riparian Management Objectives

The KFP incorporates INFS, which has RMOs that guide management of key habitat variables for good fish habitat on National Forest System lands. The four RMOs applicable to Project activities that would affect forested streams are for large woody debris, pool frequency, stream width/depth ratio, and average daily maximum water temperature (Table 319). The effects of Project activities on attaining these four RMOs are discussed in the following sections. The described effects are based on prior sections, such as Section 3.6.4.3.1, *Sediment*, Section 3.6.4.3.2, *Water Quantity*, and Section 3.6.4.3.3, *Water Quality—Nutrients, Metals, and Temperature*.

East Side Streams. The Project would not retard or prevent the attainment of any applicable RMO in the Libby Creek or Big Cherry Creek watersheds. The Project would have no effect on large woody debris in Libby Creek. The Project also would cause no measurable increase in the 7-day average daily maximum water temperature in Libby Creek. Libby Creek stream temperature differences between sites upstream of the Water Treatment Plant groundwater discharges and downstream of those discharges appear to be influenced by a variety of factors including streamflow and air temperatures (ERO Resources Corp. 2018a). The MPDES permit requires MMC to monitor and report the temperature of Libby Creek at LB-200 (upstream of the Libby Adit) and LB-300 (downstream of the Libby Adit) as well as the temperature of the effluent. DEQ will use the monitoring data to evaluate the need, if any, for a temperature limit in a future MPDES permit action (DEQ 2016c). There may be negligible and short-term (2 days) sediment increases in Big Cherry Creek, Bear Creek, Cable Creek, Midas Creek, and Poorman Creek if instream work was conducted in these drainages. Minor increases in Libby Creek streamflow below the Libby Adit Site would have minor beneficial effects on the width/depth ratio and on pool frequency. The increased habitat availability during low-flow conditions downstream of the Water Treatment Plant discharge to Libby Creek would be a minor beneficial effect. Project effects, including possible sediment effects, may affect and are not likely to adversely affect bull trout or critical habitat in east side streams. Low streamflow is not a cause of or a contribution to RMO nonattainment in Libby Creek. The causes of RMO nonattainment in Libby Creek, described in Section 3.6.3.1, *Aquatic Habitat*, would remain and would not be affected by the Project.

West Side Streams. The Project would not retard or prevent the attainment of any applicable RMO in Rock Creek, East Fork Rock Creek, or the East Fork Bull River. The Project would have no effect on large woody debris in Rock Creek, East Fork Rock Creek, or the East Fork Bull River. Effects of sediment would be limited to construction of an earthen barrier to replace an existing gate on NFS road #150A, an activity that would have no effect on RMO attainment. The negligible reduction in streamflow also would cause no measurable increase in the 7-day average

daily maximum water temperature and no measurable effect on the width/depth ratio or on pool frequency in Rock Creek, East Fork Rock Creek, or the East Fork Bull River. Streamflow reductions in East Fork Rock Creek, Rock Creek, and the East Fork Bull River are predicted to be negligible, which would have a negligible effect on bull trout and bull trout critical habitat. Streamflow would return to existing conditions within 5 years after the Libby Adit was plugged. Project effects, including possible sediment effects, may affect and are not likely to adversely affect bull trout or critical habitat in west side streams. Low streamflow is not a cause of or a contribution to RMO nonattainment in Rock Creek, East Fork Rock Creek, or the East Fork Bull River. The causes of RMO nonattainment in Rock Creek and East Fork Rock Creek, described in Section 3.6.3.1, *Aquatic Habitat*, and RMO attainment in the East Fork Bull River would remain and would not be affected by the Project.

3.6.4.3.7 Threatened and Endangered Species

Kootenai River Core Area

The effects of Alternative 3 on bull trout and bull trout occupied or critical habitat in the Kootenai River Core Area would include long-term reductions in sediment delivery to Libby Creek and Midas Creek, negligible temperature and water quality changes associated with the Water Treatment Plant discharge to groundwater adjacent to Libby Creek, and increased habitat availability in the same reach during low-flow conditions due to increased streamflow.

There may be negligible and short-term (2 days) sediment increases in Big Cherry Creek, Bear Creek, Cable Creek, Midas Creek, and Poorman Creek if instream work was conducted in these drainages. Possible removal of road crossings on Midas Creek and Cable Creek and streamflow increases downstream of the Water Treatment Plant discharge in Libby Creek may improve fish passage. None of the predicted effects would change baseline conditions. Alternative 3 may affect and is not likely to adversely affect bull trout or critical habitat in the Kootenai River Core Area.

Lake Pend Oreille Core Area

The effects of Alternative 3 on bull trout and bull trout occupied or critical habitat in the Lake Pend Oreille Core Area would include possible negligible and short-term (2 days) increases in sediment in East Fork Rock Creek and negligible and temporary reductions in streamflow and associated negligible changes in total dissolved solids concentrations and temperature in East Fork Rock Creek, Rock Creek, the East Fork Bull River, and the lower Bull River. None of the predicted effects would change baseline conditions. Alternative 3 may affect and is not likely to adversely affect bull trout or critical habitat in the Lake Pend Oreille Core Area.

In terms of the RMOs, the Project would have no effect on large woody debris in Rock Creek, East Fork Rock Creek, or the East Fork Bull River. The negligible reduction in streamflow also would cause no measurable increase in the 7-day average daily maximum water temperature and no effect on the width/depth ratio or on pool frequency in Rock Creek, East Fork Rock Creek, or the East Fork Bull River. Streamflow reductions in East Fork Rock Creek, Rock Creek, and the East Fork Bull River are predicted to be negligible and would have a negligible effect on bull trout and bull trout critical habitat. Streamflow would return to existing conditions within 5 years after the Libby Adit was plugged. Low streamflow is not a cause of or a contribution to RMO nonattainment in Rock Creek, East Fork Rock Creek, or the East Fork Bull River. The causes of RMO nonattainment in Rock Creek, East Fork Rock Creek, and the East Fork Bull River would remain and would not be affected by the Project.

3.6.4.3.8 Forest Service Sensitive Species

Alternative 3 may impact redband trout and westslope cutthroat trout in Libby Creek but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species. Alternative 3 would not affect flow and pure redband trout habitat in Little Cherry Creek. Instream activities in tributaries, such as culvert replacement, may cause short-term increases and a long-term reduction in sediment delivery in Libby Creek. Temperature changes in Libby Creek associated with the Water Treatment Plant discharge to groundwater adjacent to Libby Creek have been and would continue to be negligible. Discharges from the Water Treatment Plant to groundwater would increase flows in Libby Creek below the Libby Adit. Peak flow would increase less than 1 percent and average annual flow by about 5 percent at LB-300, proportionally decreasing with distance downstream. During high and average flow periods, streamflow changes would not be detectable (Grant et al. 2008), and fish habitat availability would not be affected. During low flow periods, fish habitat availability would increase slightly because of the slightly higher flows. Streamflow reductions in East Fork Rock Creek, Rock Creek, and the East Fork Bull River are predicted to be negligible. Similarly, groundwater flow changes into Rock Lake are predicted to be negligible. Streamflow changes in East Fork Rock Creek, Rock Creek, and the East Fork Bull River and effects on Rock Lake would have no impact on westslope cutthroat trout. The primary risk to both the redband and the westslope cutthroat populations would remain hybridization, which is unrelated to Project activities. Alternative 3 would have no impact on the western pearlshell.

3.6.4.3.9 Effectiveness of the KNF's Proposed Monitoring and Mitigation

Monitoring

MMC would continue to conduct aquatic biological monitoring before, during, and after the Project at sites in and downstream of the analysis area in the Libby Creek watershed and at a benchmark site upstream of any potential influence of the Project (Appendix C). The collection of data at benchmark sites and before any Project activity would provide comparative data to evaluate whether any changes detected in aquatic assemblages were related to impacts from Project activities. The monitoring plan is comprehensive and includes assessment of fish, macroinvertebrate, and periphyton assemblages, as well as habitat and substrate conditions. This plan would effectively assess the condition of the aquatic communities and habitat in analysis area stream sites in the Libby Creek watershed and detect potential impacts on these populations. Most sampling activities would occur once a year or more frequently and, over time, would provide sufficient data to detect trends occurring within these populations. Monitoring reports discussing the results of the sampling would be submitted annually, and modifications to the plan would be made if necessary.

Mitigation

Road access changes would reduce sediment delivery to streams. The effectiveness of these reductions on aquatic habitat would be monitored. Because access changes would have a small reduction in long-term sediment delivery relative to the total sediment load in Libby Creek, the ability to differentiate pre- and post-Project effects may not be possible by monitoring.

3.6.4.4 Alternative 4

Except for effects on RHCAs, effects of Alternative 4 on aquatic resources would be the same as Alternative 3. New road construction in a RHCA would not be needed for the geotechnical investigations in Alternative 4.

3.6.4.5 Cumulative Effects

Cumulative effects in the analysis area include past and current actions that are likely to continue in the future and reasonably foreseeable actions that could affect the aquatic biota. Other activities that could affect the aquatic biota include timber harvesting, land clearing, home construction, road construction, septic field installation, water well drilling, livestock grazing, and stream channel and bank stabilization or restoration projects. These activities can have either adverse or beneficial effects on the aquatic biota. The effects of past and current actions are described in the JFEIS.

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Rock Creek's 3D groundwater model predicted that baseflow in area streams would not be affected during Phase I Evaluation (Hydrometrics 2014).

If the Montanore Project were approved and implemented, the cumulative effects of the Montanore Project are described in the JFEIS. Assuming they occurred concurrently, the Montanore and Rock Creek projects would cumulatively reduce flow in the Rock Creek, East Fork Bull River, and Bull River watersheds. No other aspects of the two projects would have cumulative effects on surface water resources. The cumulative effects of the two projects are described in the JFEIS, and the predicted effects are shown in JFEIS Table 118. Based on DEQ's 2016 ROD for the Montanore Project (DEQ 2016b), the KNF expects that another nondegradation compliance determination for construction and operation of the Montanore Project may be made after MMC collected additional information. To comply with DEQ's nondegradation provisions, changes in $7Q_{10}$ streamflow in the CMW greater than 10 percent must be less than discussed in the JFEIS, unless DEQ determined $7Q_{10}$ flow changes of more than 10 percent were nonsignificant.

Activities associated with the Miller-West Fisher Vegetation Project will occur, in part, in the West Fisher Creek watershed where Evaluation Project access changes would be implemented. The project would include access changes on 1.92 miles of road; 3.29 miles of new temporary road construction; 19.2 miles of road storage; 1.43 miles of road decommissioning; 5.9 miles of trail tread improvement, construction, and reconstruction; and removal of 20 culverts. Access changes in the West Fisher Creek drainages would cumulatively decrease water routing and sediment input from roads into stream channels. Removing culverts and reconstructing the stream channels where these culverts are located would begin to restore the stream channel and fish habitat at those crossings. Removing those culverts could also restore connectivity by reconnecting aquatic habitat. Short-term adverse effects from watershed restoration would be addressed and mitigated through timing restrictions and BMP implementation. None of the other reasonably foreseeable actions described in Section 3.3 would cumulatively affect aquatic habitat adversely.

3.6.4.6 Regulatory/Forest Plan Consistency

3.6.4.6.1 Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental impacts on National Forest surface resources; comply with applicable state and federal water quality standards, including the Clean Water Act; take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations; and construct and

maintain all roads so as to assure adequate drainage and to minimize or, where practicable, eliminate damage to soil, water, and other resource values.

Minimize Adverse Environmental Impact (36 CFR 228.8)

Alternative 2 would not fully comply with 36 CFR 228.8. In this alternative, MMC did not propose to implement feasible measures to minimize changes in streamflow or all practicable measures to maintain and protect fisheries and to minimize effects from road usage. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental impacts on surface water quality and fisheries habitat. These measures would include developing and implementing a final Road Management Plan and a Vegetation Removal and Disposition Plan; implementing BMPs on access roads; decommissioning barriered roads or placing them into intermittent stored service; constructing all stream crossings in compliance with KFP standards and guidelines; and implementing measures such as increased buffer zones and using multiple, site-specifically designed adit plugs at closure to minimize changes in streamflow.

Fisheries and Wildlife Habitat (36 CFR 228.8(e))

Compliance with state and federal water quality standards, specifically changes in streamflow and floodplains, are discussed in Section 3.11.4.6, *Regulatory/Forest Plan Consistency*, in the *Surface Water* section (p. 161). Section 3.13.4.7, *Regulatory/Forest Plan Consistency*, in the *Water Quality* section discusses compliance with water quality laws and regulations (p. 202).

Roads (36 CFR 228.8(f))

Alternative 2 would not fully comply with 36 CFR 228.8(f) as it relates to water quality because MMC did not propose to implement all practicable measures to minimize adverse environmental impacts on surface water quality and fisheries habitat. Alternatives 3 and 4 would comply with 36 CFR 228.8(f) as it relates to surface water quality and fisheries habitat. Additional discussion regarding compliance with 36 CFR 228.8(f) is in the *National Forest Management Act/Kootenai Forest Plan* section regarding roads management (RF-2 through RF-5), beginning on page 118. In Alternatives 3 and 4, roads would be constructed and maintained to ensure adequate drainage and to minimize or, where practicable, eliminate damage to soil, water, and other resource values.

3.6.4.6.2 Endangered Species Act

Alternative 2 would have no effect on the bull trout or bull trout critical habitat. Alternatives 3 and 4 may affect and are not likely to adversely affect bull trout or critical habitat in the Kootenai River Core Area or in the Lake Pend Oreille Core Area. Effects of Alternatives 3 and 4 were summarized in Section 3.6.4.3.6, *Riparian Management Objectives*. For all alternatives, ESA compliance would be ensured through Section 7 consultation. The KNF will submit a BA to the USFWS that will describe the potential effect of Alternative 3 on threatened and endangered species that may be present in the area. After review of the BA and consultation, the USFWS will issue either a concurrence letter or a Biological Opinion.

3.6.4.6.3 Wilderness Act

All alternatives have the potential to indirectly affect wilderness qualities. Alternatives 3 and 4 would be conducted to protect the surface resources, including aquatic resources. All alternatives would be in accordance with the general purpose of maintaining the wilderness unimpaired for future use and enjoyment as wilderness and to preserve the wilderness character consistent with the use of the land for mineral operations in compliance with 36 CFR 228.15 and the Wilderness Act.

3.6.4.6.4 National Forest Management Act/Kootenai Forest Plan

Riparian Habitat Conservation Areas

This section discusses consistency with KFP RMOs, riparian standards, and riparian guidelines relevant to the Project, as listed below.

Riparian Management Objectives: pool frequency, large woody debris, width/depth ratio, and temperature

KFP standards for RHCAs:

- Minerals management (MM-3)
- General riparian area management (RA-4)

Two additional standards for RHCAs:

- General riparian area management (FW-STD-RIP-01)
- General riparian area management (FW-STD-RIP-02)

KFP guidelines for RHCAs:

- Roads management (RF-1 through RF-5)
- Minerals management (MM-1, MM-2, and MM-6)
- Lands (LH-3 and LH-4)
- General riparian area management (RA-2 through RA-4)
- Watershed and habitat restoration (WR-1 and WR-2)
- Fisheries and wildlife restoration (FW-1 and FW-4)

Riparian Management Objectives: Pool Frequency, Large Woody Debris, Width/Depth Ratio, and Temperature

The interim RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of the riparian goals is measured. Interim RMOs provide the target toward which managers aim as they conduct resource management activities across the landscape. It is not expected that the objectives would be met instantaneously, but rather would be achieved over time. However, the intent of interim RMOs is not to establish a ceiling for what constitutes good habitat conditions. Actions that reduce habitat quality (whether existing conditions are better or worse than objective values) would be inconsistent with the purpose of this interim direction.

All Alternatives. The Project would not retard or prevent the attainment of any applicable RMO. The Project would not affect large woody debris and would cause no measurable increase in the 7-day average daily maximum water temperature in analysis area streams. Libby Creek stream temperature differences between sites upstream of the Water Treatment Plant groundwater discharges and downstream of those discharges appear to be influenced by a variety of factors, including streamflow and air temperatures. The negligible reduction in streamflow also would cause no measurable increase in maximum water temperature and have no measurable effect on the width/depth ratio or on pool frequency in Rock Creek, East Fork Rock Creek, and the East

Fork Bull River. Minor increases in Libby Creek streamflow below the Libby Adit Site would have a minor beneficial effect on the width/depth ratio or on pool frequency. Streamflow reductions in East Fork Rock Creek, Rock Creek, and the East Fork Bull Rive are predicted to be negligible and would have a negligible effect on bull trout and bull trout critical habitat. Low streamflow is not a cause of or a contribution to RMO nonattainment in analysis area streams. The causes of RMO nonattainment in analysis area streams would remain and would not be affected by the Project.

There may be negligible and short-term sediment increases in Big Cherry Creek, Bear Creek, Cable Creek, Midas Creek, and Poorman Creek if instream work was conducted in these drainages. Possible sediment increases in these streams would not retard or prevent attainment of the RMOs.

Road Management Guideline (RF-1)

Cooperate with federal, tribal, state, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain RMOs.

All Alternatives. All alternatives would meet the intent of this guideline. All alternatives would include implementation of both state and national BMPs for the road construction and reconstruction to contribute to the attainment of RMOs.

Road Management Guideline (RF-2)

For each existing or planned road, meet the Riparian Management Objectives and avoid adverse effects to inland native fish by:

a. completing watershed analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas within priority watersheds.

b. minimizing road and landing locations in Riparian Habitat Conservation Areas.

c. initiating development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, address the following items in the plan:

1. Road design criteria, elements, and standards that govern construction and reconstruction.

2. Road management objectives for each road.

3. Criteria that govern road operation, maintenance, and management.

4. Requirements for pre-, during-, and post-storm inspections and maintenance.

5. Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives.

6. Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control.

7. Mitigation plans for road failures.

d. avoiding sediment delivery to streams from the road surface.

1. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is infeasible or unsafe.

2. Route road drainage away from potentially unstable stream channels, fills, and hillslopes.

e. avoiding disruption of natural hydrologic flow paths.

f. avoiding sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.

Road width in all new and reconstructed roads would be the minimum necessary to provide for safe and efficient use. The KNF has implemented several actions independent of the Project to meet RMOs associated with road management. The Libby Ranger District completed a Roads Analysis Report for the Libby Ranger District that established road design criteria, elements, and standards that govern construction and reconstruction and developed management objectives for existing roads. The report provided a descriptive ranking of the problems and risks associated with the current road system, and a list of prioritized opportunities for addressing identified problems and risks (KNF 2005).

Alternative 2. Alternative 2 would avoid new road construction in a RHCA. Alternative 2 would not be in compliance with RF-2 because MMC's Plan of Operations did not address all items required by RF-2c, RF-2e, or RF-2f. MMC's Plan of Operations also did not address Libby Creek Road (NFS road #231) or Upper Libby Creek Road (NFS road #2316). MMC also did not commit to avoiding sidecasting of road material on road segments within or abutting RHCAsin priority watersheds.

Alternatives 3 and 4. Except for a 185-foot section of a proposed access road, all new access roads and drill pads in Alternative 3 would be outside of an RHCA. The unavoidable construction of a new access road through a RHCA would be west of Little Cherry Loop Road and would affect 0.09 acre of one RHCA. The RHCA is between two isolated wetlands and adjacent to a non-fish-bearing stream. Isolated wetlands are not connected by surface flow to jurisdictional waters of the U.S. or to state waters. Where the RHCA would be crossed is relatively flat. Implementation of BMPs would minimize or avoid sediment delivery to the adjacent wetlands; sediment delivery to a stream would be avoided. It is unlikely that any sediment that did reach the adjacent wetlands would reach Libby Creek or Poorman Creek, the nearest fish-bearing streams. Because no alternative to road construction exists, MMC would develop a Road Management Plan that analyzed any new road constructed in a RHCA, documenting it was the minimum necessary for the approved mineral activity. Roads no longer required for mineral or land management activities would be placed into intermittent stored service or decommissioned (see KFP standard RF-3). With the KNF"s mitigations, Alternative 3 would comply with RF-2b. Alternative 4 would comply with RF-2b because new road construction would avoid RHCAs. In both alternatives, new road construction and implementation of BMPs on existing roads would avoid sediment delivery to streams from the road surface and avoid disruption of natural hydrologic flow paths in compliance with RF-2d and RF-2e.

Alternatives 3 and 4 would comply with RF-2c and RF-2f because they require MMC to develop and implement a final Road Management Plan. MMC would develop the plan for the KNF's approval and would implement a plan that would describe the following for the access roads, roads used in the geotechnical investigations, and other roads affected by the Project, including access changes required to be implemented for wildlife mitigation:

- Criteria that govern road operation, maintenance, and management

- Requirements of pre-, during-, and post-storm inspection 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
- Analysis of any new road constructed in a RHCA, documenting it was the minimum necessary for the approved mineral activity

The plan would describe management of road surface materials during plowing, such as snow and methods to control road ice. Sidecasting of soils or snow would be avoided. Sidecasting of road material would be prohibited on road segments within or abutting RHCAs. Culverts along Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) that pose a substantial risk to riparian conditions would be replaced as necessary to comply with KFP standards and guidelines and Forest Service guidance, such as fish passage or conveyance of adequate flows (USDA Forest Service 2008, 2015a).

Road Management Guideline (RF-3)

Determine the influence of each road on the Riparian Management Objectives. Meet Riparian Management Objectives and avoid adverse effects on inland native fish by:

a. reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that retard attainment of Riparian Management Objectives, or do not protect priority watersheds from increased sedimentation.

b. prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of Riparian Habitat Conservation Areas.

c. closing and stabilizing or obliterating and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected.

Alternative 2. Alternative 2 would comply with RF-3. MMC did not propose any new roads or reconstruction of existing roads in Alternative 2.

Alternatives 3 and 4. Alternatives 3 and 4 would comply with RF-3. Culverts along Libby Creek Road (NFS road #231) that pose a substantial risk to riparian conditions would be replaced as necessary to comply with KFP standards and guidelines and Forest Service guidance, such as fish passage or conveyance of adequate flows (USDA Forest Service 2008, 2015a). Other BMPs also would be implemented. In addition, MMC would be responsible for developing, for the KNF's approval, a final Road Management Plan that meets standards for RF-3. The final Road Management Plan would address the access roads, roads used in the geotechnical investigations, and other roads affected by the Project, including access changes required to be implemented for wildlife mitigation, and would be incorporated into an amended Plan of Operations for the KNF.

Road Management Guideline (RF-4)

Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bedload and debris, where those improvements would/do pose a substantial risk to riparian conditions. Substantial risk improvements include those that do not meet design and operation maintenance criteria, or that have been shown to be less effective than designed for controlling erosion, or that retard attainment of Riparian Management Objectives, or that do not protect priority watersheds from increased sedimentation. Base priority for upgrading on risk in priority watersheds and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

Alternative 2. Alternative 2 would not comply with RF-4. MMC's Plan of Operations did not address drainage features along Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316). MMC anticipates that no drainage would be provided, but would follow the KNF's guidance if installation of culverts were required.

Alternatives 3 and 4. Alternatives 3 and 4 would comply with RF-4. Culverts that pose a substantial risk to riparian conditions would be replaced as necessary to comply with KFP standards and guidelines and Forest Service guidance, such as fish passage or conveyance of adequate flows (USDA Forest Service 2008, 2015a). The development and implementation of a final Road Management Plan in Alternatives 3 and 4 would include a mitigation plan for road failures at stream crossings.

Road Management Guideline (RF-5)

Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

All Action Alternatives. All action alternatives would comply with RF-5. MMC did not propose any new road construction in Alternative 2. New roads in Alternatives 3 and 4 would not cross existing or potential fish-bearing streams.

Minerals Management Guideline (MM-1)

Minimize adverse effects to inland native fish species from mineral operations. If a Notice of Intent indicates that a mineral operation would be located in a Riparian Habitat Conservation Area, consider the effects of the activity on inland native fish in the determination of significant surface disturbance pursuant to 36 CFR 228.4. For operations in a Riparian Habitat Conservation Area ensure operators take all practicable measures to maintain, protect, and rehabilitate fish and wildlife habitat which may be affected by the operations. When bonding is required, consider (in the estimation of bond amount) the cost of stabilizing, rehabilitating, and reclaiming the area of operations.

Alternative 2. Alternative 2 would not be in compliance with MM-1 because MMC's Plan of Operations did not propose practicable measures to maintain, protect, and rehabilitate fish and wildlife habitat along Libby Creek Road (NFS road #231) or Upper Libby Creek Road (NFS road #2316) that would be used. MMC also did not commit to avoiding sidecasting of road material on road segments within or abutting RHCAs in priority watersheds.

Alternatives 3 and 4. Alternatives 3 and 4 would require MMC to implement practicable measures to maintain, protect, and rehabilitate fish and wildlife habitat along Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316). Sidecasting of road material on road segments within or abutting RHCAs along these roads would be prohibited. This SEIS considers the effects of all alternatives on inland native fish in the determination of significant surface disturbance pursuant to 36 CFR 228.4. The KNF would share responsibility with DEQ to monitor and inspect the Project and has authority to approve a Plan of Operations that includes all the necessary modifications to ensure that impacts on surface resources would be minimized. These modifications are incorporated into Alternatives 3 and 4. The KNF and DEQ would collect a reclamation bond from MMC to ensure that the land affected by Project activities was properly reclaimed. The joint reclamation bond would be held by DEQ to ensure compliance with the reclamation plan associated with the DEQ Operating Permit and the Plan of Operations. The KNF may require an additional bond if it determined that the bond held by DEQ was not adequate to reclaim National Forest System land or was administratively unavailable to meet KNF requirements.

Minerals Management Guideline (MM-2)

Locate structures, support facilities, and roads outside Riparian Habitat Conservation Areas. Where no alternative to siting facilities in Riparian Habitat Conservation Areas exists, locate and construct the facilities in ways that avoid impacts on Riparian Habitat Conservation Areas and streams and adverse effects on inland native fish. Where no alternative to road construction exists, keep roads to the minimum necessary for the approved mineral activity. Close, obliterate and revegetate roads no longer required for mineral or land management activities.

Alternatives 2 and 4. Alternative 2 would comply with MM-2. MMC did not propose any new road construction in Alternative 2. Alternative 4 would comply with MM-2 because new road construction would avoid RHCAs.

Alternative 3. Alternative 3 would be consistent with MM-2. Except for a 185-foot section of a proposed access road, all new access roads and drill pads would be outside of an RHCA. The unavoidable construction of a new access road through a RHCA in Alternative 3 would be west of Little Cherry Loop Road and would affect 0.09 acre of one RHCA. The RHCA is between two isolated wetlands and adjacent to a non-fish-bearing stream. Isolated wetlands are not connected by surface flow to jurisdictional waters of the U.S. or to state waters. Where the RHCA would be crossed is relatively flat. Implementation of BMPs would minimize or avoid sediment delivery to the adjacent wetlands; sediment delivery to a stream would be avoided. It is unlikely that any sediment that did reach the adjacent wetlands would reach Libby Creek or Poorman Creek, the nearest fish-bearing streams. Because no alternative to road construction exists, MMC would develop a Road Management Plan that analyzed any new road constructed in a RHCA, documenting it was the minimum necessary for the approved mineral activity. Roads no longer required for mineral or land management activities would be placed into intermittent stored service or decommissioned (see KFP standard RF-3).

Minerals Management Standard (MM-3)

Prohibit solid and sanitary waste facilities in Riparian Habitat Conservation Areas. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in Riparian Habitat Conservation Areas exists, and releases can be prevented and stability can be ensured, then:

a. analyze the waste material using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics.

b. locate and design the waste facilities using the best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, prohibit such facilities in Riparian Habitat Conservation Areas.

c. monitor waste and waste facilities to confirm predictions of chemical and physical stability, and make adjustments to operations as needed to avoid adverse effects to inland native fish and to attain Riparian Management Objectives.

d. reclaim and monitor waste facilities to assure chemical and physical stability and revegetation to avoid adverse effects to inland native fish, and to attain the Riparian Management Objectives.

e. require reclamation bonds adequate to ensure long-term chemical and physical stability and successful revegetation of mine waste facilities.

All Alternatives. All alternatives would comply with MM-3. No solid or sanitary waste facilities would be located in a RHCA.

Minerals Management Guideline (MM-6)

Develop inspection, monitoring, and reporting requirements for mineral activities. Evaluate and apply the results of inspection and monitoring to modify mineral plans, leases, or permits as needed to eliminate impacts that prevent attainment of Riparian Management Objectives and avoid adverse effects on inland native fish.

All Action Alternatives. All action alternatives would comply with MM-6. In Alternative 2, MMC would follow all inspection, monitoring, and reporting requirements for mineral activities developed by the KNF. MMC would evaluate and apply the results of inspection and monitoring to modify mineral plans, leases, or permits as needed to eliminate impacts that prevent attainment of RMOs and avoid adverse effects on inland native fish. In the other action alternatives, the KNF modified the monitoring and reporting requirements to better assess the effects of the Project (see Appendix C).

Lands Guideline (LH-3)

Issue leases, permits, rights-of-way, and easements to avoid effects that would retard or prevent attainment of the Riparian Management Objectives and avoid adverse effects on inland native fish. Where the authority to do so was retained, adjust existing leases, permits, rights-of-way, and easements to eliminate effects that would retard or prevent attainment of the Riparian Management Objectives or adversely affect inland native fish. If adjustments are not effective, eliminate the activity. Where the authority to adjust was not retained, negotiate to make changes in existing leases, permits, rights-of-way, and easements to eliminate effects that would prevent attainment of the Riparian Management Objectives or adversely affect inland native fish. Priority for modifying existing leases, permits, rights-of-way, and easements would be based on the current and potential adverse effects on inland native fish and the ecological value of the riparian resources affected.

All Alternatives. All alternatives would comply with LH-3. The KNF issuance of any permit or approval associated with the Project would avoid effects that would retard or prevent attainment of the RMOs and avoid adverse effects on inland native fish.

Lands Guideline (LH-4)

Use land acquisition, exchange, and conservation easements to meet RMOs and facilitate restoration of fish stocks and other species at risk of extinction.

All Alternatives. All alternatives would be consistent with LH-4. None of the alternatives would use land acquisition, exchange, or conservation easements specifically to meet RMOs or facilitate restoration of fish stocks and other species at risk of extinction. Alternatives 3 and 4 would include transfers of land title or placement of conservation easements that may contribute to the recovery of the bull trout.

General Riparian Area Management Guideline (RA-2)

Trees may be felled in Riparian Habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

All Action Alternatives. Timber harvest in RHCAs would be avoided in all action alternatives.

General Riparian Area Management Guideline (RA-3)

Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on inland native fish.

All Action Alternatives. All action alternatives would comply with RA-3. In Alternative 2, measures outlined in MMC's Weed Control Plan approved by the Lincoln County Weed Control District would be followed during operations and reclamation. All herbicides used in the analysis 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. In the other action alternatives, MMC also would implement all weed BMPs identified in Appendix A of the KNF Invasive Plant Management Final EIS (KNF 2007b) for all weed-control measures. These measures would ensure that herbicides, pesticides, other toxicants, and other chemicals were used in a manner that would not retard or prevent attainment of RMOs and would avoid adverse effects on inland native fish.

General Riparian Area Management Standard (RA-4)

Prohibit storage of fuels and other toxicants within Riparian Habitat Conservation Areas. Prohibit refueling within Riparian Habitat Conservation Areas unless there are no other alternatives. Refueling sites within a Riparian Habitat Conservation Area must be approved by the Forest Service or Bureau of Land Management and have an approved spill containment plan.

All Alternatives. All alternatives would comply with RA-4. Fuel storage at the Libby Plant Site would not be within a RHCA. MMC has prepared a Spill Response Plan.

Watershed and Habitat Restoration Guideline (WR-1)

Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native species and contributes to attainment of Riparian Management Objectives.

All Action Alternatives. Alternative 2 would not affect bull trout or designated bull trout critical habitat and would be neutral toward compliance with WR-1. The design features for Alternatives

3 and 4 would promote the long-term ecological integrity of ecosystems, conserve the genetic integrity of native species, and contribute to attainment of the RMOs. Placing roads into intermittent stored service or decommissioning them would reduce sediment in area creeks over the long term and contribute to attainment of the RMOs.

Watershed and Habitat Restoration Guideline (WR-2)

Cooperate with federal, state, local, and tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPS) or other cooperative agreements to meet RMOs.

All Alternatives. All alternatives would be consistent with WR-2 for the reasons described for RF-1.

Fisheries and Wildlife Restoration Guideline (FW-1)

Design and implement watershed fish and wildlife habitat restoration and enhancement actions in a manner that contributes to attainment of the Riparian Management Objectives.

All Action Alternatives. Alternative 2 would not affect bull trout or designated bull trout critical habitat and would be neutral toward compliance with FW-1. The design features for Alternatives 3 and 4 would contribute to attainment of the RMOs. Placing roads into intermittent stored service or decommissioning them would reduce sediment in area creeks over the long term and contribute to attainment of the RMOs.

Fisheries and Wildlife Restoration Guideline (FW-4)

Cooperate with federal, tribal, and state fish management agencies to identify and eliminate adverse effects on inland native fish associated with habitat manipulation, fish stocking, fish harvest, and poaching.

All Alternatives. All alternatives would be consistent with FW-4 for the reasons described for RF-1.

Riparian Standard (FW-STD-RIP-01)

When RHCAs are intact and functioning at desired condition, then management activities shall maintain or improve that condition. Short-term effects (effects that occur during, or immediately following, implementation of activity) from activities in the RHCAs may be acceptable when those activities support long-term benefits (benefits that occur following completion of the activity) to the RHCAs and aquatic resources.

Riparian Standard (FW-STD-RIP-02)

When RHCAs are not intact and not functioning at desired condition, management activities shall include restoration components that compensate for project effects to promote a trend toward desired conditions. Large-scale restoration plans or projects that address other cumulative effects within the same watershed may be considered as compensatory components and shall be described during site-specific project analyses.

Alternatives 2 and 4. Alternatives 2 and 4 would avoid affecting RHCAs and are designed in accordance with FW-STD-RIP-01 and FW-STD-RIP-02.

Alternative 3. Alternative 3 would affect 0.09 acre of RHCA. The effect would be short-term, and the new road would be reclaimed after the geotechnical investigations were completed. Long-term benefits would accrue to RHCAs and aquatic resources from decommissioning roads or placing them into intermittent stored service. Alternative 3 is designed in accordance with FW-STD-RIP-01 and FW-STD-RIP-02.

Standard Hellgate Treaty of 1855

The Hellgate Treaty of 1855 reserved for the Kootenai Nation, among other rights, "the right to fish at all usual and accustomed places…on open and unclaimed lands." The KFP recognizes these treaty rights and allows the Flathead/Kootenai-Salish Indian tribes to fish within the KNF. Ongoing consultation with the CSKT ensures that tribal treaty rights are protected. Section 3.5, *American Indian Rights*, discusses American Indian rights.

Forest Service Sensitive Species Statement of Findings

This analysis serves as the biological evaluation for effects on Forest Service sensitive aquatic species associated with the various alternatives for implementing the Project. Alternative 2 would have no impact on westslope cutthroat trout, redband trout, or western pearlshell. Alternatives 3 and 4 may impact on redband trout and westslope cutthroat trout in Libby Creek but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species. All action alternatives would have no impact on the western pearlshell.

3.6.4.7 Irretrievable and Irreversible Commitments

None of the alternatives would result in an irretrievable or irreversible commitment of resources.

3.6.4.8 Short-Term Effects and Long-Term Productivity

The effects of Alternative 3 on bull trout and bull trout occupied or critical habitat in the Kootenai River Core Area would include long-term reductions in sediment delivery to Libby Creek and Midas Creek, negligible temperature and water quality changes associated with the Water Treatment Plant discharge to groundwater adjacent to Libby Creek, and increased habitat availability in the same reach during low-flow conditions due to increased streamflow. There may be negligible and short-term (2 days) sediment increases in Big Cherry Creek, Bear Creek, Cable Creek, Midas Creek, and Poorman Creek if instream work was conducted in these drainages. Possible removal of road crossings on Midas Creek and Cable Creek and streamflow increases downstream of the Water Treatment Plant discharge in Libby Creek may improve fish passage. The effects of Alternative 3 on bull trout and bull trout occupied or critical habitat in the Lake Pend Oreille Core Area would include possible negligible and short-term (2 days) increases in sediment in East Fork Rock Creek and negligible and temporary reductions in streamflow and associated negligible changes in total dissolved solids concentrations and temperature in East Fork Rock Creek, Rock Creek, the East Fork Bull River, and the lower Bull River.

3.6.4.9 Unavoidable Adverse Environmental Effects

The unavoidable construction of a new access road through a RHCA would be west of Little Cherry Loop Road and would affect 0.09 acre of one RHCA. Implementation of BMPs would minimize or avoid sediment delivery to the adjacent wetlands; sediment delivery to a stream would be avoided. It is unlikely that any sediment that did reach the adjacent isolated wetlands would reach Libby Creek or Poorman Creek, the nearest fish-bearing streams.

3.7 Cultural Resources

3.7.1 Regulatory Framework

Federal requirements under the National Historic Preservation Act are described in the JFEIS. Similar state laws governing cultural resources are found in 22-3, MCA. The KFP direction considered in the analysis of cultural resources is:

> **FW-DC-CR-01.** Cultural resources are inventoried, evaluated for inclusion on the National Register of Historic Places, and managed according to their allocation category, including preservation, enhancement-public use, or scientific investigation. National Register ineligible cultural resources may be released from active management. Until evaluated, cultural resources are treated as National Register eligible. Historically and archaeologically important cultural resources and traditional cultural properties are nominated to the National Register.
>
> **FW-DC-CR-02.** Cultural resources are safeguarded from vandalism, looting, and environmental damage through monitoring, condition assessment, protection, and law enforcement measures. Interpretation and adaptive use of cultural resources provide public benefits and enhance understanding and appreciation of KNF prehistory and history. Cultural resource studies provide relevant knowledge and perspectives to KNF land management. Artifacts and records are stored in appropriate curation facilities and are available for academic research, interpretation, and public education.
>
> **FW-GDL-CR-01.** Cultural resource protection provisions should be included in applicable contracts, agreements, and special use permits for National Register-listed or eligible properties.
>
> **FW-GDL-CR-02.** Historic human remains should be left undisturbed unless there is an urgent reason (e.g., human health and safety, natural event, etc.) for their disturbance.

In 2010, the KNF and the SHPO entered into a Programmatic Agreement regarding the protection of historic properties within the area of potential effect (APE) of the Montanore Project. The APE is defined as “the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist” (36 CFR 800.16). The APE of the Evaluation Project is smaller than the APE of the Montanore Project.

3.7.2 Analysis Area and Methods

The analysis area consists of the East Fork Bull River, East Fork Rock Creek, Rock Creek and Libby Creek where dewatering the Libby Adit and drifts may reduce streamflow, the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access for grizzly bear mitigation. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and cultural resources in the Fisher River watershed would not be affected.

3.7.3 Affected Environment

Known cultural resources that could be affected by Project activities (Table 321) are three eligible sites and one recommended not eligible site. The Libby Mining District (District) encompasses most of the Libby Adit Site and geotechnical investigations area. This site is a National Register of Historic Places (NRHP)–eligible historic district that embodies the physical features of mining from 1867 to the 1950s and a visual aspect that conveys both setting and location criteria. Site 24LN1209, the Old Libby Wagon Road, would be used for access in Alternatives 3 and 4 and is considered a contributing element to the District. Site 24LN943 is a historic logging camp recommended as not eligible; it was destroyed by previous construction associated with the Libby Adit (private property). Site 24LN1680 is believed to be a portion of a placer mine that extends about 100 feet into the Libby Adit Site. It is currently unknown if any elements of this resource actually extend into the APE.

Table 321. Known Cultural Resources in the Analysis Area.

Smithsonian Site #	Site Type	NRHP Eligibility	Area of Potential Effect
24LN943[1]	Logging camp	Recommended not eligible (destroyed)	Libby Adit All Alternatives
24LN1209[1]	Historic road/trail—Libby Wagon Road	Eligible	Geotechnical Investigation Area Alternative 3
24LN1323	Libby Mining District	Eligible	Geotechnical Investigation Area Alternatives 3 and 4
24LN1680	Placer Mine Ditch	Eligible	Libby Adit (100 feet according to GIS) All Alternatives

[1]Contributing cultural resources to the Libby Mining District (24LN1323).

3.7.4 Environmental Consequences

No direct, indirect, or cumulative effects would occur on cultural resources in Alternative 1. Natural weathering, deterioration, and vandalism of cultural resources would continue. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150.

3.7.4.1 Alternative 2

No additional ground disturbance outside of the existing 11.6-acre disturbance area would occur in Alternative 2, and no cultural resources would be affected. Review and consultation with the SHPO is required for site 24LN943 in order to receive a consensus determination of not eligible based on the loss of physical integrity of the site. Assuming concurrence from the SHPO, no additional work would be required. GIS analysis indicates that about 100 feet of an eligible mining ditch (site 24LN1680) extends into the disturbance area of the Libby Adit Site; any portion of the eligible mining ditch that may have once extended into the Libby Adit Site

disturbance area would have been destroyed by previous ground-disturbing activity. Monitoring would be conducted in this area before any new disturbance at the Libby Adit Site occurred.

3.7.4.2 Alternative 3

No additional ground disturbance at the Libby Adit Site outside of the existing 11.6-acre disturbance area would occur in Alternative 3, and no cultural resources at the site would be affected. Review and consultation with the SHPO is required for site 24LN943 in order to receive a consensus determination of not eligible based on the loss of physical integrity of the site. Assuming concurrence from the SHPO, no additional work would be required. GIS analysis indicates that about 100 feet of an eligible mining ditch (site 24LN1680) extends into the disturbance area of the Libby Adit Site; any portion of the eligible mining ditch that may have once extended into the Libby Adit Site disturbance area would have been destroyed by previous ground-disturbing activity. Monitoring would be conducted in this area when any new disturbance at the Libby Adit Site occurred.

MMC would disturb 6.4 acres for new access roads and drill pads for the geotechnical investigation work in the Libby Mining District. An estimated 2,690 feet of site 24LN1209 (road #1408) would be used for access. Such use and disturbance would adversely affect these two resources. MMC would develop mitigation plans for sites 24LN1209 and 24N1323 in consultation with the SHPO that could include developing an interpretive sign along Libby Creek Road or developing a display in the Libby Heritage Museum. At the end of the 12-week geotechnical investigations, disturbances would be reclaimed and revegetated. Over the long term, as vegetation on the reclaimed new roads became established, the scenic integrity of the District would return to existing conditions.

Before starting the Project, MMC would implement BMPs on Libby Creek Road and Upper Libby Creek Road shown in Table 311 in Chapter 2. In addition, MMC may remove culverts or complete other ground-disturbing activities in locations where the KNF would change road access for grizzly bear mitigation. An intensive cultural resource inventory of any location to be disturbed during the Project that had not been previously inventoried would be completed to meet the requirements of 36 CFR 800, the guidelines in the 2012 KNF Site Inventory Strategy (KNF 2012), and the SHPO. Such areas would include any surface disturbance required in design features described in Alternatives 3 or 4, such as road improvements listed in Table 311. An intensive cultural resource inventory is a pedestrian survey with transects no more than 100 feet apart. The adequacy of past intensive cultural resource inventories would be decided by the KNF in consultation with the SHPO.

After completion of a cultural resource survey, MMC would follow the requirements of a Programmatic Agreement between the KNF and the SHPO. MMC would submit to the KNF an inventory report meeting SHPO requirements. The report would include recommendations of eligibility for listing on the NRHP for all identified historic properties. When an adverse effect on an eligible historic property was anticipated, MMC may choose to redesign the activity to avoid the property. If avoidance is not feasible, MMC would undertake actions to mitigate any adverse effect following the requirements of 36 CFR 800.6.

3.7.4.3 Alternative 4

The effects of Alternative 4 on cultural resources at the Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, and locations where the KNF would

change road access for grizzly bear mitigation would be the same as Alternative 3. Alternative 4 would disturb 1.5 acres for new access roads and drill pads in the Libby Mining District, adversely affecting the resource. Site 24LN1209 (road #1408) would not be used for access. Over the long term, as vegetation on the reclaimed new roads became established, the scenic integrity of the District would return to existing conditions. Mitigation for adverse effects on the District would be the same as Alternative 3.

3.7.4.4 Cumulative Effects

Past action, such as road building and timber harvest, may have affected cultural resources. Cultural resources affected by past actions after the passage of the National Historic Preservation Act of 1966 were mitigated in accordance with approved mitigation plans. No reasonably foreseeable actions would have a cumulative effect with Project activities.

3.7.4.5 Regulatory/Forest Plan Consistency

After the identification of cultural resources, mitigation, and consultation, all alternatives would make progress toward the desired conditions for cultural resources (FW-DC-CR-01 and 02), would be designed and implemented in accordance with cultural resource guidelines (FW-GDL-CR-01 and 02), and would comply with all applicable federal regulations concerning cultural resources.

3.7.4.6 Irreversible and Irretrievable Commitments

All action alternatives would adversely affect small portions of the Libby Mining District (24LN1323) and possibly a portion of 24LN1680. In addition, Alternative 3 would adversely affect site 24LN1209. Over the long term, as vegetation on the reclaimed new roads became established, the scenic integrity of the District would return to existing conditions. The Project would not have irreversible or irretrievable commitments of known cultural resources.

3.7.4.7 Short-Term Uses and Long-Term Productivity

None of the alternatives would have a long-term effect on cultural resources.

3.7.4.8 Unavoidable Adverse Environmental Effects

Unavoidable effects on cultural resources would be mitigated through developing and implementing mitigation plans approved by the KNF, in consultation with the SHPO. When tribally affiliated sites were affected, consultation with Native American Tribes also would be initiated.

3.8 Hydrologic and Geochemical Approach to Water Quality Assessment

3.8.1 Generalized Approach to Water Resources Impact Analysis

The KNF's generalized approach to water resources impact analysis is described in the JFEIS.

3.8.2 Project Water Balance, Potential Discharges, and Impact Assessment Locations

3.8.2.1 Project Activities

MMC would dewater the full extent of the existing Libby Adit, extend the adit to beneath the ore zones (Alternative 2) or above the ore zones (Alternatives 3 and 4), and develop lateral drifts and drill stations. Groundwater in the vicinity of the adit and drifts would flow toward the adit and drift voids. An estimated 545,300 tons (Alternative 2) or 287,000 tons (Alternatives 3 and 4) of waste rock and 6,000 tons of ore (Alternatives 3 and 4) would be generated and stored at the Libby Adit Site. The storage areas would be lined to collect runoff from the areas and seepage through the storage areas. MMC would cover stockpiles of alteration-zone waste rock and ore with an impermeable material to minimize infiltration from precipitation. Adit and waste rock water would be collected and piped to a Water Treatment Plant at the Libby Adit Site. After treatment, treated water would be discharged to a percolation pond at the Libby Adit Site. Water discharged to the pond would percolate to groundwater, which would then flow to Libby Creek adjacent to the adit portal site.

In the impact analysis presented in subsequent sections, the KNF assessed the effects of adit and drift inflows on groundwater levels and streamflow. The streams assessed are those potentially affected by dewatering in the Libby Creek, East Fork Rock Creek, and East Fork Bull River watersheds. The impact assessment locations for the effects of discharged water on streamflow and surface water quality are streams downstream of any discharge location. Groundwater quality was assessed adjacent to any discharge location. Impact assessment locations are shown on Figure 319.

3.8.2.2 Libby Adit Site Closure

MMC would close the Libby Adit and reclaim the site. Closure activities would include removing surface facilities, plugging the adit, and reclaiming surface disturbances. MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. A third, westernmost plug, if needed in Alternatives 3 and 4, would be located to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains. The additional plug, if necessary, would ensure any groundwater tributary to Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. After the adit was plugged, Water Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. If an additional plug was needed and installed to minimize post-closure effects, the time to fill the adit and drifts would be

about half of what it was with two plugs. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded.

3.8.3 Streamflow, Baseflow, and $7Q_2$, $7Q_{10}$, and $14Q_5$ Flow Definitions and Uses in EIS Analyses

The KNF used the Region 1 Water Yield and Sediment Model (WATSED) and ECAC model to predict streamflow changes and used estimated 3D model-derived streamflow to analyze the effects of the alternatives on streamflow and water quality (see Section 3.11.2, *Analysis Area and Methods*, for a discussion of the models). Updated streamflow data are presented in Section 3.11.3. Because none of the analysis area streams have been continuously gaged and hydrographs have not been developed except at LB-200, baseflow, average low flow, and peak values cannot be determined. Certain low flows, as defined in the next section, have been estimated or simulated for specific locations. The uncertainties associated with the use of these estimated low flows in the hydrology and water quality analyses are discussed in JFEIS Section 3.11.4.4.6, *Uncertainties Associated with the Water Quality Assessment*.

Peak flow is the portion of the annual water cycle that contains the highest 30 continuous days of streamflow in the watershed. It is during peak flow periods when the greatest potential impacts on stream channels usually occur. Peak flows are affected by weather events and management activities in the watershed. Annual flow is the total output of the watershed on a yearly basis. Changes in annual flow occur due to climatic variability, such as drought, which can decrease the total amount of streamflow over a yearly cycle. Natural and management activities such as forest fires, timber harvest, and road building can also impact the amount of water leaving the watershed. Removal of vegetation allows more of the natural precipitation to leave the watershed because it is not used by plants for transpiration. About 15 percent of the annual flow occurs during the period when streams are in the baseflow condition. The KNF used the Region 1 WATSED model and ECAC model to predict changes in annual and peak streamflow, as discussed in the JFEIS.

Baseflow is the contribution of near-channel alluvial groundwater and deeper bedrock groundwater to a stream channel. Baseflow does not include any direct runoff from rainfall or snowmelt into the stream. During the driest portions of the year, the only flow into the stream channel is baseflow. Streamflow may not reduce to baseflow in years when higher than normal precipitation occurs in later summer and early fall or when the residual snow pack continues to melt through late summer and early fall. In analysis area streams, streams in the area may be “at baseflow” for about 1 to 2 months between mid-July and early October; periods of baseflow may also occur from November through March. “At baseflow” refers to a period when the water in a stream channel is the result of only the baseflow component. Water from baseflow sources, such as bedrock, contributes to streams 365 days a year, but during much of the year, the dominant source of surface flow is from runoff and groundwater discharge from surficial deposits. Without continuous flow measurements, it may not be possible to know whether streamflow is reduced to only the baseflow contribution in any given year.

Geomatrix (2011) prepared a 3D model of the Montanore analysis area for MMC to assist in defining potential impacts on bedrock groundwater and surface water resources of the Montanore Project. The Geomatrix 3D model is discussed in Section 3.11.2, *Analysis Area and Methods*. On behalf of RCR, Hydrometrics prepared a 3D model of the proposed Rock Creek study area to assist in defining potential impacts on bedrock groundwater and surface water resources of the

Rock Creek Project (Hydrometrics 2014). The model domains of the 3D models for the proposed Montanore and Rock Creek projects overlapped, and they each used the same software package. The modeling of the two projects was performed independently and used different approaches for their respective simulations. The model predictions are similar with respect to the magnitude of the predicted adit inflows and changes in baseflow due to dewatering. Table 322 provides a comparison of predicted existing baseflow for specific locations along two stream reaches where the two models overlap. The models of the two mine areas simulated impacts on bedrock groundwater only from mine and adit dewatering. The model-predicted changes to baseflow from each mine refer to only the bedrock component of baseflow due to the effects of dewatering each respective mine. Throughout the SEIS, the term "baseflow" refers only to the bedrock component of baseflow in streams.

The differences in the predicted existing baseflows between the two models are greater in the upper watersheds with limited or no streamflow measurements for calibration. The Rock Creek model predicted higher existing baseflow in upper East Fork Rock Creek and lower existing baseflow in the upper East Fork Bull River than the Montanore model. The differences are likely the result of how recharge from precipitation was distributed at the higher elevations in each model.

Table 322. Comparison of Model-Predicted Existing Baseflows—Rock Creek and Montanore Models.

Drainage and Location	Rock Creek Model-Predicted Existing Baseflow (cfs)	Montanore Model-Predicted Existing Baseflow (cfs)
Rock Creek		
East Fork Rock Creek at CMW boundary (EFRC-200)	0.7	0.29
Rock Creek above confluence with Clark Fork River (RC-2000)	7.8	7.70
East Fork Bull River		
East Fork Bull River within CMW boundary (EFBR-500)	1.4	4.36
East Fork Bull River above confluence with Bull River (at mouth)	10.4	11.34

Sources: Hydrometrics (2014) and Geomatrix (2011).

The $7Q_{10}$ flow is defined as the lowest streamflow averaged over 7 consecutive days that occurs, on average, once every 10 years. The $7Q_{10}$ flow has a 10 percent probability of occurring in any given year (10-year recurrence interval) and is commonly used by DEQ when setting MPDES permit effluent limits for pollutants other than nutrients and allowable pollutant loads for streams. DEQ also uses $7Q_{10}$ flow in assessing whether flow changes are nonsignificant for purposes of the statute prohibiting degradation of state waters. The $7Q_2$ flow is the lowest streamflow averaged over 7 consecutive days that occurs, on average, once every 2 years. The $7Q_2$ flow has a 50 percent probability of being exceeded in any one year (2-year recurrence interval). Because streamflow in analysis area streams has not been continuously gaged for an extended period, $7Q_{10}$ and $7Q_2$ flows cannot be estimated directly. The KNF's use of estimated $7Q_{10}$ and $7Q_2$ flows for

analysis area streams using a regression equations method developed by the USGS (Hortness 2006) is described in the JFEIS.

Section 3.13.1.1.2, *MPDES Permit MT0030279*, discloses that DEQ issued MMC a final MPDES permit in 2017 (DEQ 2017a). As part of the MPDES permitting action, DEQ established a critical streamflow in Libby Creek. The critical streamflow was based on the applicable provisions of ARM 17.30.620-629 requiring that discharge permits not cause the receiving water concentrations to exceed any applicable standard when streamflows equal or exceed the critical flows. Pursuant to ARM 17.30.635(2), the receiving water critical flow for point source discharges must be based on the minimum consecutive 7-day average flow that is expected to occur, on average, once in 10 years ($7Q_{10}$). If data are insufficient to establish a $7Q_{10}$, DEQ must establish an acceptable streamflow. The $7Q_{10}$ value used in the MPDES permitting action was based on the estimated $7Q_{10}$ of 3.03 cfs at LB-300. The discussion of streamflow effects in the SEIS is based on DEQ's estimated $7Q_{10}$ of 3.03 cfs at LB-300. DEQ's $7Q_{10}$ flow value is consistent with the $7Q_{10}$ flow estimated in the JFEIS using a USGS method developed for ungaged watersheds (Hortness 2006). Similarly, the effects of the Project at EFRC-200 and all other stream monitoring locations are based on the estimated $7Q_{10}$ flow shown in Table 323 using the USGS method developed for ungaged watersheds (Hortness 2006).

Table 323. Estimated $7Q_2$ and $7Q_{10}$ Flow Used in the Streamflow Analysis and Associated Ranges.

Stream Location	Estimated $7Q_{10}$ (cfs)	Range		Estimated $7Q_2$ (cfs)	Range	
		Low $7Q_{10}$ (cfs)	High $7Q_{10}$ (cfs)		Low $7Q_2$ (cfs)	High $7Q_2$ (cfs)
Libby Creek						
LB-300[1]	3.03	1.42	6.46	4.73	2.65	8.47
LB-2	8.62	4.04	18.36	13.27	7.42	23.75
LB-2000	8.99	4.22	19.15	13.85	7.74	24.78
East Fork Rock Creek and Rock Creek						
EFRC-200[1]	0.57	0.27	1.22	0.92	0.52	1.65
RC-3[1]	5.70	2.67	12.14	8.80	4.92	15.74
RC-2000	8.80	4.13	18.74	13.53	7.56	24.21
East Fork Bull River						
EFBR-2[1]	2.93	1.37	6.24	4.57	2.56	8.18
EFBR-500[1]	3.71	1.74	7.90	5.77	3.23	10.33
EFBR at mouth	7.97	3.74	16.97	12.27	6.86	21.95

[1]Locations have drainage areas or precipitation values outside the range of values used to develop the equations, or are near the maximum and minimum values used in the equations; results may be unreliable (Hortness 2006).
Locations are shown on Figure 319.
Source: JFEIS Appendix G.

In accordance with ARM 17.30.635(4), the effluent limit for controlling nitrogen and phosphorus concentrations in surface water was based on the seasonal $14Q_5$, which is the lowest average 14-consecutive-day low flow, occurring from July through October, with an average recurrence frequency of once in 5 years. Because a $14Q_5$ flow for Libby Creek has not been established, DEQ developed a reasonable estimation of the $14Q_5$ for Libby Creek of 3.28 cfs (1,472 gpm), based on a comparison of the Libby Creek drainage basin to the nearby Flower Creek drainage basin.

3.8.4 Uncertainty, Monitoring, and Mitigation

The best available information was used to analyze the effects on water resources. While some uncertainty is inherent in all predictions, the uncertainties specific to these analyses are discussed in each of the following sections on geochemistry, hydrology, and water quality. To address these specific elements, monitoring plans have been developed and are described in Appendix C for Alternatives 3 and 4. Mitigation measures are discussed in Chapter 2 in Alternatives 3 and 4. The following sections on geochemistry, hydrology, and water quality include a discussion on the anticipated effectiveness of Alternative 3 and 4 monitoring and mitigation measures.

3.9 Geology and Geochemistry

3.9.1 Analysis Area and Methods

The geochemical analysis area encompasses the underground zones from which waste rock would be removed during the extension of the Libby Adit and development of drifts and drill pads. The methods for data collection and impact analysis are the same as described in the JFEIS.

3.9.2 Affected Environment

3.9.2.1 Geologic Setting

The geologic setting is described in the JFEIS.

3.9.2.2 Site Geology

The site geology is described in the JFEIS.

3.9.3 Mining History

The area's mining history is described in the JFEIS.

3.9.4 Environmental Geochemistry

The potential for acid rock drainage and trace metal release is described in the JFEIS. Geochemical analyses of ore and waste rock sampled during evaluation drilling at Rock Creek-Montanore (pre-2001) and during operations at Troy Mine, together with characterization of waste rock from the Montanore Libby Adit, tailings from Rock Creek metallurgical tests and Troy operations, and in situ water quality data from the Libby Adit and the Troy Mine, comprise the available data on environmental geochemistry for the impact analysis. These data, which address questions of acid generation and trace element and nutrient release potential, are described in part by Enviromin (2013) and Geomatrix (2007) and are discussed in the JFEIS (Section 3.9 and Appendix C).

3.10 Groundwater Hydrology

Groundwater occurs in fractures of the bedrock formations beneath the analysis area and in unconsolidated glacial and alluvial sediments along and adjacent to drainages throughout the analysis area. Although hydraulically connected in many areas, the two water-bearing geologic materials behave differently because of their respective hydraulic characteristics. In the JFEIS, conceptual and numerical models of the analysis area hydrogeology developed to understand the characteristics of the groundwater flow system and evaluate potential impacts of the Project on the environment were described.

3.10.1 Regulatory Framework

Federal and state requirements under the Organic Administration Act, the Forest Service's Locatable Mineral Regulations (36 CFR 228 Subpart A), and the Wilderness Act are described in the JFEIS. DEQ is responsible for administering several water quality statutes, including the Public Water Supply Act, the Montana Water Quality Act, and the Montana Water Use Act. Water quality is discussed in detail in Section 3.13, *Water Quality*. The KFP direction considered in the analysis of groundwater is:

> **FW-DC-WTR-02.** Water quality meets applicable state water quality standards and fully supports beneficial uses. Flow conditions in watersheds, streams, lakes, springs, wetlands, and groundwater aquifers fully support beneficial uses, and meet the ecological needs of native and desirable non-native aquatic species and maintain the physical integrity of their habitats.
>
> **FW-DC-WTR-03.** Stream flows provide for channel and floodplain dimensions that mimic reference conditions. Stream flows allow for water and sediment conveyance and overall channel maintenance. Sediment deposits from over-bank floods allow floodplain development and the propagation of flood-dependent riparian plant species. Surface and groundwater flows recharge riparian aquifers, provide late-season stream flows, cold water temperatures, and sustain the function of surface and subsurface aquatic ecosystems.

3.10.2 Analysis Area and Methods

The groundwater analysis area for direct, indirect, and cumulative effects consists of areas overlying the Libby Adit, drift, and drill pads; areas downgradient of the percolation pond at the Libby Adit Site where treated water would be discharged; and the proposed location of geotechnical investigations between Poorman Creek and Little Cherry Creek. The methods for data collection and impact analysis are the same as described in the JFEIS. The basic hydrogeology data are representative of current conditions, based on comparison of pre-2003 and 2005 data to current conditions. The fundamental direction of groundwater flow has not changed since data collection began. The aquifer characteristics measured in the 1980s and 1990s are not expected to change within the time frame of the Project. Baseflow in Little Cherry, Poorman, and Ramsey Creeks would not be affected and is not discussed further.

3.10.3 Affected Environment

The groundwater resources that may be affected by Project activities are described in JFEIS Section 3.10.3, *Affected Environment*. MMC continues to monitor water levels at monitoring

wells at the Libby Adit in accordance with Operating Permit No. 00150 and MPDES Permit MT0030279. MMC also monitors adit inflows and water pressure in a Libby Adit fracture. Monitoring data are available in MMC's annual reports (MMC 2014a, 2015c, 2016, 2017c, 2018b). Measured water levels at the wells for the past several years are within the range described in JFEIS Section 3.11.3, *Affected Environment*.

As disclosed in the JFEIS, the average annual adit inflow rate decreased from 125 gpm in 2009 to 53 gpm in 2013, based on the volume of water delivered to the Water Treatment Plant. Average annual adit inflow rate has continued to decrease, averaging 38 gpm in 2016 (MMC 2017c). The inflow rate into the adit and drifts modeled for the Project was 260 gpm (Geomatrix 2011).

Water samples, including from springs supporting GDEs, were analyzed for isotopes by MMC and DEQ since 2010, and by Gurrieri (2001) in 1999; Gurrieri (2015) summarized and interpreted available isotope data. These data were described in JFEIS Section 3.11.3, *Affected Environment*. Appendix C describes additional isotope analyses that would be completed before starting the Project.

The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on groundwater hydrology in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. Appendix C describes the additional groundwater data that would be collected before and during the Project. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.10.4 Environmental Consequences

3.10.4.1 Alternative 1

Alternative 1 would not change groundwater levels or baseflow. Disturbances at the Libby Adit Site would remain until the adit was plugged and the site reclaimed in accordance with existing permits and approvals. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Any changes in streamflow in Libby Creek above the Libby Adit Site from the partial dewatering of the Libby Adit would continue until groundwater levels recovered after the Libby Adit was plugged. Groundwater levels overlying the Libby Adit and baseflow in Libby Creek would return to existing conditions after the adit was plugged. Groundwater storage effects would be less than Alternative 2 due to less underground development.

3.10.4.2 Alternative 2

3.10.4.2.1 Project Activities

The effects of adit inflows while the Libby Adit remained open would be the same as Alternatives 3 and 4, which are discussed under Alternative 3.

3.10.4.2.2 Libby Adit Site Closure

MMC would place two plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two plugs would be near the Libby Adit portal, as discussed in Section 2.4.4.1, *Closure of the Libby Adit and Site Reclamation*. After the adit was plugged, Water

Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely could range from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. Geomatrix (2011) did not model closure conditions because they assumed mine construction would occur sequentially.

A change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. If groundwater flowed from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage, baseflow in west-side streams probably would be more than predicted for the Project but less than existing conditions. Libby Creek baseflow may be slightly greater than existing conditions if such a diversion of groundwater occurred. Any changes in baseflow in East Fork Rock Creek and the East Fork Bull River would be more likely to be permanent than in Alternatives 3 and 4.

Assuming a reasonable range of storage values for the bedrock, such as those used in the 3D model, groundwater storage in the flooded adit and drifts would be greater than groundwater stored in fractures in the same area before underground activities. The estimated increase in groundwater storage would be 60 million gallons or 186 acre-feet of water.

3.10.4.3 Alternative 3

3.10.4.3.1 Project Activities

Mine Area

Adit Inflows

As adit dewatering and drift development progressed, the average adit inflow would increase with predicted short-term spikes in flow as new water-bearing fractures were encountered. An inflow rate of 260 gpm was predicted by the 3D model, with possible short-term inflow peaks. Blasting during adit extension and drifts development may result in stress redistribution that could affect local groundwater flow in fractures around the adit and drifts. The stress redistribution may open some fractures and close others, depending on the actual stress regime. It is unlikely this would result in a change in the steady-state inflows to the adit and drifts. It is possible that changes to the fracture network resulting from the stress redistribution could affect (increase or decrease) drawdown beneath local areas and alter inflow to specific portions of the adit and drifts, but it is not possible to predict if or where this may occur.

Groundwater Drawdown

The 3D model predicted that groundwater drawdown would be greatest along the trend of the Libby Adit and along the Snowshoe fault, ranging between 10 and 100 feet. The predicted drawdown was between 100 and 500 feet in some areas (Geomatrix 2011). In December 2008, MMC dewatered the Libby Adit to the 7,200-foot level and began collecting periodic adit groundwater inflow data. The “7,200 foot level” is defined as 7,200 feet along the adit from the

Table 324. Predicted Changes to Baseflow.

Drainage and Location (Figure 319)	Model-Predicted Existing Baseflow (cfs)	Without MMC's Modeled Mitigation		
		Model-Predicted Baseflow (cfs)	Predicted Change in Baseflow (cfs)	Percent Change in Baseflow
Rock Creek and East Fork Rock Creek				
At mouth (RC-2000)	7.70	7.69	-0.01	>-1%
CMW boundary (EFRC-200)	0.29	0.28	-0.01	-3%
In CMW (EFRC-50)	0.04	0.04	0.00	0%
East Fork Bull River				
At mouth (East Fork Bull River at Mouth)	11.34	11.32	-0.02	>-1%
CMW Boundary (EFBR-500)	4.36	4.36	0.00	0%
In CMW (EFBR-300)	0.29	0.29	0.00	0%
Libby Creek				
Libby Creek at US 2	19.83	19.81	-0.02	>-1%
LB-300	1.22	1.19	-0.02	-2%
CMW boundary (~LB-100)	0.54	0.54	0.00	0%
In CMW (LB-50)	0.28	0.28	0.00	0%

">-1%" = percent change is between 0 and -1%
cfs = cubic feet per second. "cfs" is the accepted unit for reporting streamflow. Because it is a large unit (1 cfs = 448.8 gpm), predicted changes in terms of cfs appear to be very precise (i.e., reported to 0.01 cfs). If the results were converted to gallons per minute, they would be reported to the nearest 5 gpm. JFEIS Section 3.11.4.4.6, *Uncertainties Associated with Detecting Streamflow Changes due to Mine Activities*, discusses streamflow variability and measurability.
With the data currently available, the model results provide a potential range of dewatering rates and streamflow impacts. They are the best currently available estimates of impacts and associated uncertainty that can be obtained using currently available data in the groundwater models. See Section 3.10.4.3.3, *Groundwater Model Uncertainty*, for more discussion of model uncertainty.
Source: Geomatrix 2011.

portal. Modeled drawdown east of 7,200 feet from the portal along the adit has already occurred. The extent of drawdown west of the 7,200-foot level that has already occurred is not known.

Changes in Baseflow

The 3D model predicted small changes in baseflow in Libby Creek, East Fork Rock Creek, Rock Creek, and the East Fork Bull River (Table 324). No changes in streamflow are predicted in the CMW in Libby Creek or the East Fork Bull River. The model predicted a decrease in streamflow in East Fork Rock Creek in the CMW (at EFRC-200 at the Rock Lake outlet) of 0.01 cfs, or 4 to 5 gallons per minute. For context, a typical ½-inch, 50-foot household garden hose has a flow rate of 12 gallons per minute. Predicted flow changes are less than what could be measured accurately.

Springs and Seeps

Based on the results of the numerical models, groundwater drawdown would occur around the underground openings as a result of dewatering of the adit and drifts. Flow from springs hydraulically connected to the deeper groundwater flow path would be reduced. Because springs

below an elevation of about 5,000 to 5,600 feet may derive their water from both shallow and deep groundwater flow paths at various ratios, it is not possible to predict the amount (if any) of flow reduction for any one spring. Springs and seeps in the mine area have been inventoried, but the inventory has not yet identified the specific groundwater source for each spring or seep. The GDE monitoring described in Appendix C would require that specific analyses be performed to determine the source of water to specific springs.

Geotechnical Investigation Area

Groundwater levels in the geotechnical investigation area between Poorman and Little Cherry Creeks would be lower in areas surrounding wells on which aquifer tests were performed. The tests would be short, lasting up to 48 hours, and groundwater levels would return within days to pre-test levels. Groundwater withdrawals from Libby Creek alluvium also would not occur, and groundwater levels in Libby Creek alluvium would not be affected. Aquifer tests are not expected to affect springs and seeps in the area. A beneficial water use permit is not required if the intent is to conduct aquifer tests, water quality tests, water level monitoring, or other testing or monitoring of a water source (85-2-369, MCA).

3.10.4.3.2 Libby Adit Site Closure

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. The analysis of Alternative 2 indicated that a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. MMC would update the 3D model within 2 years of completing data collection from underground, assessing if an additional plug was necessary to avoid or minimize permanent effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River. If needed, a plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. The KNF estimates the westernmost plug, if needed, would be 1,850 feet from the start of the inclined drift to above the ore body.

After the adit was plugged, Water Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. If an additional plug was needed and installed to minimize post-closure effects, the time to fill the adit and drifts would be about half of what it was with two plugs. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates a third plug would ensure that streamflow in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions.

Assuming a reasonable range of storage values for the bedrock, such as those used in the 3D model, groundwater storage in the flooded adit and drifts would be greater than groundwater

storage in fractures in the same area before underground activities. The estimated increase in groundwater storage would be 54 million gallons or 166 acre-feet of water, slightly less than Alternative 2 due to the small drift sizes.

3.10.4.3.3 Groundwater Model Uncertainty

Both the 2D and 3D model reports include a discussion of the respective model's sensitivity to a range of hydrologic characteristics (ERO Resources Corp. 2009; Geomatrix 2011). The sensitivity analysis for the 3D model indicates that varying hydraulic conductivity of the various layers by one order of magnitude (10 times) in either direction provides results that may be considered feasible, but the model calibration was poorer than for the selected hydraulic conductivity values. The sensitivity analysis of varying hydraulic conductivity using the 3D model resulted in a range of adit inflows of 130 to 1,800 gpm. Based on historical and current inflow data from the Libby Adit, steady-state adit inflows of 130 or 1,800 gpm are unlikely, indicating that the hydraulic conductivity values used in the calibrated model run provide a reasonable estimate of adit inflow, groundwater drawdown, and changes to baseflow within the constraints of other parameters used in the models.

Each model report discusses overall uncertainty of the respective model results. The hydraulic properties of the bedrock and faults are also uncertain; predictions of adit inflows and impacts on water resources are sensitive to permeability of major fault zones. In addition to varying the bulk hydraulic conductivity, Geomatrix (2011) varied the hydraulic conductivity of layers adjacent to faults. The modified fault analysis did not provide a good match with flow tests performed within the Libby Adit and overpredicted observed adit inflow. The modified fault analysis predicted greater depletion in baseflow to nearby streams, compared to the calibrated model runs (Geomatrix 2011). With the data currently available, the model results provide a potential range of dewatering rates and streamflow impacts. They are the best currently available estimates of impacts and associated uncertainty that can be obtained using currently available data in the groundwater models.

In addition to model uncertainty, measurability is another issue. The numerical model predicted baseflow changes at various locations along streams draining the area overlying the adit and proposed drifts, but the model did not consider what is possible to detect or measure. Although streamflow monitoring would continue, it probably would not be able to detect Project-related changes in streamflow at the levels predicted by the model because of the predicted changes are small and streamflow has natural variability. Other factors should be considered when reviewing and interpreting predicted baseflow. For example, baseflow at any one location along a stream may not be easily defined within the range of the model-predicted changes. Impacts from dewatering the adit and drifts may be expressed in other ways, such as changing the elevation at which streams begin to flow. Dewatering (and resultant groundwater drawdown) may cause this elevation to be lower in a drainage. JFEIS Section 3.11.4.4.6, *Uncertainties Associated with Detecting Streamflow Changes due to Mine Activities*, discussed streamflow variability and measurability.

3.10.4.3.4 Effectiveness of the KNF's Proposed Monitoring and Mitigation

Monitoring

Groundwater Levels

The most effective method for monitoring groundwater levels would be the installation of piezometers in the area overlying the ore body. This method is typically used to establish baseline

groundwater conditions and monitor changes due to Project activities. Because the ore body is located within the CMW, the KNF did not include the surface installation of piezometers in the CMW in Alternatives 3 and 4. Drilling in the CMW would have required the use of helicopter-supported drilling in an important grizzly bear corridor. To avoid affecting the bear by drilling in the CMW, the KNF developed a detailed underground monitoring program, provided in Appendix C. Underground monitoring would be effective if implemented as discussed in Appendix C.

In Alternatives 3 and 4, MMC would monitor groundwater level changes from numerous locations within the adit and drifts (Appendix C). This information would be effective in establishing seasonal and long-term trends resulting from dewatering, and in understanding the hydrogeology to be used in refining the 3D model. Because the underground piezometers would be installed after the dewatering process had started, this monitoring would not fully characterize existing conditions.

Changes in Spring Flow

MMC would collect flow data from springs in the area predicted by the groundwater model to be affected by groundwater drawdown due to dewatering. MMC has started spring flow monitoring in the area overlying the adit and proposed drifts and would continue monitoring until bond was released (Appendix C). Springs selected for flow measurement would be those that derive most or all of their water from bedrock sources, such as SP-41. Flow of the selected springs would be measured at least annually when accessible (typically early July through October), and others would be recorded continuously during the same period, where it was feasible. Spring flow and other GDE monitoring, when coupled with monitoring of adit inflows and groundwater levels from inside the adit and drifts, would be effective in detecting Project-related effects in the upper watersheds of the analysis area.

Changes in Stream Baseflow

MMC would collect flow data from stream reaches predicted to be affected by dewatering. MMC started streamflow monitoring in the area overlying the adit and proposed drifts and would continue it until bond was released (Appendix C). Continuous data recorders would be used at some monitoring locations, where feasible, to obtain streamflow measurements, particularly during periods of low flow. Although streamflow monitoring would continue, it probably would not be able to detect Project-related changes in streamflow at the levels predicted by the model because the predicted changes are small and streamflow has natural variability. Effectiveness would increase as data from multiple years were evaluated to establish long-term trends in baseflow.

Mitigation

Buffers

The 3D modeling was performed using buffers of 100 and 500 feet from the Rock Lake Fault and Rock Lake, respectively. In Alternatives 3 and 4, Project activities would be limited to within 300 feet of the Rock Lake Fault and 1,000 feet of Rock Lake to minimize the risk of high water inflow rates and resulting reduction in groundwater levels. The KNF also would monitor underground development relative to the prescribed buffers (see Section C.5, *Rock Mechanics*, in Appendix C).

Grouting

Grouting of fractures in the Libby Adit extension and drifts would reduce inflows. Historically, grouting of fractures in the Libby Adit has been effective in reducing inflows, and MMC would be able to maintain grouting in the adit and drifts until the Libby Adit was plugged. With proper maintenance, grouting would be effective in reducing adit inflows. Should certain threshold inflow rates be observed, as described in Appendix C, MMC would report the conditions, and the KNF would evaluate whether specific actions would be required.

Multiple Adit Plugs

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. The analysis of Alternative 2 indicated that a change in groundwater flow path may occur because the inclined drift would interconnect the watersheds of East Fork Rock Creek and the East Fork Bull River with the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. MMC would update the 3D model within 2 years of completing data collection from underground, assessing if an additional plug was necessary to avoid or minimize permanent effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River. If needed, a plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. The KNF estimates the westernmost plug, if needed, would be 1,850 feet from the start of the inclined drift to above the ore body.

After the adit was plugged, Water Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. If an additional plug was needed and installed to minimize post-closure effects, the time to fill the adit and drifts would be about half of what it was with two plugs. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates a third plug would ensure that groundwater levels overlying the Libby Adit and drifts and baseflow in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions.

3.10.4.4 Alternative 4

Effects of Alternative 4 would be the same as Alternative 3.

3.10.4.5 Cumulative Effects

3.10.4.5.1 Past and Current Actions

The Heidelberg Adit is a horizontal tunnel that was constructed in the 1920s. The adit extends about 790 feet into a cliff face located along East Fork Rock Creek about 850 vertical feet below Rock Lake. Groundwater flow from the adit is reported to range from 45 to 135 gpm (Gurrieri 2001). During the KNF's 2007 field review, flow from the adit was estimated to be 50 gpm, and,

because of dry conditions at the time of the site visit, this rate is considered to be baseflow from bedrock. Because flow data were apparently not collected before construction of this adit, it is not known if the adit outflow affected baseflow in nearby East Fork Rock Creek.

The Libby Adit was constructed between 1990 and 1991 by NMC and is about 14,000 feet long and slopes downward toward the ore body at a 6 percent slope. Groundwater inflow to the adit increased as the adit was driven, peaking at 239 gpm. The steady-state flow from the adit was 150 gpm. In 2008, MMC dewatered the Libby Adit to the 7200-foot level and began collecting periodic adit groundwater inflow data. In 2016, average annual inflow into the adit was 38 gpm. No groundwater piezometers were installed at the time the adit was constructed to identify changes in groundwater levels near the adit as a result of dewatering.

If the Montanore Project were approved and implemented, the cumulative effects of the Montanore Project are described in the JFEIS. Based on DEQ's 2016 ROD for the Montanore Project (DEQ 2016b), the KNF expects that another nondegradation compliance determination for construction and operation of the mine may be made after MMC collected additional information during the Project. To comply with DEQ's nondegradation provisions, changes in $7Q_{10}$ streamflow in the CMW greater than 10 percent must be less than discussed in the JFEIS, unless DEQ determined $7Q_{10}$ flow changes of more than 10 percent were nonsignificant.

3.10.4.5.2 Rock Creek Project

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Rock Creek's 3D groundwater model predicted that baseflow would not be affected during Phase I Evaluation (Hydrometrics 2014).

Assuming they occurred concurrently, the Montanore Project and Phase II of the Rock Creek Project would cumulatively reduce flow in the Rock Creek, East Fork Bull River, and Bull River watersheds. No other aspects of the two projects would have cumulative effects on groundwater resources. The cumulative effects of the two projects are described in the JFEIS, and the predicted effects are shown in JFEIS Table 104.

3.10.4.5.3 Other Reasonably Foreseeable Actions

No other reasonably foreseeable actions would have cumulative effects on groundwater flow.

3.10.4.6 Regulatory/Forest Plan Consistency

3.10.4.6.1 Organic Administration Act and Forest Service Locatable Minerals Regulations

The Forest Service is responsible for ensuring that mineral operations on National Forest System lands comply with Forest Service locatable mineral regulations (36 CFR 228 Subpart A) for environmental protection. One of these regulations (36 CFR 228.8) requires that mineral operations be conducted, where feasible, to minimize adverse environmental impacts on National Forest System surface resources. Alternative 2 would not fully comply with 36 CFR 228.8 because MMC did not propose to implement feasible measures to minimize adverse environmental impacts on surface resources. Alternatives 3 and 4 would incorporate additional feasible measures to minimize adverse environmental impacts on National Forest System surface resources. The measures would include increasing buffer zones, installing multiple site-specifically designed adit plugs at closure, and increased monitoring. Alternatives 3 and 4

expanded MMC's proposed monitoring plans and would include action levels on adit inflows and changes in surface water flow and lake levels that would trigger corrective measures to be implemented by MMC (see Appendix C).

3.10.4.6.2 Wilderness Act

All alternatives have the potential to indirectly affect wilderness qualities. Mitigation measures identified in Chapter 2 for Alternatives 3 and 4 and monitoring required for Alternatives 3 and 4 (Appendix C) would be implemented to minimize potential changes in wilderness character. Mitigation measures, such as increasing the buffer zones near Rock Lake and the Rock Lake Fault and the KNF's monitoring, would reduce the risk of measurable hydrological indirect effects on the surface within the wilderness.

Mitigation measures and monitoring requirements in Alternatives 3 and 4 are reasonable stipulations for protection of the wilderness character and are consistent with the use of the land for mineral development. Alternatives 3 and 4 would be conducted to protect the surface resources in accordance with the general purpose of maintaining the wilderness unimpaired for future use and enjoyment as wilderness and to preserve the wilderness character consistent with the use of the land for mineral operations in compliance with 36 CFR 228.15 and the Wilderness Act. Alternatives 3 and 4 would comply with the Wilderness Act. Alternatives 3 and 4 would minimize adverse environmental impacts on surface resources in the wilderness and thereby comply with the regulations (36 CFR 228 Subpart A) for locatable mineral operations on National Forest System lands.

3.10.4.6.3 National Forest Management Act/Kootenai Forest Plan

Compliance with the KFP is described in the following sections.

FW-DC-WTR-02. All alternatives would meet applicable state water quality standards and fully support beneficial uses. DEQ's Hard Rock Operating Permit decision (DEQ 2016b), issuance of a MPDES permit (2017 MPDES permit MT0030279) (DEQ 2017a), or any other state water quality permit or approval (401 certification if needed) constitute compliance with Montana water quality requirements and Clean Water Act requirements regarding water quality. Geotechnical activities would have a negligible short-term effect on groundwater. Flow conditions in groundwater aquifers would support beneficial uses and meet the ecological needs of native and desirable nonnative aquatic species and maintain the physical integrity of their habitats. All alternatives would be neutral with regard to progress toward this desired condition.

FW-DC-WTR-03. None of the alternatives would affect channel dimensions or have facilities in a Federal Emergency Management Agency (FEMA)–designated floodplain. Effect on groundwater discharge into streams in the analysis area would be negligible. Groundwater flows would continue to recharge riparian aquifers, provide late-season stream flows and cold water temperatures, and sustain the function of surface and subsurface aquatic ecosystems. The alternatives would be neutral with regard to progress toward this desired condition.

3.10.4.7 Irreversible and Irretrievable Commitments

Most of the total precipitation that falls in the Cabinet Mountains flows from the mountains as surface water and groundwater. The total water yield varies from year to year as a function of the total precipitation and varying amounts of evapotranspiration. Some water would be used consumptively by the Project, reducing the total yield of the region by that amount. Relative to

the total yield of the affected watersheds, the consumptively used volume would be small. The reduction in yield would be an irretrievable commitment of resources.

In addition to water consumptively used, the estimated increase in groundwater storage due to the adit and drifts would be between 160 and 190 acre-feet, depending on the alternative. This volume of groundwater required to fill the adits and drifts would be an irretrievable commitment of resources.

After the adits and drifts filled and groundwater levels recovered, the total water yield of the region would return to existing conditions. Without mitigation in Alternative 2, the adit and drifts could permanently change the groundwater flow paths from the East Fork Rock Creek watershed toward the East Fork Bull River watershed. Mitigation would be designed to minimize post-closure changes in East Fork Rock Creek and East Fork Bull River streamflow and water quality. Without mitigation in Alternative 2, the change in groundwater flow paths would be an irreversible commitment of resources.

3.10.4.8 Short-Term Uses and Long-Term Productivity

As described, there would be a short-term reduction in available water from this portion of the Cabinet Mountains equal to the consumptive use of the Project. Given the overall flow rate of streams from this area, the total short-term change would be small. Long-term water availability of this area would not be reduced, and the distribution among the four major drainages would not be altered.

3.10.4.9 Unavoidable Adverse Environmental Effects

The consumptive use of groundwater by the Project would unavoidably reduce the total water yield from this portion of the Cabinet Mountains. The anticipated consumptive use would be small relative to the total water yield of the analysis area.

3.11 Surface Water Hydrology

This section provides information on analysis area streams, springs, and lakes, and potential consequences to streamflow, spring flows, and lake levels. Surface water rights are discussed in Section 3.12, *Water Rights*, and surface water quality is discussed in Section 3.13, *Water Quality*.

3.11.1 Regulatory Framework

3.11.1.1 Federal Requirements

Federal requirements under the Organic Administration Act, the Wilderness Act, the Federal Water Pollution Control Act (Clean Water Act), and Executive Order 11988 are described in the JFEIS. Because the JFEIS was remanded in part for failing to comply with the Clean Water Act, federal requirements pursuant to the Clean Water Act are discussed below.

The Federal Water Pollution Control Act (Clean Water Act) is designed to protect and improve the quality of water resources and maintain their beneficial uses. Mineral operations on National Forest System lands are subject to compliance with Clean Water Act Sections 401, 402, and 404 as applicable. Analysis and discussion related to Section 404 of the Clean Water Act and Executive Order 11990 are in Section 3.23, *Wetlands and Other Waters of the U.S.*

The Forest Service's locatable minerals regulations are promulgated at 36 CFR 228 Subpart A. The regulations apply to operations conducted under the U.S. mining laws as they affect surface resources on National Forest System lands under the jurisdiction of the Secretary of Agriculture. One of the mineral regulations (36 CFR 228.8) requires that mineral operations be conducted, where feasible, to minimize adverse environmental impacts on National Forest surface resources. 36 CFR 228.8 also requires that mineral operations comply with applicable state and federal water quality standards, including the Clean Water Act; take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations; and reclaim the surface disturbed in operations by taking such measures as preventing or controlling on-site and off-site damage to the environment and forest surface resources. All waters within the boundaries of National Forests may be used for any beneficial use under applicable state law. 36 CFR 228.8(h) states that "certification or other approval issued by state agencies or other federal agencies of compliance with laws and regulations relating to mining operations will be accepted as compliance with similar or parallel requirements of these regulations."

The KFP direction considered in the analysis of streamflow is:

> **GOAL-WTR-01.** Maintain or improve watershed conditions in order to provide water quality, water quantity, and stream channel conditions that support ecological functions and beneficial uses.
>
> **FW-DC-WTR-01.** Watersheds and associated aquatic ecosystems retain their inherent resilience to respond and adjust to disturbance without long-term, adverse changes to their physical or biological integrity.
>
> **FW-DC-WTR-02.** Water quality meets applicable state water quality standards and fully supports beneficial uses. Flow conditions in watersheds, streams, lakes, springs, wetlands, and groundwater aquifers fully support beneficial uses, and meet the ecological

needs of native and desirable non-native aquatic species and maintain the physical integrity of their habitats.

FW-DC-WTR-03. Stream flows provide for channel and floodplain dimensions that mimic reference conditions. Stream flows allow for water and sediment conveyance and overall channel maintenance. Sediment deposits from over-bank floods allow floodplain development and the propagation of flood-dependent riparian plant species. Surface and groundwater flows recharge riparian aquifers, provide late-season stream flows, cold water temperatures, and sustain the function of surface and subsurface aquatic ecosystems.

FW-DC-WTR-06. Cooperate with other landowners, agencies, and partners to monitor, maintain, and improve watershed and stream channel conditions.

3.11.1.2 State Requirements

State requirements under the Montana Floodplain and Floodway Management Act and the Montana Natural Streambed and Land Preservation Act are described in the JFEIS. Because the JFEIS was remanded in part for failing to comply with the Clean Water Act, state requirements pursuant to the Clean Water Act are discussed below.

The State of Montana, through DEQ, has been delegated authority for administering nonpoint source pollution prevention programs, the National Pollutant Discharge Elimination System program, and water quality standards required by the Clean Water Act. Montana's Water Quality Act provides a regulatory framework for protecting, maintaining, and improving the quality of state waters for beneficial uses. Pursuant to the Montana Water Quality Act, DEQ developed water quality classifications and standards, a nondegradation policy, and a permit system to control discharges into state waters. Mineral operations must comply with Montana's regulations and standards for surface water and groundwater.

The Montana Water Quality Act requires DEQ to protect high-quality waters from degradation; this law implements the Clean Water Act requirement to adopt a statewide antidegradation policy. The current rules were adopted in 1994 in response to amendments to Montana's nondegradation statute in 1993 and apply to any activity that is a new or increased source that may degrade high-quality water. The Montana Water Quality Act defines "degradation" as a change in water quality that lowers the quality of high-quality waters for a parameter, unless the change is nonsignificant. All of the waters in the analysis area are high-quality waters, except surface waters that have zero flow or surface expression for more than 270 days during most years. High-quality waters are defined in the Montana Water Quality Act (75-5-103(13), MCA). The nondegradation rules do not apply to water quality parameters for which an authorization to degrade was obtained before the 1993 amendments to the statute. Noranda, MMC's predecessor, obtained an authorization to degrade in 1992 for certain water quality parameters. For those parameters, the limits contained in the authorization to degrade apply. For those parameters not covered by the authorization to degrade, such as flow, the applicable nonsignificance criteria established by the 1994 rules, and any subsequent amendments, apply (ARM 17.30.715).

Nondegradation rules provide that if an activity increases or decreases the mean monthly flow of a stream by less than 15 percent, or the 7-day, 10-year ($7Q_{10}$) flow of a stream by less than 10 percent, such changes are nonsignificant for purposes of the statute prohibiting degradation of state waters (ARM 17.30.715(1)(a)). Notwithstanding compliance with the nonsignificance

criteria in ARM 17.30.715(1), DEQ may determine under ARM 17.30.715(2) that a change in water quality is degradation based on the following criteria: (a) cumulative impacts or synergistic effects, (b) secondary byproducts of decomposition or chemical transformation, (c) substantive information derived from public input, (d) changes in flow, (e) changes in the loading of parameters, (f) new information regarding the effects of a parameter, or (g) any other information deemed relevant by DEQ and that relates to the criteria in ARM 17.30.715 (1). Under ARM 17.30.715(3), DEQ may determine that a change in water quality is nonsignificant based on information submitted by an applicant that demonstrates conformance with the guidance found in 75-5-301(5)(c), MCA, which is (i) potential for harm to human health, a beneficial use, or the environment; (ii) strength and quantity of any pollutant; (iii) length of time the degradation will occur; and (iv) the character of the pollutant so that greater significance is associated with carcinogens and toxins that bioaccumulate or biomagnify, and lesser significance is associated with substances that are less harmful or less persistent. Such a determination would be submitted for public comment before making a decision. Under the Montana Water Quality Act, no authorization to degrade may be obtained for outstanding resource waters, such as surface waters within a wilderness.

In 2016, DEQ issued a ROD on the Montanore Project (DEQ 2016b). In the ROD, DEQ determined that activities associated with the Evaluation Phase of the Montanore Project, except the discharges to surface water, would comply with the Montana Water Quality Act, including the nondegradation provisions. DEQ's approval of the amendments to Operating Permit No. 00150 pertaining to the Project was conditioned on MMC receiving DEQ's approval of the renewal of MPDES Permit No. MT0030279. DEQ issued a final MPDES permit in 2017 (DEQ 2017a) along with responses to comments on prior draft permits (DEQ 2017c). In issuing the MPDES permit, DEQ set effluent limits and conditions for Outfall 001 that comply with the surface water quality standards, the nondegradation policy, and the BHES Order to ensure that the current and future beneficial uses of state waters are protected (DEQ 2016c).

3.11.2 Analysis Area and Methods

3.11.2.1 Analysis Area

The analysis area consists of the East Fork Bull River, East Fork Rock Creek, Rock Creek and Libby Creek where dewatering the Libby Adit and drifts may reduce streamflow, the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and some locations where the KNF would change road access for grizzly bear mitigation. Proposed access changes in roads would be implemented in the Big Cherry Creek and Standard Creek drainages. Access changes in these drainages would not affect streamflow or floodplains and are not discussed further. A transmission line would not be constructed, and streamflow and floodplains in the Fisher River and its tributary Sedlak Creek, West Fisher Creek and its tributary Standard Creek, Miller Creek, and Hunter Creek would not be affected.

3.11.2.2 Methods

Except for the changes described in this section, the methods for data collection and impact analysis are the same as described in the JFEIS.

3.11.2.2.1 Ongoing Streamflow, Lake Levels, and GDE Monitoring

Streamflow and Lake Levels

MMC continues to collect streamflow data in accordance with the 2006 MPDES permit, the 2017 MPDES permit when it superseded the 2006 MPDES permit, and Operating Permit No. 00150. Monitoring data are available in MMC's annual reports (MMC 2014a, 2015b, 2016, 2017c, 2018b). As described in JFEIS Section 3.11.2.2, MMC completed GDE surveys in the mine area between 2009 and 2013 and continued GDE monitoring in 2016 (Klepfer Mining Services 2017a) and 2017 (MMC and Klepfer Mining Services 2018). Data from the 2016 and 2017 GDE monitoring are described in the subsequent *Affected Environment* section.

MMC conducted synoptic flow measurements on Libby Creek in 2016 and 2017, and on East Fork Rock Creek and the East Fork Bull River in 2017 (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). Ten Libby Creek sites were included in the synoptic measurements. In East Fork Rock Creek, 10 sites from above Rock Lake to the confluence of the creek with West Fork Rock Creek were included in the measurements. In the East Fork Bull River, 11 sites from above St. Paul Lake to the confluence with the North Fork East Fork Bull River were included in the measurements. Flow synoptic measurements were taken twice a month from July to October (MMC and Klepfer Mining Services 2018).

In 2013, MMC installed continuous flow instruments (data loggers that measure stream height) at EFBR-50, EFRC-50, EFRC-100, and LB-200. The EFRC-50 data logger washed out the first year it was installed, and in 2017 another attempt was made to install a continuous monitoring station at the site (MMC and Klepfer Mining Services 2018). Between 2013 and 2017, regular flow measurements were taken at EFRC-50. Based on the 2017 attempt, MMC determined site conditions were not ideal to install a continuous monitoring station at the previous location. A new station, also named EFRC-50, was installed 1,000 feet below the original location, and data collection commenced on August 20, 2017 (MMC and Klepfer Mining Services 2018). A data logger was installed at EFBR-50 at the same time EFRC-50 was installed. It also did not survive a winter season, and unlike the data logger at EFRC-50, the data logger was not recovered and could not be found. On June 26, 2017, a new continuous flow monitoring station was installed at EFBR-50 (MMC and Klepfer Mining Services 2018). The EFRC-100 data logger has not been reliable to collect consistent data, and in 2016, partial data were collected from this site (Klepfer Mining Services 2017a). On June 27, 2017, a new continuous flow monitoring station was installed at EFRC-100 (MMC and Klepfer Mining Services 2018). The difficulty of establishing flow instrumentation in streams in the Cabinet Mountains is exemplified by measured flows at EFBR-50 in the headwaters of the East Fork Bull River. Flows at EFBR-50 were low in July through September, with the lowest flow of 0.38 cfs measured in September. A flow of 14.94 cfs at EFBR-50 was measured in mid-October 2016, reflecting the 18.6 inches of precipitation over the course of the month recorded at the Poorman SNOTEL site (Natural Resources Conservation Service 2018).

In 2016 and 2017, MMC conducted wetted perimeter monitoring on East Fork Rock Creek at site RC-3 and the East Fork Bull River at site EFBR-2 with the objective of assessing flow depletion predicted by the numerical hydrological model on these stream systems (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). The intent of the monitoring was to establish a relationship between stream flow and wetted perimeter. Three transects and a benchmark for elevation control were established for each site. The stream gradient at EFBR-2 was steeper, and several channels influenced water levels and the wetted perimeter. The steep gradient acerbated

the challenge of establishing a water level during low flows. The EFBR-2 site includes mostly large cobble to boulder substrate. The RC-3 site has a cobble substrate. These substrate materials are not ideal for establishing a consistent cross-sectional area for each transect. Water elevations vary because the larger cobbles separate the flow into individual channels within the transect. Under these conditions, the relationship between flow and wetted perimeter does not satisfy the assumptions of the flow measurement method used. Further, ongoing sampling has shown that significant substrate movement occurs between sampling events. For ongoing monitoring, MMC would consider modifications to the method to address the current limitations by relocating the station or adapting different techniques to measure flows and wetted perimeter. Any changes to the wetted perimeter monitoring method would require the KNF's approval.

In July, August, and September 2017, Kline made streamflow and fish habitat observations in the upper East Fork Bull River drainage near Placer Creek below Saint Paul Lake (Kline Environmental Research 2017).

MMC established benchmark sites to provide monitoring stations outside of the area of influence of Project activities. For flows, stations were established on Bear Creek (BC-50) and Swamp Creek (SC-1). SC-1 is on the creek downgradient of Wanless Lake and Buck Lake and is at a similar elevation to EFRC-300 (Rock Creek Meadows). Monitoring site BC-50 is a benchmark site for LB-200. They are at similar elevations and have similar stream characteristics; flow is significantly less at BC-50 than at LB-200 (MMC and Klepfer Mining Services 2018). Wanless Lake is a benchmark site for Rock Lake and is at similar elevation. WL-1 and WL-2 are Wanless Lake inlet and outlet monitoring stations, respectively. A data logger was installed at WL-1 in 2014. In 2015, an attempt was made to retrieve the data from the transducer, but the unit could not be located. In 2016, the unit was found, but the batteries were dead and no data were stored. The unit was reinstalled in 2016, and the most recent data download was conducted in October 2017 (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). A data logger was first installed at WL-2 in July 2017 (MMC and Klepfer Mining Services 2018).

MMC continuously monitors lake levels at Rock Lake and Wanless Lake and collaborates with the KNF on the continuous monitoring of Lower Libby Lake levels (MMC and Klepfer Mining Services 2018). Rock Lake has been monitored since 2009. The KNF began monitoring the level of Lower Libby Lake in 2010; the recorder housing failed in 2013, and it was replaced in 2014. Continuous monitoring data from Wanless Lake level monitoring have been collected since 2013. The unit stopped collecting data on May 2015. The unit dislodged from its anchor and was retrieved in 2016, and minor repairs were made to the data logger. The Wanless Lake data logger failed to collect data during winter 2016/2017 and was repaired and reinstalled in July 2017 (MMC and Klepfer Mining Services 2018).

GDE Monitoring

MMC monitors flow, water quality, and plant composition at four GDE sites (GDE sites 1 through 4). Flow is also measured at selected springs. Flow at GDE-3 and GDE-4 was measured in 2017, while flow at GDE-1 and two of the five seeps at GDE-2 was difficult to measure or estimate because of the diffuse nature of the flow (MMC and Klepfer Mining Services 2018). Vegetation monitoring at the GDE sites is described in Section 3.23, *Wetlands and Other Waters of the U.S*. As part of the 2017 GDE monitoring activities, four potential GDE benchmark spring locations were inventoried (MMC and Klepfer Mining Services 2018). The benchmarks springs are located in the West Fisher Creek drainage and the Engle Lak portion of the Rock Creek

drainage and provide viable options for reference to the currently monitored GDE sites (MMC and Klepfer Mining Services 2018).

3.11.2.2.2 Impact Analysis

The KNF used six locations (EFRC-200, RC-2000, EFBR-500, LB-300, LB-2000, and East Fork Bull River at Mouth) to summarize streamflow effects from Project activities (Table 325); the locations are shown on Figure 319. The East Fork Rock Creek site, EFRC-200, is at the outlet of Rock Lake at the CMW boundary. The Rock Creek site, RC-2000, is at the mouth of Rock Creek above the confluence of the Clark Fork River. Two East Fork Bull River sites were assessed: EFBR-500 at the CMW boundary and East Fork Bull River at Mouth located above its confluence with the Bull River. Two sites are on Libby Creek: LB-300 below the Libby Adit Site, and LB-2000 just above the confluence with Bear Creek. Geomatrix (2011) reported that adit inflows would not affect baseflow during the Evaluation Project at two sites (LB-100 and LB-200) above LB-300, and effects on streamflow above LB-300 are not discussed further. The *Affected Environment* section discusses ongoing monitoring throughout the analysis area, regardless of whether a particular location would be affected by the Project. Streamflow in Little Cherry, Poorman, and Ramsey Creeks would not be affected and is not discussed further.

The discussion of streamflow effects in this section is based on DEQ's estimated $7Q_{10}$ of 3.03 cfs at LB-300. Similarly, the effects of the Project at EFRC-200 and all other stream monitoring locations are based on the estimated $7Q_{10}$ flow shown in Table 323 using the USGS method developed for ungaged watersheds (Hortness 2006).

In support of the JFEIS, ERO prepared a 2012 memo on an analysis of the streamflow/wetted perimeter relationship at aquatic life impact assessment sites on the East Fork Bull River, East Fork Rock Creek, and Libby Creek in 2012 (ERO Resources Corp. 2012). ERO updated the memo in 2017 (ERO Resources Corp. 2017a). The 2017 memo replaced the 2012 memo, provided some additional information regarding the analysis, and updated the streamflows used in the analysis to be consistent with the streamflows used in the SEIS. It also updated the estimates of changes in wetted perimeter due to predicted Project changes in streamflow at three locations on Libby Creek, Rock Creek, and the East Fork Bull River.

The KNF used a discharge rate of 263 gpm during the Evaluation Phase of the Montanore Project in the JFEIS. The estimated discharge of 263 gpm was based on the 3D model–predicted inflows during the Evaluation Phase (Geomatrix 2011); modeling is described in JFEIS Section 3.11.2.3.1, *Streamflow*. The model predicted that average inflows over the 2-year modeled period would be 230 gpm of water flowing into the adit and drifts, and 30 gpm of water from mineralized zones, or "mine water." A small amount of water (3 gpm) from precipitation is expected to be collected from the waste rock storage areas. For the 2017 MPDES permit (DEQ 2016c), DEQ used an average year-round discharge rate from the Water Treatment Plant of 365 gpm, based on flow rates in MMC's MPDES permit application. MMC's flow rate was based on the sum of the adit water (360 gpm) and stormwater runoff for the Libby Adit pad (5 gpm). The discharge rate is higher than estimated in the JFEIS for the Evaluation Project because it covered the permit's 5-year term, which at the time of the MPDES permit application (2011) included a Construction Phase.

The KNF used the discharge rate of 365 gpm reported by MMC in assessing streamflow effects. Discharge rates similar to the 365 gpm rate used for the Project analysis have occurred since 2008 when MMC began discharging after reopening the Libby Adit. The maximum flow rate reported

on the MMC's Discharge Monitoring Reports during the term of the 2006-issued MPDES permit while maintaining water levels in the 14,000-foot adit was 374 gpm.

3.11.3 Affected Environment

3.11.3.1 Stream and Spring Flow

Except as described in this section, surface hydrologic resources that may be affected by Project activities are described in JFEIS Section 3.11.3, *Affected Environment*. Measured flows at LB-200, LB-300, LB-500, LB-1000, LB-2000, and LB-3000 for the past several years were within the range described in JFEIS Section 3.11.3, *Affected Environment*. In 2016, unusually high flows in Libby Creek occurred in October when 18.6 inches of precipitation was recorded over the course of the month at the Poorman SNOTEL site (Natural Resources Conservation Service 2018). MMC continues to monitor streamflow in upper East Fork Rock Creek and the upper East Fork Bull River. MMC also continues to monitor spring flow in springs in the drainages of upper Libby Creek, upper East Fork Rock Creek, and the upper East Fork Bull River.

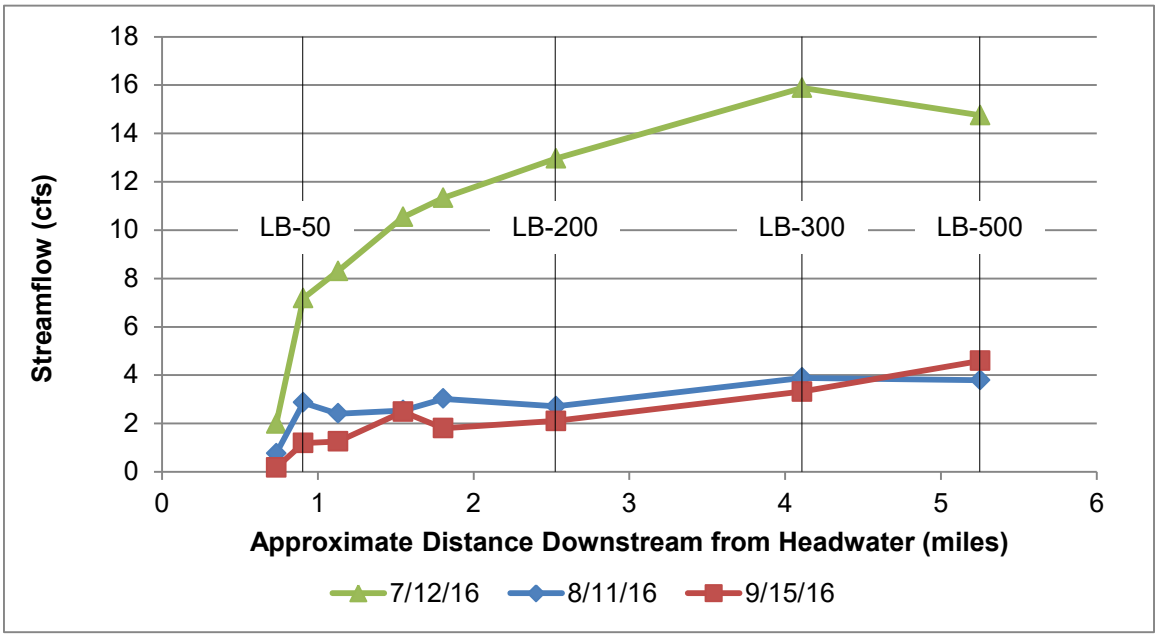
Available flow data at EFBR-50, EFBR-300, EFRC-50, EFRC-100, LB-200, and BC-50 are reported in the 2016 and 2017 GDE reports (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). Flows at EFBR-50 in 2016 were low in July through September, with the lowest flow of 0.38 cfs measured in September. A flow of 14.94 cfs at EFBR-50 was measured in mid-October 2016, reflecting the 18.6 inches of precipitation recorded over the course of the month at the Poorman SNOTEL site (Natural Resources Conservation Service 2018). Similarly, EFBR-300 had a flow of 3.66 cfs in September 2016 and a flow of 31.42 cfs in October. The highest flow at BC-50 of 15.3 cfs was measured in July, and the lowest flow of 1.39 cfs was measured in September.

MMC continues to collect synoptic flow data in upper Libby Creek (Chart 1) (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). Generally, upper Libby Creek is a gaining stream throughout its reach. Segments that lost flow to alluvial deposits generally were not consistent between sampled periods. The most consistent segment that lost more than 1 percent flow was LB-500. Flow at LB-500 was less than at LB-300 in six out of the nine sampled periods in 2016.

Synoptic monitoring of East Fork Rock Creek below Rock Lake during the lowest flow periods indicates this stream is not a consistent gaining stream. RC-3, located on East Fork Rock Creek between EFRC-1000 and EFRC-2000, had higher flows than the upstream location EFRC-1000 and the downstream location EFRC-2000 during lowest flow periods. RC-3 also generally had higher flow than EFRC-2000 during the full monitoring period. Monitoring stations above Rock Lake generally have very low flows. Measurements taken at EFRC-50 and EFRC-100 are similar, and the reach between them may not be a gaining reach.

In 2016 and 2017, MMC conducted wetted perimeter monitoring on East Fork Rock Creek at site RC-3 and the East Fork Bull River at site EFBR-2. The monitoring included measuring streamflow at both sites in July through October (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). The highest flows at RC-3 were measured in July, and the lowest flows were measured in September. Similar to RC-3, the highest flows at EFBR-2 were measured in July, and the lowest flows were measured in September.

Chart 1. Flow in Upper Libby Creek, 2016.



In mid-September 2017, Kline observed a spring in the East Fork Bull River, 2,100 feet upstream of the confluence with Placer Creek. In Placer Creek, Kline observed sufficient flow in July to support fish; the lower reach of Placer Creek was dry in August and September (Kline Environmental Research 2017).

3.11.3.2 Lake Levels

Water levels in Rock Lake, Lower Libby Lake, and Wanless Lake are lowest during January and highest during May and June. Available lake level data are presented in the 2016 GDE monitoring report (Klepfer Mining Services 2017a) and the 2017 GDE monitoring report (MMC and Klepfer Mining Services 2018).

3.11.3.3 Data Adequacy

The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on streamflow and floodplains in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. Appendix C in the SEIS describes the additional water quality data that would be collected in Alternatives 3 and 4. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.11.4 Environmental Consequences

3.11.4.1 Alternative 1

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit

Site would remain until reclaimed in accordance with Operating Permit No. 00150. Reduction of streamflow in Libby Creek above the Libby Adit from the partial dewatering of the Libby Adit would continue until groundwater levels recovered after the Libby Adit was plugged. Changes in streamflow from Water Treatment Plant discharges would continue until the Libby Adit was plugged.

3.11.4.2 Alternative 2

3.11.4.2.1 Project Activities

Streamflow

The Project is predicted to have no effect on streamflow in Libby Creek upstream of the Water Treatment Plant discharge (Geomatrix 2011). Flow in Libby Creek is predicted to continue to increase at LB-300 in Libby Creek by 16 percent of the estimated $7Q_2$ flow and 26 percent of the estimated $7Q_{10}$ flow. Flow at LB-2000 in Libby Creek is predicted to increase by 6 percent of the estimated $7Q_2$ flow and 9 percent of the estimated $7Q_{10}$ flow (Table 325). Flow changes in Libby Creek may be greater than shown in Table 325 for a 3- to 4-week period if MMC discharged at rates up to 500 gpm during initial adit dewatering. Predicted changes would be less if the average annual discharge was less than the 365 gpm used in the analysis. The Project would have no effect on streamflow in any other stream in the Libby Creek watershed.

Table 325. Estimated Changes during $7Q_2$ and $7Q_{10}$ Flows.

Activity	East Fork Rock Creek EFRC-200[1]	Rock Creek RC-2000	East Fork Bull River EFBR-500	East Fork Bull River at Mouth	Libby Creek LB-300[1]	Libby Creek LB-2000[1]
	(cfs except % change)					
Modeled baseflow change (without mitigation)	-0.01	-0.01	0.00	-0.02	-0.02	-0.02
Potable water	0	0	0	0	-0.02	-0.02
Subtotal	-0.01	-0.01	0.00	-0.02	-0.04	-0.04
Water Treatment Plant discharge	0	0	0	0	0.81	0.81
Change at $7Q_2$ flow	-0.01	-0.01	0.00	-0.02	0.77	0.77
Estimated existing $7Q_2$ flow	0.92	13.53	5.77	12.27	4.73	13.85
Estimated $7Q_2$ flow with Project	0.91	13.52	5.77	12.25	5.50	14.62
Percent change in $7Q_2$ flow	-1%	>-1%	0%	>-1%	+16%	+6%
Change at $7Q_{10}$ flow	-0.01	-0.01	0.00	-0.02	0.77	0.77
Estimated existing $7Q_{10}$ flow	0.57	8.80	3.71	7.97	3.03	8.99
Estimated $7Q_{10}$ flow with Project	0.56	8.79	3.71	7.95	3.80	9.76
Percent change in $7Q_{10}$ flow	-2%	>-1%	0%	>-1%	+26%	+9%

[1]The changes shown for LB-300 and LB-2000 due to potable water use and Water Treatment Plant discharges have occurred since 2008.
Modeled baseflow change based on Geomatrix (2011).
cfs = cubic feet per second; > = greater than.
“>-1%” = percent change is between 0 and -1%.
With the data currently available, the model results provide a potential range of dewatering rates and streamflow impacts. They are the best currently available estimates of impacts and associated uncertainty that can be obtained using currently available data in the groundwater models. See JFEIS Section 3.10.4.3.5, *Groundwater Model Uncertainty*, for more discussion of model uncertainty.

Baseflow changes predicted by the 3D model due to adit and drift dewatering would reduce streamflow by 0.02 cfs at the mouth of the East Fork Bull River, a change of less than 1 percent in the estimated $7Q_{10}$ flow. The 3D model predicted streamflow would not be affected in the East Fork Bull River at and above the CMW boundary (EFBR-500). Baseflow changes predicted by the model would reduce streamflow in East Fork Rock Creek by 0.01 cfs at the CMW boundary (EFRC-200) and at the mouth of Rock Creek (RC-2000); changes in the estimated $7Q_{10}$ flow would be 2 percent or less. MMC would extend the Libby Adit and develop drill pads and drifts; two drill pads would be within 300 feet of the Rock Lake Fault. Because of the proximity to the Rock Lake Fault of the drill pads and drifts, the likelihood of encountering higher inflows adjacent to the Rock Lake Fault and potentially having greater effect on streamflow in the East Fork Bull River would be greater in Alternative 2 than in Alternatives 3 and 4.

The wetted perimeter at RC-3 would be reduced by a calculated 0.02 feet or 2 inches (less than 1 percent change), and the wetted perimeter at EFBR-2 would not be affected (Table 326). Discharges to groundwater, which eventually flow to Libby Creek, would increase the wetted perimeter in Libby Creek below LB-300. The increase is estimated to be 3 percent at LB-2, which is in Libby Creek above the confluence with Little Cherry Creek.

Table 326. Predicted Changes in $7Q_{10}$ Flow and Wetted Perimeter at LB-2, EFBR-2, and RC-3.

	LB-2[1]		EFBR-2		RC-3	
	Existing Condition	Evaluation	Existing Condition	Evaluation	Existing Condition	Evaluation
Estimated $7Q_{10}$ flow (cfs)	8.62		2.93		5.70	
Change in flow (cfs)	0.00	0.77	0.00	0.00	0.00	-0.01
Predicted $7Q_{10}$ flow (cfs)	8.62	9.39	2.93	2.93	5.70	5.69
Wetted perimeter (ft)	9.03	9.28	1.35	1.35	10.35	10.33
Difference (ft)	0.00	0.25	0.00	0.00	0.00	-0.02
% Difference		3%		0%		>-1%

[1]The changes shown for LB-2 due to potable water use and Water Treatment Plant discharges have occurred since 2008.
“>-1%” = percent change is between 0 and -1%.
Source: ERO Resources Corp. 2017a.

Discharges would slightly increase peak flow (less than 1 percent) and average annual flow (about 5 percent) at LB-300. The percent increase in average annual flow below LB-300 would be less as flow increases downstream. Peak and annual flow are discussed in Section 3.8.3, *Streamflow, Baseflow, and 7Q2, 7Q10, and 14Q5 Flow Definitions and Uses in EIS Analyses*. For all assessed locations except in Libby Creek below the Libby Adit, changes of 5 percent or less would be within the measurement error of the most accurate streamflow measurement methods, as discussed in JFEIS Section 3.11.4.4.6, *Uncertainties Associated with Detecting Streamflow Changes due to Mine Activities*.

Discharges would occur year-round. Because MMC would not be able store water underground, discharge would be continuous as the existing adit was dewatered. The rate of discharge would depend on the inflow rate to the adit and drifts. Except a small reduction in baseflow from dewatering and the increased use of water from Libby Creek for potable water supply, the effects

predicted in Libby Creek have occurred since 2008 when MMC began discharges after opening the Libby Adit.

An assessment of the effect of Water Treatment Plant discharge on Libby Creek flow was completed to evaluate stream stability using existing stream flow data and information on channel substrate, habitat, and bank characteristics (Kline Environmental Research 2015). The KNF independently reviewed and concurred with the assessment. The increase in flow from the Water Treatment Plant would be negligible during high flows and is predicted to increase low flow by 26 percent at LB-300 (from 3.03 to 3.80 cfs). The total flow below Outfall 001 would not exceed the existing natural range of flow in Libby Creek. Stream channel processes that naturally occur would continue, but at a slightly elevated rate. The rate of bedload transport would increase slightly (Kline Environmental Research 2015). The increase during bankfull or channel-forming flows would be less than 1 percent. The flow increase would have negligible effects on streambank erosion, would not alter the physical substrate habitat, and would not affect sediment transport, aggradation, or degradation. In issuing MMC a MPDES permit, DEQ set effluent limits and conditions for discharges to Outfall 001 that comply with the surface water quality standards, the nondegradation policy, and the BHES Order to ensure that the current and future beneficial uses of state waters are protected (DEQ 2016c).

Rock Lake and Rock Creek Meadows

The 3D model predicted a small decrease in groundwater discharge into Rock Lake (3 acre-feet per year). The effect on the estimated lake volume of 1,302 acre-feet would be negligible. The effect on lake level and surface area would be very small, less than can be calculated accurately.

The 3D model predicted a decrease of 0.01 cfs in East Fork Rock Creek where it enters Rock Creek Meadows. Observations made during an agency field review in a very dry period (September 2007) indicated that a high water table supported the wetlands. Streamflow in East Fork Rock Creek where it enters Rock Creek Meadows was estimated at 2 cfs. A predicted reduction of 0.01 cfs from an estimated streamflow of 2 cfs in the East Fork Rock Creek at the Meadows would result in a less than 1 percent flow reduction. The hydrology support for the wetland vegetation in Rock Creek Meadows is not expected to be affected.

Stream and Floodplain Crossings

Alternative 2 would not affect stream and FEMA-designated floodplain crossings.

3.11.4.2.2 Libby Adit Site Closure

MMC would place two plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two plugs would be near the Libby Adit portal, as discussed in Section 2.4.4.1, *Closure of the Libby Adit and Site Reclamation*. After the adit was plugged, Water Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded.

Geomatrix (2011) did not model closure conditions after the Evaluation Project. A change in groundwater flow path may occur because the inclined drift would connect groundwater beneath

the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. It is unknown if streamflow in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. It is also unknown if groundwater discharge into Rock Lake would return to existing conditions. If groundwater flowed from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage, streamflow in west-side streams probably would be more than predicted during the Project but less than existing conditions. Libby Creek flow may be slightly greater than existing conditions if such a diversion of groundwater occurred.

3.11.4.3 Alternative 3

3.11.4.3.1 Project Activities

Streamflow, Rock Lake, and Rock Creek Meadows

The size of the underground drifts would be smaller than in Alternative 2. Because the effect on adit inflows from a smaller underground opening size would be negligible, the predicted effects on streamflow (Table 325), wetted perimeters (Table 326), Rock Lake, and Rock Creek Meadows would be the same as Alternative 2. As in Alternative 2, flow changes in Libby Creek may be greater than shown in Table 325 for a 3- to 4-week period if MMC discharged at rates up to 500 gpm during initial adit dewatering. Predicted changes would be less if the average annual discharge was less than the 365 gpm used in the analysis. In Alternatives 3 and 4, MMC would maintain a buffer of at least 1,000 feet from Rock Lake and 300 feet from the Rock Lake Fault while extending the adit and developing the drifts. MMC would drill into the fault to assess its geologic and hydrologic properties. The buffers would be verified by an underground mine surveyor. The likelihood of encountering higher inflows adjacent to the Rock Lake Fault would be less than in Alternative 2.

Discharges from the Water Treatment Plant may not occur year-round. In 2016, MMC discharged for 163 days, or about 45 percent of the year (MMC 2017c). Discharge would be continuous as the existing adit was dewatered. After the adit was dewatered, MMC could use the last 300 feet of the adit as a water pool if necessary to store water. The adit's distal end could hold 730,000 gallons of water, or 8 days of inflow at current inflow rates of 65 gpm, or 2 days of inflow at modeled inflow rates of 260 gpm. Discharges would be greater or would occur more frequently than currently is occurring as additional underground development occurred. The frequency and rate of discharge would depend on the inflow rate into the adit and drifts. Average annual inflow rates have decreased considerably since the adit was initially dewatered in 2008. Similarly, average annual inflow rates would be the highest during the first year of the Project and would decrease slowly over time.

Stream and Floodplain Crossings

Alternative 3 would not affect FEMA-designated floodplain crossings. New road construction in the geotechnical investigation area and implementation of BMPs on access roads and roads proposed for access changes would have no effect on streamflow.

3.11.4.3.2 Libby Adit Site Closure

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. The effect of Alternative 2 indicated that a change in groundwater flow

path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. MMC would update the 3D model within 2 years of completing data collection from underground, assessing if an additional plug was necessary to avoid or minimize permanent effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River. If needed, a plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. The KNF estimates the westernmost plug, if needed, would be 1,850 feet from the start of the inclined drift to above the ore body.

After the adit was plugged, Water Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. If an additional plug was needed and installed to minimize post-closure effects, the time to fill the adit and drifts and to reach steady-state groundwater levels would be about half of what it was with two plugs. Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates a third plug would ensure that streamflow in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. The KNF also expects a third plug would ensure that groundwater discharge into Rock Lake also would return to existing conditions.

3.11.4.3.3 Effectiveness of the KNF's Proposed Monitoring and Mitigation

Monitoring

Streamflow would be measured at numerous locations (see Appendix C) to monitor Project effects. MMC also would monitor lake levels in Rock Lake and Lower Libby Lake. Although streamflow and lake level monitoring would continue, it probably would not be able to detect Project-related changes in streamflow or lake levels at the levels predicted by the model because the predicted changes are small and streamflow and lake levels have natural variability. Effectiveness would increase as data from multiple years were evaluated to establish long-term trends in baseflow. Spring flow and other GDE monitoring would continue and, when coupled with monitoring of adit inflows and groundwater levels from inside the adit and drifts, would be effective in detecting Project-related effects in the upper watersheds of the analysis area.

Mitigation

Mitigation of effects on stream baseflow and on Rock Lake, the effectiveness of the mitigations, and the uncertainty associated with each mitigation are discussed in detail in the SEIS in Section 3.10.4.3.3, *Groundwater Model Uncertainty*, and Section 3.10.4.3.4, *Effectiveness of the KNF's Proposed Monitoring and Mitigation*, in the *Groundwater Hydrology* section. Mitigations during the Project would include:

- Maintaining buffers around the Rock Lake Fault and Rock Lake where the adit extension and drift development would not occur to reduce the risk of high inflows and excessive impacts on surface flows and the level of Rock Lake. Based on the 3D model results, buffers would be highly effective in minimizing effects on surface water.
- Installing an additional adit plug deep within the Libby Adit if necessary to ensure that permanent streamflow effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River would be eliminated or minimized.

3.11.4.4 Alternative 4

The effects of Alternative 4 would be the same as Alternative 3.

3.11.4.5 Cumulative Effects

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Rock Creek's 3D groundwater model predicted that baseflow would not be affected during Rock Creek's Phase I Evaluation (Hydrometrics 2014).

If the Montanore Project were approved and implemented, the cumulative effects of the Montanore Project are described in the JFEIS. Assuming they occurred concurrently, the Montanore and Rock Creek Projects would cumulatively reduce flow in the Rock Creek, East Fork Bull River, and Bull River watersheds. No other aspects of the two projects would have cumulative effects on surface water resources. The cumulative effects of the two projects are described in the JFEIS, and the predicted effects are shown in JFEIS Table 118. Based on DEQ's 2016 ROD for the Montanore Project (DEQ 2016b), the KNF expects that another nondegradation compliance determination for construction and operation of the mine may be made after additional information was collected. To comply with DEQ's nondegradation provisions, changes in $7Q_{10}$ streamflow in the CMW greater than 10 percent must be less than discussed in the JFEIS, unless DEQ determined $7Q_{10}$ flow changes of more than 10 percent were nonsignificant.

Cumulative effects of other reasonably foreseeable actions in the analysis area are described in the JFEIS. The Wayup Mine in upper West Fisher Creek and the Libby Creek Ventures drilling plan adjacent to Upper Libby Creek Road are no longer reasonably foreseeable.

3.11.4.6 Regulatory/Forest Plan Consistency

This section discusses compliance with applicable laws and regulations regarding surface water hydrology, specifically changes in streamflow and floodplains. Section 3.13.4.7, *Regulatory/Forest Plan Consistency*, in the *Water Quality* section (p. 202) discusses compliance with water quality laws and regulations.

3.11.4.6.1 Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental impacts on National Forest surface resources; comply with applicable state and federal water quality standards, including the Clean Water Act; take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by mineral operations; and reclaim the

surface disturbed in operations by taking such measures as preventing or controlling on-site and off-site damage to the environment and forest surface resources.

Alternative 2 did not include appropriate mitigation for all reasonably foreseeable adverse streamflow effects on watersheds and associated aquatic ecosystems that would result from the Project. For example, adit extension and drift development would occur within 300 feet of the Rock Lake Fault. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental impacts on National Forest surface resources and to maintain and protect fisheries habitat. These measures would include increasing buffers adjacent to Rock Lake and the Rock Lake Fault, installing multiple site-specifically designed adit plugs at closure if needed to minimize effects, and increased monitoring. The KNF expanded MMC's proposed monitoring plans, which would include action levels on adit inflows and changes in surface water flow and lake levels that would trigger corrective measures to be implemented by MMC (see Appendix C).

3.11.4.6.2 Wilderness Act

All alternatives have the potential to indirectly affect wilderness qualities. Design features identified in Chapter 2 for Alternatives 3 and 4 and monitoring required for Alternatives 3 and 4 (Appendix C) would be implemented to minimize changes in wilderness character. For example, increasing the buffer zones near Rock Lake and the Rock Lake Fault and requiring verification of the buffers by a third-party mine surveyor would reduce the risk of measurable hydrological indirect effects on the surface within the wilderness. Design features and monitoring requirements in Alternatives 3 and 4 are reasonable stipulations for protection of the wilderness character and are consistent with the use of the land for mineral development. Alternatives 3 and 4 would be conducted to protect the surface resources in accordance with the general purpose of maintaining the wilderness unimpaired for future use and enjoyment as wilderness and to preserve the wilderness character consistent with the use of the land for mineral operations in compliance with 36 CFR 228.15 and the Wilderness Act. Alternatives 3 and 4 would comply with the Wilderness Act. Alternatives 3 and 4 would minimize adverse environmental impacts on surface resources in the wilderness and thereby comply with the regulations (36 CFR 228 Subpart A) for locatable mineral operations on National Forest System lands.

3.11.4.6.3 Clean Water Act and Montana Water Quality Act

In 2016, DEQ issued a ROD on the Montanore Project (DEQ 2016b). In the ROD, DEQ determined that activities associated with the Evaluation Phase of the Montanore Project, except the discharges to surface water, would comply with the Montana Water Quality Act, including the nondegradation provisions. DEQ's approval of the amendments to Operating Permit No. 00150 pertaining to the Project was conditioned on MMC receiving DEQ's approval of the renewal of MPDES Permit No. MT0030279. DEQ issued a final MPDES permit in 2017 (DEQ 2017a) along with responses to comments on prior draft permits (DEQ 2017c). In issuing the MPDES permit, DEQ set effluent limits and conditions for Outfall 001 that comply with the surface water quality standards, the nondegradation policy, and the BHES Order to ensure that the current and future beneficial uses of state waters are protected (DEQ 2016c). MMC appealed various parts of the permit, and those parts are not in effect, pending resolution of the appeal. 36 CFR 228.8(h) states that "certification or other approval issued by state agencies or other federal agencies of compliance with laws and regulations relating to mining operations will be accepted as compliance with similar or parallel requirements of these regulations." DEQ's Hard Rock Operating Permit decision (DEQ 2016b), issuance of a MPDES permit (2017 MPDES permit

MT0030279) (DEQ 2017a), or any other state water quality permit or approval (401 certification if needed) constitute compliance with Montana water quality requirements and Clean Water Act requirements regarding water quality.

3.11.4.6.4 National Forest Management Act/Kootenai Forest Plan

Compliance with the KFP is described in the following sections.

GOAL-WTR-01. All alternatives would maintain or improve watershed conditions in order to provide water quality, water quantity, and stream channel conditions that support ecological functions and beneficial uses. DEQ's Hard Rock Operating Permit decision (DEQ 2016b), issuance of a MPDES permit (2017 MPDES permit MT0030279) (DEQ 2017a), or any other state water quality permit or approval (401 certification if needed) constitute compliance with Montana water quality requirements and Clean Water Act requirements regarding water quality. Changes in streamflow in west side streams would be negligible and would have no effect on ecological functions and beneficial uses, The increased habitat availability during low-flow conditions downstream of the Water Treatment Plant discharge to Libby Creek and a long-term decrease in sediment delivery from roads would improve Libby Creek watershed conditions.

FW-DC-WTR-01. Watersheds and associated aquatic ecosystems would retain their inherent resilience to respond and adjust to disturbance without long-term, adverse changes to their physical or biological integrity in Alternatives 3 and 4. Alternatives 3 and 4 include appropriate mitigation for all reasonably foreseeable adverse streamflow effects on watersheds and associated aquatic ecosystems. Alternatives 3 and 4 would be neutral with regard to progress toward this desired condition. Alternative 2 did not include appropriate mitigation for all reasonably foreseeable adverse streamflow effects on watersheds and associated aquatic ecosystems and would not make progress or be neutral with regard to progress toward this desired condition. The effect forestwide of Alternative 2 would be negligible.

FW-DC-WTR-02. All alternatives would meet applicable state water quality standards and fully support beneficial uses. DEQ's Hard Rock Operating Permit decision (DEQ 2016b), issuance of a MPDES permit (2017 MPDES permit MT0030279) (DEQ 2017a), or any other state water quality permit or approval (401 certification if needed) constitute compliance with Montana water quality requirements and Clean Water Act requirements regarding water quality. Geotechnical activities would have no effect on streamflow. Flow conditions in watersheds, streams, lakes, and springs would support beneficial uses and meet the ecological needs of native and desirable nonnative aquatic species and maintain the physical integrity of their habitats. All alternatives would be neutral with regard to progress toward this desired condition.

FW-DC-WTR-03. None of the alternatives would affect channel dimensions or have facilities in a FEMA-designated floodplain. Effect on streamflow and water temperatures would be negligible. Streamflows would continue to recharge riparian aquifers, provide late-season stream flows and cold water temperatures, and sustain the function of surface and subsurface aquatic ecosystems. The alternatives would be neutral with regard to progress toward this desired condition.

FW-DC-WTR-06. All alternatives would maintain and improve forestwide trends toward achieving the desired condition of cooperating with other parties to improve watershed conditions. Alternatives 3 and 4 would improve watershed conditions on lands obtained by MMC for grizzly bear mitigation.

3.11.4.6.5 Executive Order 11988 and Montana Floodplain and Floodway Management Act

No FEMA-designated floodplain would be affected. All alternatives would comply with the Montana Floodplain and Floodway Management Act and Executive Order 11988.

3.11.4.7 Irreversible and Irretrievable Commitments

A minor amount of water would be used consumptively for potable water and underground drilling, reducing the total water yield in the region by that amount. Relative to the total yield of the affected watersheds, the consumptively used volume would be very small. The reduction in yield would be an irretrievable commitment of resources.

3.11.4.8 Short-Term Uses and Long-Term Productivity

The short-term use of surface water resources in the various alternatives would consist of dewatering the Libby Adit, reducing baseflow of analysis area streams, and using analysis area streams for discharge of treated water. Long-term productivity of surface water resources would not be affected.

3.11.4.9 Unavoidable Adverse Environmental Effects

Alternatives 3 and 4 would not have unavoidable long-term adverse environmental effects.

3.12 Water Rights

3.12.1 Regulatory Framework

Requirements under the Montana Water Use Act and the Forest Service/State of Montana Reserved Water Rights Compact (85-20-1401 Article IV B.1., MCA) are described in the JFEIS.

Dewatering the adit and drifts during the Project or allowing them to fill with groundwater after the adit was plugged is not a beneficial use of water, and a beneficial water use permit would not be required (DNRC 2012). Although MMC would not be able to obtain a permit to secure an appropriation to dewater the adit or drifts or allow the underground void to fill with groundwater, the Water Use Act has a requirement that a person cannot waste water, use water unlawfully, or prevent water from moving to another person having a prior right to use the water. If dewatering the adits and drifts or allowing them to fill with groundwater resulted in one of these prohibitions, MMC would need a plan to regulate the controlling works of an appropriation as may be necessary to prevent the wasting or unlawful use of water and to ensure that a person having a prior senior right is not deprived of their lawful use of water (85-2-114(1), MCA).

Water testing or monitoring also is not a beneficial use of water, and a beneficial water use permit would not be required. A permit is not required if the intent is to conduct aquifer tests, water quality tests, water level monitoring, or other testing or monitoring of a water source (85-2-369, MCA).

The KFP direction considered in the analysis of water rights is:

> **FW-DC-WTR-05.** Water rights for consumptive and non-consumptive water uses obtained in the name of the Forest Service support instream flows that provide for channel maintenance, water quality, aquatic habitats, and riparian vegetation. Water quality and beneficial uses are fully protected under special use permits related to water uses.

3.12.2 Analysis Area and Methods

The analysis area and methods for data collection and impact analysis are the same as described in the JFEIS. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.12.3 Affected Environment

MMC holds two 1902 surface water rights on Libby Creek, one for mining near the Libby Adit Site in Section 15, T27N, R31W (with a maximum diversion of 44.9 gpm between April 1 and December 19, and a 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 groundwater right near the Libby Adit Site in Section 15, T27N, R31W (with a total diversion of 40 gpm year-round).

The Forest Service has a year-round 40 cfs instream flow right with a 2007 priority date for a segment of Libby Creek that starts at Bear Creek and goes to above Hoodoo Creek. The use of the right is to provide adequate flows for bull trout to migrate from Libby Creek into Bear Creek and spawn. The Forest Service also has a 1949 right to divert 0.5 cfs for mining during May and June from Libby Creek above the confluence with Howard Creek at the Recreation Gold Panning

Area, and a 1925 water right on Libby Creek above Ramsey Creek to divert 25 gpm for commercial purposes.

A private entity owns three 1925 surface water rights on Libby Creek for mining, domestic, and stock use and one 1900 water right on Ramsey Creek for mining use that have points of diversion downstream of the Libby Adit Site (JFEIS Table 119). The rights shown in JFEIS Table 119 are junior to MMC's surface water rights and senior to MMC's groundwater right and all Forest Service rights on Libby Creek. Both water rights for mining are for a maximum diversion rate of 1 cfs and maximum volume of 521.6 acre-feet per year.

3.12.4 Environmental Consequences

3.12.4.1 Alternative 1

Surface water and groundwater rights in the area would not be affected. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150.

3.12.4.2 Alternative 2

MMC's existing water rights would be adequate for the Project, and no new water right would need to be acquired. No senior water right would be adversely affected. MMC's dewatering the adit and drifts during the Project or allowing them to fill with groundwater after the adit was plugged would not waste water, use water unlawfully, or prevent water from moving to another entity having a prior right to use the water.

3.12.4.3 Alternative 3

Effects on water rights from water use and management at the Libby Adit Site would be the same as Alternative 2. Water for geotechnical investigations, such as field permeability testing of piezometers, would be from potable sources and brought to the site with a water truck or from nearby piezometer wells developed within the same aquifer to be tested. The Forest Service's 40 cfs instream right in Libby Creek would not be adversely affected by MMC's testing or monitoring.

3.12.4.4 Alternative 4

The effects on area water rights would be the same as described in Alternative 3.

3.12.4.6 Cumulative Effects

Because no new water right would be obtained, no water rights would be cumulatively affected.

3.12.4.7 Regulatory/Forest Plan Consistency

3.12.4.7.1 Montana Water Use Act and the Montana Reserved Water Rights Compact

All alternatives would comply with the Montana Water Use Act and the Montana Reserved Water Rights Compact.

3.12.4.7.2 National Forest Management Act/Kootenai Forest Plan

None of the alternatives would adversely affect the Forest Service's water right on Libby Creek. All alternatives would be neutral with regard to progress toward the desired condition for water rights (FW-DC-WTR-05).

3.12.4.8 Irreversible and Irretrievable Commitments

No irreversible or irretrievable commitment of resources would occur.

3.12.4.9 Short-Term Uses and Long-Term Productivity

This section is not applicable to water rights.

3.12.4.10 Unavoidable Adverse Environmental Effects

Project activities would have no unavoidable adverse environmental effects on water rights.

3.13 Water Quality

3.13.1 Regulatory Framework

3.13.1.1 Permits, Approvals, and Authorizations Held by MMC

3.13.1.1.1 Board of Health and Environmental Sciences Order No 93-001-WQB

The BHES Order No 93-001-WQB is JFEIS Appendix A. The Order remains in effect for the operational life of the project and for as long as necessary thereafter. The Order established numeric limits for total dissolved solids, chromium, copper, iron, manganese, and zinc in both surface water and groundwater; nitrate+nitrite in groundwater only; and total inorganic nitrogen in surface water only (Table 327 and Table 328). Since the Order was issued, the applicable water quality criteria for most parameters have changed; the water quality criteria as listed in the current version of Circular DEQ-7 are the water quality criteria applicable to any discharge associated with the Project (DEQ 2017b).

3.13.1.1.2 MPDES Permit MT0030279

DEQ issued a MPDES permit to NMC in 1997 for Libby Adit discharge to the local groundwater or Libby Creek. Three outfalls were included in the permit: Outfall 001—percolation pond discharging to groundwater; Outfall 002—drainfield with three infiltration zones discharging to groundwater; and Outfall 003—pipeline outlet to Libby Creek. DEQ renewed the permit in 2006. DEQ issued a draft renewal MPDES permit and a fact sheet and held a public hearing on the draft permit in 2015. After reviewing comments on the 2015 draft permit, DEQ issued another draft renewal permit in 2016 along with a fact sheet (DEQ 2016c). After reviewing comments on the 2016 draft permit, DEQ issued a final renewal MPDES permit in 2017 (DEQ 2017a) along with responses to comments on prior draft permits (DEQ 2017b). MMC appealed various parts of the permit, and those parts are not in effect, pending resolution of the appeal. MMC also held MPDES permit MTR104874 for stormwater discharges from the Libby Adit Site. These discharges were incorporated into the renewed MPDES permit and discharge at Outfall 001.

The 2017 permit retains the three outfalls that were in the 1997 and 2006 permits. Outfalls 001 and 002 are permitted as surface water discharges that incorporate a groundwater and surface water mixing zone for certain parameters. The percolation pond (Outfall 001) has an estimated capacity of 25 acre-feet. The drainfields (Outfall 002) are designed to accommodate discharge flows in excess of 200 gallons per minute (gpm). The five new stormwater outfalls, which would be needed for the Montanore Project and are not proposed for use during the Evaluation Project, are:

- Outfall 004—stormwater-only outfall for runoff from the Upper Libby Adit pad and access road discharging into Libby Creek
- Outfall 005—stormwater-only runoff from a 3.8-acre road segment between the Libby Adit pad and the Libby Plant Site discharging into Libby Creek
- Outfall 006—stormwater-only runoff from a 6.2-acre road segment north of the Libby Plant Site discharging into Ramsey Creek
- Outfall 007—stormwater-only runoff from a 2.8-acre road segment south of the Poorman Tailings Impoundment Site discharging into Poorman Creek; this outfall is unlikely to be used because the access road alignment changed after MMC submitted its MPDES renewal permit application

- Outfall 008—stormwater-only runoff from a 2.9-acre road segment south of the Poorman Tailings Impoundment Site discharging into Poorman Creek

Precipitation and runoff from the Libby Adit pad area would be collected and directed to Outfall 001. The drainage area for Outfall 005 is separate from the Libby Adit pad area and does not include the drainage area for Outfall 001.

The permit includes interim effluent limits that are applicable to discharges from Outfalls 001, 002, and 003 that are effective through 2019. Beginning in 2020, final effluent limits would apply to discharges from Outfalls 001, 002, and 003. MMC appealed the final effluent limits for discharges from Outfalls 001, 002, and 003; those limits are not in effect, pending resolution of the appeal. The permit also includes final effluent limits for discharges from Outfalls 004 through 008, effective over the life of the permit.

The permit requires MMC to prepare and submit two reports annually for 3 years (2017, 2018, and 2019). One report will address, at a minimum and on an individual parameter basis, any steps taken toward meeting the final limits for antimony, cadmium, chromium, copper, iron, lead, manganese, zinc, total ammonia, total inorganic nitrogen, total nitrogen, and total dissolved solids. A second report will document any steps taken toward meeting the numeric nutrient standard for total nitrogen. Both reports will document, at a minimum and on an individual parameter basis, the mitigation, elimination, and treatment options taken into consideration for any process installed or method employed to meet the final effluent limitations. The reports will include, as necessary and appropriate, the performance criteria, any engineering drawings, any line diagrams or process flow charts, and any other pertinent design or installation materials. MMC also will complete a facility optimization study and nutrient reduction analysis. The study will include an analysis of nutrient trading feasibility within the watershed. Written notification indicating completion and availability of the study results must be submitted to DEQ by April 2019. MMC submitted the 2017 reports to DEQ in January 2018, in accordance with the MPDES permit.

3.13.1.2 Applicable Regulations and Standards

3.13.1.2.1 Federal Requirements

Federal requirements under the Organic Administration Act are described in the JFEIS. Federal requirements under the Federal Water Pollution Control Act (Clean Water Act) are described in Section 3.11.1.1, *Federal Requirements*. The KFP direction considered in the analysis of water quality is:

> **GOAL-WTR-01.** Maintain or improve watershed conditions in order to provide water quality, water quantity, and stream channel conditions that support ecological functions and beneficial uses.
>
> **FW-DC-WTR-01.** Watersheds and associated aquatic ecosystems retain their inherent resilience to respond and adjust to disturbance without long-term, adverse changes to their physical or biological integrity.
>
> **FW-DC-WTR-02.** Water quality meets applicable state water quality standards and fully supports beneficial uses. Flow conditions in watersheds, streams, lakes, springs, wetlands, and groundwater aquifers fully support beneficial uses, and meet the ecological

needs of native and desirable non-native aquatic species and maintain the physical integrity of their habitats.

FW-DC-WTR-04. Municipal watersheds and public water systems (source water protection areas) meet water quality standards.

FW-STD-WTR-01. Management activities shall maintain or improve water quality in public source water areas, and be consistent with applicable state source water protection requirements. Short-term effects (effects that occur during, or immediately following, implementation of activity) from activities in source water areas may be acceptable when those activities support long-term benefits (benefits that occur following completion of the activity) to aquatic resources.

FW-GDL-WTR-01. Management activities in impaired watersheds (listed by the state under section 5 of the Integrated 303(d)/305(b) Report) with approved TMDLs are designed to comply with the TMDL. Management activities in watersheds with streams on the 303(d) list are designed to maintain or improve conditions relative to the cause for impairment and will not cause a decline in water quality or further impair beneficial uses. A short-term or incidental departure from state water quality standards may occur where there is no long-term threat or impairment to the beneficial uses.

FW-GDL-WTR-02. In order to avoid future risks to watershed condition, ensure hydrologic stability when decommissioning or storing roads or trails.

FW-GDL-WTR-03. Project-specific best management practices (BMPs) will be incorporated in all land use and project plans as a principle mechanism for controlling non-point pollution sources, meet soil and water goals, and protect beneficial uses. To the extent practicable, ditch and road surface runoff should be disconnected from streams and other water bodies.

FW-GDL-RIP-01. Soil and snow should not be side-cast into surface water during road maintenance operations.

3.13.1.2.2 State Requirements

DEQ is responsible for administering several water quality statutes, including the Public Water Supply Act and the Montana Water Quality Act. DEQ also administers several sections of the federal Clean Water Act pursuant to an agreement between the State of Montana and EPA. The State of Montana, through DEQ, has been delegated authority for administering nonpoint source pollution prevention programs, the National Pollutant Discharge Elimination System program, and water quality standards. The Water Quality Act provides a regulatory framework for protecting, maintaining, and improving the quality of water for beneficial uses. Pursuant to the Water Quality Act, DEQ has developed water quality classifications and standards, a nondegradation policy, and a permit system to control discharges into state waters. Mineral operations must comply with Montana's regulations and standards for surface water and groundwater.

MPDES permits are required for discharges of wastewater to state surface water. MPDES permits regulate discharges of wastewater by imposing, when applicable, technology-based effluent limits, which specify the minimum level of treatment or control for pollutants and water quality–based effluent limits that attain and maintain applicable numeric and narrative water quality

standards. A MPDES permit may also include limits for discharges of stormwater and require the development of a SWPPP. Montana Ground Water Pollution Control System permits are required for discharges of wastes to state groundwater. Discharges to groundwater from operations subject to operating permits under the Metal Mine Reclamation Act are not subject to groundwater permit requirements (75-5-401(5), MCA).

Water Quality Standards

DEQ updated water quality standards for inorganic pollutants in 2017; applicable surface water quality standards are provided in Table 327, and applicable groundwater quality standards are provided in Table 328. DEQ also has required reporting limits for pollutants when conducting water quality analyses. Both Montana's surface and groundwater rules contain narrative standards (ARM 17.30.620 through 17.30.670 and ARM 17.30.1001 through 17.30.1045). The narrative standards cover a number of parameters, such as alkalinity, chloride, hardness, sediment, sulfate, and total dissolved solids, for which sufficient information does not yet exist to develop specific numeric standards. The narrative standards are directly translated to protect beneficial uses from adverse effects, supplementing the existing numeric standards. Narrative standards in ARM 17.30.637(1) include, in part, that surface waters must be free from substances attributable to discharges that create conditions toxic or harmful to human, animal, plant, or aquatic life, or produce undesirable aquatic life.

Within the CMW, no increase in turbidity may occur above ambient concentrations. Most streams outside of the CMW have both a numeric turbidity standard of 5 nephelometric turbidity units (NTUs) (Table 327) and a narrative sediment and suspended sediment standard. The narrative sediment and suspended sediment standards are that no increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA) that will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife. Ephemeral streams both in and out of the CMW are not subject to the specific water quality standards of ARM 17.30.622 or ARM 17.30.623, such as the numeric temperature standard, numeric turbidity standard of 5 NTUs, and the narrative turbidity and total suspended sediment standard (ARM 17.30.637(4)).

If authorized by DEQ by a 318 authorization, the short-term water quality standards for total suspended solids and turbidity resulting from stream-related construction activities or stream enhancement projects are the narrative standards for total suspended solids. DEQ may not authorize short-term narrative standards for activities requiring a MPDES permit. If a short-term narrative standard is authorized, the numeric standard for turbidity does not apply to the affected water body during the term of the narrative standard (75-5-318, MCA). During the review of a 318 authorization application, DEQ reviews each application on a case-by-case basis to determine whether there are reasonable alternatives that preclude the need for a narrative standard. If DEQ determines that the numeric standard for turbidity cannot be achieved during the term of the activity and that there are no reasonable alternatives to achieve the numeric standard, DEQ may authorize the use of a narrative standard for a specified term. Any authorization would include conditions that minimize, to the extent practicable, the magnitude of any change in water quality and the length of time during which any change may occur. The authorization also would include site-specific conditions that ensure that the activity is not harmful, detrimental, or injurious to public health and the uses of state waters and that ensure that existing and designated beneficial uses of state water are protected and maintained upon completion of the activity. Conditions that require water quality or quantity monitoring and reporting may be included.

In 2014, the Board of Environmental Review adopted numeric standards for total phosphorus and total nitrogen for wadeable streams in Montana Ecoregions (DEQ 2014). Wadeable streams are perennial or intermittent streams in which most of the wetted channel is safely wadeable by a person during baseflow conditions; this includes all streams in the analysis area. The analysis area is in the Northern Rockies Ecoregion; all wadeable streams have a seasonal total phosphorus standard of 0.025 mg/L and a seasonal total nitrogen standard of 0.275 mg/L between July 1 and September 30. The narrative nutrient standard applies from October 1 to June 30. Because the numeric nutrient standards are stringent and may be difficult for MPDES permit holders to meet in the short term, the Montana Water Quality Act (75-5-313, MCA) allows for the achievement of the standards over time via variance procedures found in Circular DEQ-12B (DEQ 2017c). A MPDES permit holder may apply for a general variance for either total phosphorus or total nitrogen, or both. The general variance may be established for a period not to exceed 20 years. DEQ classifies all groundwater in the analysis area as Class I, which is suitable with little or no treatment for public and private drinking water supplies, culinary and food preparation purposes, irrigation, drinking water for livestock and wildlife, and commercial and industrial purposes.

Nondegradation Rules

DEQ's nondegradation rules established pursuant to the Montana Water Quality Act are described in Section 3.11.1.2, *State Requirements*.

3.13.2 Analysis Area and Methods

3.13.2.1 Analysis Area

The groundwater quality analysis area is the same as the groundwater hydrology analysis area and is described in Section 3.10.2, *Analysis Area and Methods*. The surface water quality analysis area is the same as the surface water hydrology analysis area and is described in Section 3.11.2, *Analysis Area and Methods*. Proposed access changes in roads in the Big Creek and Standard Creek drainages would not affect surface water quality and are not discussed further. These analysis areas were used for direct, indirect, and cumulative effects. Streams outside the analysis area, such as Libby Creek below US 2 or the Bull River, may be affected, but effects would be negligible.

3.13.2.2 Methods

Except for the changes described in this section, the methods for data collection and impact analysis are the same as described in the JFEIS.

3.13.2.2.1 Water Quality Monitoring

MMC continues to collect water quality data at sites in Libby Creek in accordance with the 2006 MPDES permit, the 2017 MPDES permit when it superseded the 2006 MPDES permit, and Operating Permit No. 00150. In addition to monitoring in Libby Creek, MMC continues water quality monitoring in west-side streams and lakes and initiated monitoring at some additional sites and at the benchmark sites described in Appendix C. Monitoring data are available in MMC's annual reports (MMC 2014a, 2015b, 2016, 2017c, 2018b), the 2016 GDE monitoring report (Klepfer Mining Services 2017a), and the 2017 GDE monitoring report (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). Data associated with discharges from the Wastewater Treatment Plant are accessible on EPA's website (https://echo.epa.gov/tools/data-downloads/icis-npdes-dmr-and-limit-data-set).

Table 327. Montana Surface Water Quality Standards and Surface Water Limits Established by the BHES Order.

Parameter – Category[1]	BHES Order Limit (mg/L)	Human Health Standard (mg/L)	Aquatic Life Standard[2]	
			Acute (mg/L)	Chronic (mg/L)
Temperature[7] (°F) – H	—	—	1ºF max increase for naturally occurring range of 32º to 66ºF, 67ºF max 0.5ºF max increase for naturally occurring 66.5ºF or greater 2ºF per hour max decrease for naturally occurring temperatures above 55ºF; 2ºF max decrease for naturally occurring range of 32º to 55ºF	
pH[7] (s.u.)	—	—	Less than 0.5 pH unit change between 6.5 and 8.5, no change outside this range; natural pH above 7 must be maintained above 7	
Dissolved oxygen[3] – T	—	—	8.0 (early life) 4.0 (other life stages)	9.5 (7-day, early life) 6.5 (30-day, other life stages)
Total dissolved solids	100	—	—	—
Total suspended solids	—	—	30	20
Turbidity[7] (NTU) – H A-1 waters (within CMW) B-1 waters (outside CMW)	 — —	 — —	 No increase above ambient 5 NTU maximum increase	
Total nitrogen, as N – H July 1 to September 30 October 1 to June 30	 — —	 — —	 0.275 No excessive amounts	
Total Inorganic Nitrogen (TIN), as N – H	1	—	—	—
Nitrate + nitrite, as N – T	5.5	10	See total nitrogen standard	
Total phosphorus, as P – H July 1 to September 30 October 1 to June 30	 — —	 — —	 0.025 No excessive amounts	
Ammonia, as N – T	1.5	—	Calculated based on stream pH	
Aluminum[4] – T	—	—	0.75	0.087
Antimony[4]– T	—	0.0056	—	—
Arsenic[4] – C	—	0.01	0.34	0.15
Barium[4] – T	—	1.0	—	—
Beryllium[4] – C	—	0.004	—	—
Cadmium[4] – T	—	0.005	0.00049	0.00025
Chromium[4] – T	0.005	0.1	0.579/0.016[5]	0.0277/0.011[5]
Copper[4] – T	0.003	1.3	0.00379	0.00285
Iron[4] – H	0.1	—	—	1.0
Lead[4] – T	—	0.015	0.014	0.000545
Manganese[4]	0.05	—	—	—
Mercury[4] – T, BCF>300[6]	—	0.00005	0.0017	0.00091
Nickel[4] – T	—	0.1	0.145	0.0161
Selenium[4] – T	—	0.05	0.02	0.005
Silver[4] – T	—	0.1	0.000374	—
Zinc[4] – T	0.025	2	0.037	0.037

[1]T = toxic; C = carcinogen; H = harmful (aquatic life).
[2]Many metals standards are hardness dependent; for this table, values presented are based on a hardness of 25 mg/L.
[3]Dissolved oxygen standards are water column concentrations; see DEQ-7 for other notes.
[4]All metals standards, except aluminum, are based on total recoverable concentrations. Aluminum standards are based on dissolved aluminum concentrations and are valid only in a pH range of 6.5 to 9.
[5]Aquatic life chromium standards are for trivalent/hexavalent forms.
[6]Mercury has a bioconcentration factor (BCF) of greater than 300 (developed by EPA).
[7]Temperature, pH, and turbidity standards do not apply to ephemeral streams (ARM 17.30.637(4)).
mg/L = milligrams/liter; "—" = no applicable standard.
Sources: BHES 1992; DEQ 2017c; DEQ 2014; ARM 17.30.622; ARM 17.30.623; ARM 17.30.637(1)(e).

Table 328. Montana Groundwater Quality Standards and Groundwater Limits Established by the BHES Order.

Parameter	BHES Order Limit (mg/L)	Montana Groundwater Quality Standard (mg/L)
pH	—	6.5 – 8.5
Total dissolved solids	200	—
Nitrate + nitrite, as N	10	10
Dissolved Metals		
Antimony	—	0.006
Arsenic	—	0.01
Barium	—	1.0
Beryllium	—	0.004
Cadmium	—	0.005
Chromium	0.02	0.1
Copper	0.1	1.3
Iron	0.2	—
Lead	—	0.015
Manganese	0.05	—
Mercury	—	0.002
Nickel	—	0.1
Selenium	—	0.05
Silver	—	0.1
Zinc	0.1	2

"—" = no applicable concentration.
mg/L = milligrams per liter.
Source: BHES 1992; DEQ 2017c.

3.13.2.2.2 Impact Analysis

Mass Balance Analysis

The mass balance analysis approach used in the JFEIS to predict potential surface water quality changes resulting from wastewater discharge was reasonable for disclosure purposes, but was not consistent with the approach used by DEQ in establishing effluent limits in the MPDES permit. Because DEQ issued MMC a MPDES permit in 2017, the KNF used DEQ's values for variables in the mass balance equations. The values used in the mass balance equations are described in this section. The MPDES permit is the means by which DEQ enforces state water quality standards, and the Forest Service is allowed to rely on DEQ to issue and enforce a valid permit.

Outfall, Effluent Sources, and Receiving Water

The MPDES permit includes three outfalls for discharges from the Water Treatment Plant. During the Project, MMC would use only Outfall 001, which is a discharge to groundwater hydrologically connected to surface water. The KNF disclosed the effects of using only Outfall 001 in the SEIS. The MPDES permit lists possible effluent sources to Outfall 001 that were

anticipated to occur over the 5-year life of the permit. During the Project, the only sources of water to the Water Treatment Plant and subsequently to Outfall 001 would be adit and drift inflows and stormwater falling on the Libby Adit Site, including storage areas. All precipitation falling on the waste rock and covered ore stockpiles would be captured in an underlying sump and then pumped to the Water Treatment Plant before discharge at Outfall 001. The receiving water for discharges from Outfall 001 is Libby Creek, upstream of monitoring site LB-300. The KNF used site LB-300 to assess effects. Based on the effects at LB-300, DEQ set the effluent limits and conditions for Outfall 001 that comply with the surface water quality standards, the nondegradation policy, and the BHES Order to ensure that the current and future beneficial uses of state waters are protected.

Parameters

DEQ established interim effluent limits for the following parameters: total suspended solids, total nitrogen, TIN, cadmium, chromium, copper, iron, lead, manganese, mercury, zinc, pH, and oil and grease. The parameters of pH and oil and grease are not amenable to analysis by mass balance approach and are not discussed further. Interim effluent limits are effective through December 31, 2019. The interim effluent limit for total nitrogen is effective from July 1 and September 30. DEQ established final effluent limits for the same parameters with interim effluent limits plus the following parameters: total dissolved solids, total ammonia, nitrate+nitrite, and antimony. The final effluent limit for total nitrogen is effective from July 1 and September 30 of each year beginning in 2034. The other final effluent limits are effective beginning on January 1, 2020. MMC appealed the final effluent limits; those limits are not in effect, pending resolution of the appeal. DEQ determined all other parameters would either not cause or not have the reasonable potential to cause or contribute to an excursion of any water quality standard, including narrative standards.

With the exception of total phosphorus and total suspended solids, the KNF used those parameters for which DEQ set an effluent limit in the mass balance analysis. DEQ determined that the discharge did not currently demonstrate reasonable potential to violate the total phosphorus numeric nutrient standard. The KNF included total phosphorus in the mass balance analysis to support the fisheries effect analysis. Total suspended solids are not included in the mass balance analysis. The discharges from Outfall 001 would infiltrate into groundwater first, and the percolation pond would provide treatment for the removal of any suspended solids remaining in the effluent before the effluent percolated into Libby Creek (DEQ 2016c). The MPDES permit contains an effluent limit for total suspended solids because a limit is required by 40 CFR 440.104(a) for drainage from the adit and drifts.

Flow Variables

The effluent limits are based on the Water Treatment Plant's current design flow of 500 gpm (1.1 cfs), which DEQ determined was a reasonable measure of actual production. Adit dewatering rates of 500 gpm would be used when the adit was dewatered beyond the 7,200-foot level over a 3- to 4-week period, and would be reduced to maintenance levels after initial dewatering. The maximum flow rate reported on the MMC's Discharge Monitoring Reports during the term of the 2006-issued MPDES permit while maintaining water levels in the 14,000-foot adit was 374 gpm.

In setting effluent limits, DEQ established a critical streamflow of 3.03 cfs at monitoring station LB-300. Because all discharges during the Project would be to groundwater, DEQ also included 0.67 cfs of groundwater flux in the critical streamflow, for a total of 3.7 cfs or 1,661 gpm. The

analysis of streamflow effects was based on DEQ's estimated critical streamflow of 3.70 cfs at LB-300.

In accordance with ARM 17.30.635(4), the effluent limit for controlling nitrogen and phosphorus concentrations in surface water was based on the seasonal $14Q_5$, which is the lowest average 14-consecutive-day low flow, occurring from July through October, with an average recurrence frequency of once in 5 years. Because a $14Q_5$ flow for Libby Creek has not been established, DEQ developed a reasonable estimation of the $14Q_5$ for Libby Creek of 3.28 cfs (1,472 gpm), based on a comparison of the Libby Creek drainage basin to the nearby Flower Creek drainage basin.

Concentration Variables

In setting effluent limits, DEQ established critical background concentrations at LB-300, which were used in the KNF's mass balance analysis. For most parameters, the critical background concentration is the 75th percentile concentration of the measured or observed data. Appendix 2 of the MPDES permit fact sheet (DEQ 2016c) describes how DEQ determined the critical background concentrations at LB-300.

The KNF used effluent limits to assess water quality effects of Water Treatment Plant discharges. Effluent limits used were maximum daily, except for total inorganic nitrogen and total nitrogen, which were average monthly. Discharges subject to interim effluent limits currently are occurring and would continue to occur; discharges during the Evaluation Project also would occur after the final effluent limits became effective. Although MMC appealed the final effluent limits and those limits are not in effect, pending resolution of the appeal, the KNF predicted water quality using both sets of limits in the effects analysis. The final effluent limits are the best available information to predict future water quality. The KNF will update the mass balance analysis should the appeal be resolved and effluent limits change substantially.

In 2015, MMC requested that the general variance for both total nitrogen and total phosphorus be incorporated into the MPDES permit and indicated that the facility design flow is less than 1.0 million gallons per day. In the 2017 MPDES permit, DEQ did not grant MMC a variance from the numeric nutrient criteria. DEQ determined that a variance for total phosphorus was not necessary because the facility did not show reasonable potential to violate the total phosphorus standard. Because total nitrogen would be the same as total inorganic nitrogen expected in discharges from the Project, DEQ used the BHES Order limit for total inorganic nitrogen of 1.0 mg/L in the development of a total nitrogen effluent limit (DEQ 2017a). DEQ set an interim total nitrogen effluent limit of 9.3 pounds per day between July 1 and September 30, which would be in effect over the life of the Project.

DEQ set an interim total nitrogen effluent limit of a daily load (9.3 pounds) applicable between July 1 and September 30. In the mass balance analysis, which requires a concentration, the KNF used the interim total nitrogen effluent limit of 9.3 pounds per day to determine the Water Treatment Plant effluent concentration. An effluent concentration of 1.5 mg/L used in the mass balance analyses at a discharge rate of 500 gpm would result in a daily load of 9.3 pounds of total nitrogen. Because the total nitrogen effluent limit is based on load, the effluent concentration could increase with a reduced discharge rate and vice versa. Regardless of the effluent concentration or discharge rate, a daily load of 9.3 pounds would result in total nitrogen concentrations less than the 1.0 mg/L limit set as the BHES Order limit in Libby Creek. The total nitrogen effluent concentration also could be higher between October 1 and June 30 because the

effluent limit is effective only July 1 through September 30. The BHES limit for total inorganic nitrogen and nitrate+nitrite would be applicable year-round.

Stream Temperature

Quantitative and qualitative approaches were used to analyze potential surface water temperature changes resulting from Project activities. The Project may affect stream temperatures by discharge of treated water from the Water Treatment Plant, vegetation clearing, and changes in groundwater discharge to area streams. For other activities besides Water Treatment Plant discharges, a qualitative approach was used to analyze potential effects on surface water temperatures.

MMC collected hourly or twice-daily stream temperature data between 2005 and 2010 at aquatic monitoring sites in Libby, Ramsey, Poorman, and Little Cherry Creeks (Kline Environmental Research 2007; MMC 2018c). Kline's data discussed in the SEIS are from site L10, upstream of the Libby Adit near LB-200, and L9, downstream of the Libby Adit near LB-300. Kline collected data from L10 from October 14, 2006, through October 18, 2008, and from August 5, 2009, through August 13, 2010. Kline collected data from L9 from August 7, 2005, through October 18, 2008, and from August 5, 2009, through August 12, 2010.

In January 2008, MMC initiated discharging of treated adit water to groundwater at Outfall 001. Pumps generally operated on a 4- or 5-day basis, pumping 8 to 10 hours per day. Pumping was halted and the Water Treatment Plant did not operate during the evenings and weekends. Later in the year, operation times extended to 7 days per week (day shift only).

MMC also submitted temperature data in Libby Creek at LB-200, upstream of the Water Treatment Plant outfalls; and at LB-300, downstream of the outfalls, to DEQ during the MPDES permitting process. The synoptic temperature measurements were taken between February 2014 and May 2015 (Klepfer Mining Services 2015a). MMC began monitoring temperatures continuously at LB-200 and LB-300 in March 2017 in accordance with the MPDES permit. Temperature monitoring data are reported monthly to DEQ. Available temperature data in upper Libby Creek and Water Treatment Plant effluent are discussed in more detail in a technical memo (ERO Resources Corp. 2018a).

Stream temperature differences between LB-200 and LB-300 may not be solely attributable to discharges; many other factors, such as groundwater/surface interactions, stream depth, and canopy coverage, affect stream temperatures at adjacent stream segments (Poole and Berman 2001). Due to the numerous factors affecting stream temperatures and a changing stream temperature regime that occurs, it is difficult to quantitatively predict how the Project may alter stream temperature, or to what extent stream temperatures may change. It may not be possible to separate indirect effects of the alternatives on stream temperature from other natural effects. MMC's MPDES permit (DEQ 2017a) requires continuous temperature monitoring at LB-200 and LB-300 and calculation of average daily temperature differences between LB-200 and LB-300. The permit also requires weekly monitoring of effluent temperature.

Water Treatment Plant Effluent Temperatures

MMC submitted Water Treatment Plant effluent temperature data to DEQ during the MPDES permitting process. The data covered temperatures taken at one ultrafiltration unit (Sample ID UF-1) between 2007 and 2013 (DEQ 2016c). In the 2017 MPDES permit, DEQ required monitoring of effluent temperature. MMC measures effluent temperature hourly at two

ultrafiltration units before the water is sent to a discharge tank. From the discharge tank, water is sent to a distribution box and then discharged to a percolation pond (MPDES Permit Outfall 001). Effluent temperatures discussed in the ERO (2018a) memo are a comprehensive dataset from both ultrafiltration units (Sample IDs UF-1 and UF-2) from March 2008 through December 2017 and are the average temperature of water at the two ultrafiltration units.

Erosion and Sedimentation

In support of the JFEIS, ERO prepared a memo describing an analysis of sediment delivery to streams from roads considered potential sediment sources and that would be used for the Montanore Project (ERO Resources Corp. 2015b). The analysis used the WEPP Forest Road Erosion Predictor Model. ERO updated the memo in 2017 (ERO Resources Corp. 2017b). The 2017 memo provided updated modeling results of estimated sediment delivery from roads as a result of changes in road use by the Evaluation Project and the Montanore Project. The 2017 memo replaced the results of sediment delivery to streams from roads described in ERO's 2015 memo. Data collection and analysis methods needed for the WEPP model are described by ERO (2017b).

The 2015 memo provided a summary of DEQ and EPA's sediment load analysis completed as part of developing a sediment Total Maximum Daily Load (TMDL) for the Kootenai River-Fisher River Project area, which included lower Libby Creek outside of the analysis area. The Montanore facility was assigned a sediment wasteload allocation of 24 tons/year. The 2015 memo also provided ERO's estimate of the current sediment load to the Upper Libby Creek and Big Cherry Creek watersheds and the estimated future loads to these watersheds. ERO's analysis of the current and future sediment load to the Upper Libby Creek and Big Cherry Creek watersheds was unchanged, and the summary of the analysis was not repeated in the 2017 memo.

3.13.3 Affected Environment

Except as described in this section, surface water and groundwater quality that may be affected by Project activities are described in JFEIS Section 3.11.3, *Affected Environment*. Measured concentrations in area streams from ongoing monitoring are within the range described in JFEIS Section 3.13.3, *Affected Environment*. Water quality at previously unsampled stream sites, such as EFRC-300, and benchmark sites, such as Wanless Lake and BC-50 in upper Bear Creek (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018), were consistent with the characterization described in the JFEIS. Total suspended solids, total dissolved solids, turbidity, major ions, and nutrient concentrations are all low, frequently at or below analytical detection limits. Metal concentrations are generally low with a high percentage of below-detection-limit values. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on water quality in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. Appendix C describes the additional water quality data that would be collected. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.13.3.1 Water Treatment Plant Effluent Temperatures

Water Treatment Plant effluent temperature averaged 56.5°F based on the 2,052 samples taken daily between March 2008 and December 2017. The monthly average over the period did not vary by more than 1°F. None of the average monthly temperatures of water at the two

ultrafiltration units was greater than or equal to 59°F. Maximum effluent temperature was 58.1°F from December through February and 58.6°F from July through September (ERO Resources Corp. 2018a). The range of effluent temperatures was higher from November through March, primarily due to lower minimum temperatures in the winter.

3.13.3.2 Stream Temperatures

Kline data (Kline Environmental Research 2007; MMC 2018c) indicate that stream temperatures in Libby Creek before discharges began, upstream of the Libby Adit (site L10), typically were the lowest in January (in the low 30s°F) and were highest in July or August (in the low to mid-50s°F). Stream temperatures in Libby Creek below the Libby Adit Site (site L9) typically were the lowest in January (in the low 30s°F) and were highest in July or August (at or below 51°F). Upstream site L10 had higher average maximum temperatures than site L9 in all months except January, October, and November. Both sites had narrower temperature ranges during the winter than in the summer and fall. Temperature ranges were wider at L10 than at L9. Average monthly temperatures at L10 were warmer than at L9 during July and August (Table 329). Temperatures at both sites were below 59°F throughout the year and were below 48°F beginning in the 2nd week of September.

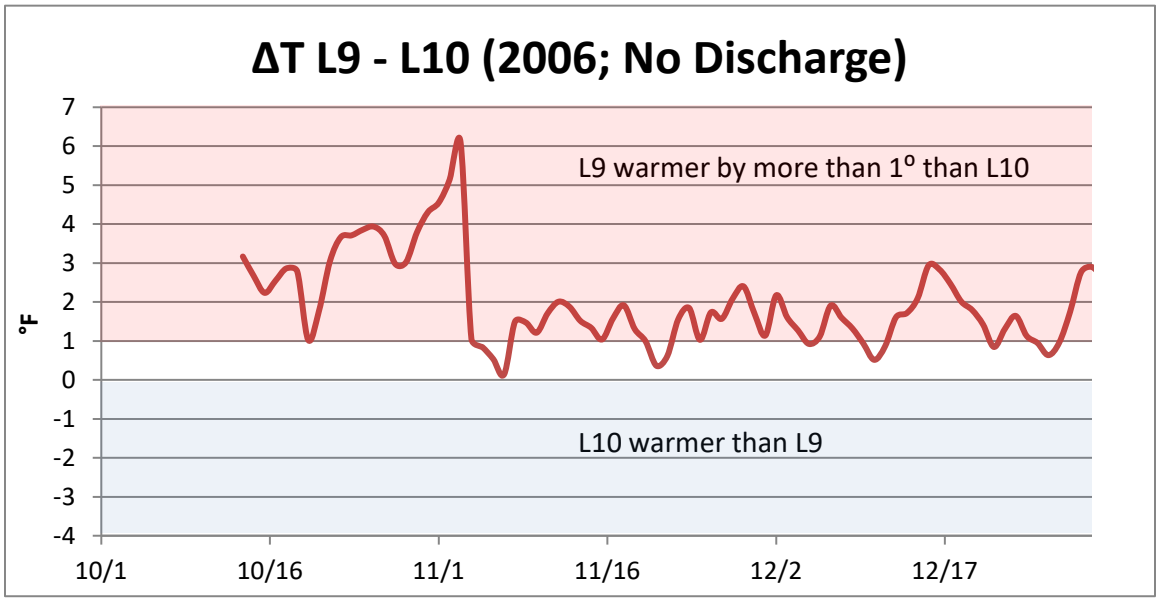
Table 329. Libby Creek Stream Temperatures in 2007 before Discharges Began.

Month	L10 Near LB-200				L9 Near LB-300			
	Average (°F)	Maximum (°F)	Minimum (°F)	Range (°F)	Average (°F)	Maximum (°F)	Minimum (°F)	Range (°F)
January	33.1	35.3	31.8	3.5	34.4	35.8	33.2	2.6
February	34.1	36.2	32.1	4.0	35.1	36.1	33.5	2.6
March	36.2	39.3	31.8	7.4	36.5	38.0	33.8	4.3
April	37.5	41.8	34.4	7.4	38.0	39.2	36.6	2.5
May	39.2	45.5	36.4	9.0	39.8	42.3	37.8	4.5
June	43.0	49.1	39.8	9.3	43.3	46.2	41.4	4.8
July	50.6	56.4	43.5	12.9	49.2	50.9	45.3	5.6
August	50.5	54.7	46.0	8.7	49.6	51.2	46.7	4.5
September	46.7	53.3	41.0	12.3	47.0	50.6	43.4	7.2
October	40.6	44.1	36.7	7.4	42.0	45.6	38.0	7.6
November	36.8	40.7	33.0	7.7	38.0	41.1	34.6	6.5
December	34.0	37.6	32.1	5.5	35.0	37.5	33.2	4.3

Data shown are from 1/1/07 through 12/31/07.
Source: Kline Environmental Research 2007; MMC 2018c.

Kline began collecting synoptic temperature data at both upstream site L10 and downstream stream site L9 on October 14, 2006. Temperatures were warmer at L9 than L10, reaching a maximum difference of 6.1°F on November 3, 2006. The following day, November 4, 2006, the temperature difference was 1°F, and it was 0.1°F three days later (Chart 2). The change in temperature differences appears to be related to greater fluctuations at the upstream site L10.

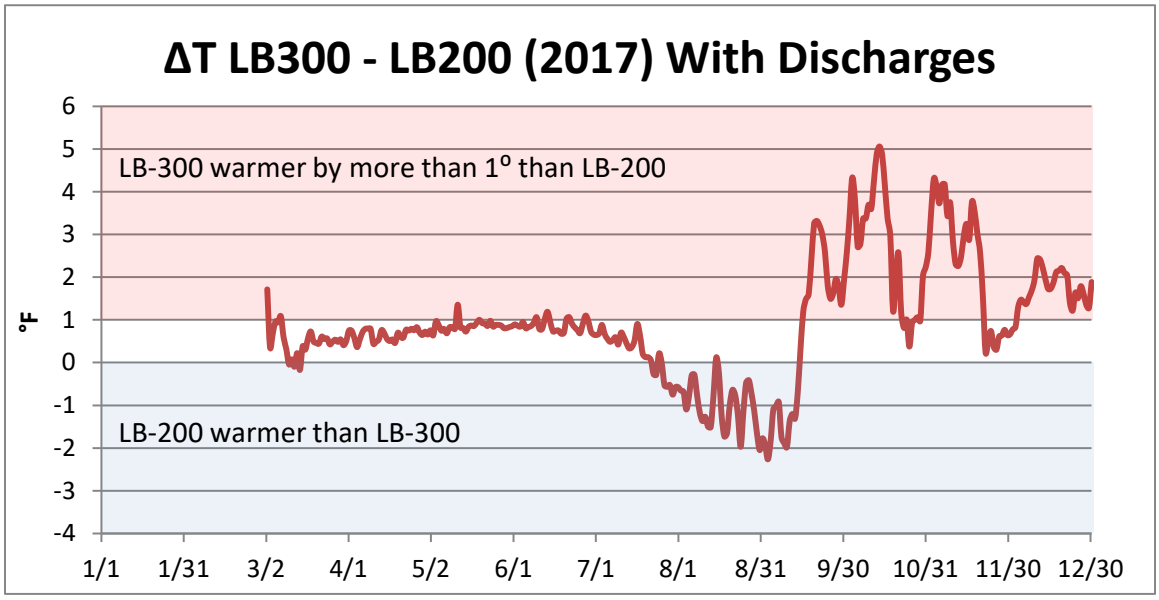
Chart 2. Temperature Differences between L9 (Downstream) and L10 (Upstream) in 2006.



Source: Kline Environmental Research 2007; MMC 2018d

The KNF assessed stream temperatures collected at LB-200 and LB-300 beginning in March 2017 (MMC 2018e). In 2017, the temperature was generally between 0.4 and 1°F warmer at downstream LB-300 than at upstream LB-200 from March to mid-July (Chart 3). Starting in mid-July, LB-200 became warmer than LB-300, reaching a maximum difference of 2.3°F in early September. From early September, the difference reversed, and by mid-October 2017, LB-300 was 5°F warmer than LB-200. The pattern of temperature differences was similar to 2007, when no discharges occurred, and to 2009, when discharge volume was 3 times greater. After mid-

Chart 3. Temperature Differences between LB-300 (Downstream) and LB-200 (Upstream) in 2017.

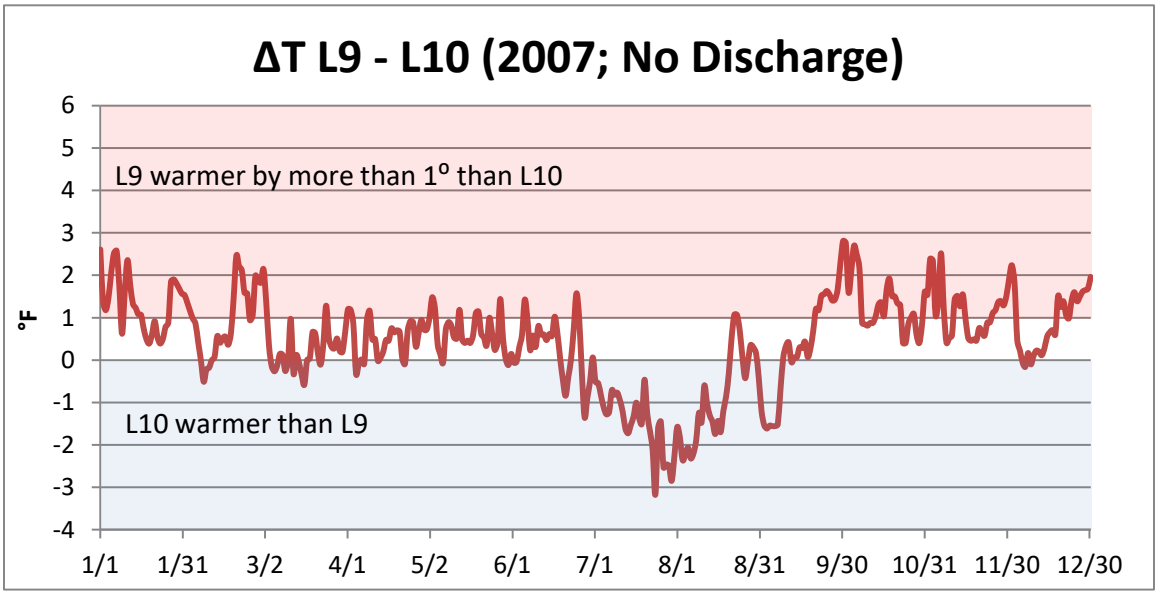


Source: MMC 2018e

October 2017, temperature differences fluctuated by 2°F to 4°F and gradually declined. The maximum weekly discharge of 0.1 cfs into groundwater is unlikely to be the cause of the large temperature fluctuations observed in 2017.

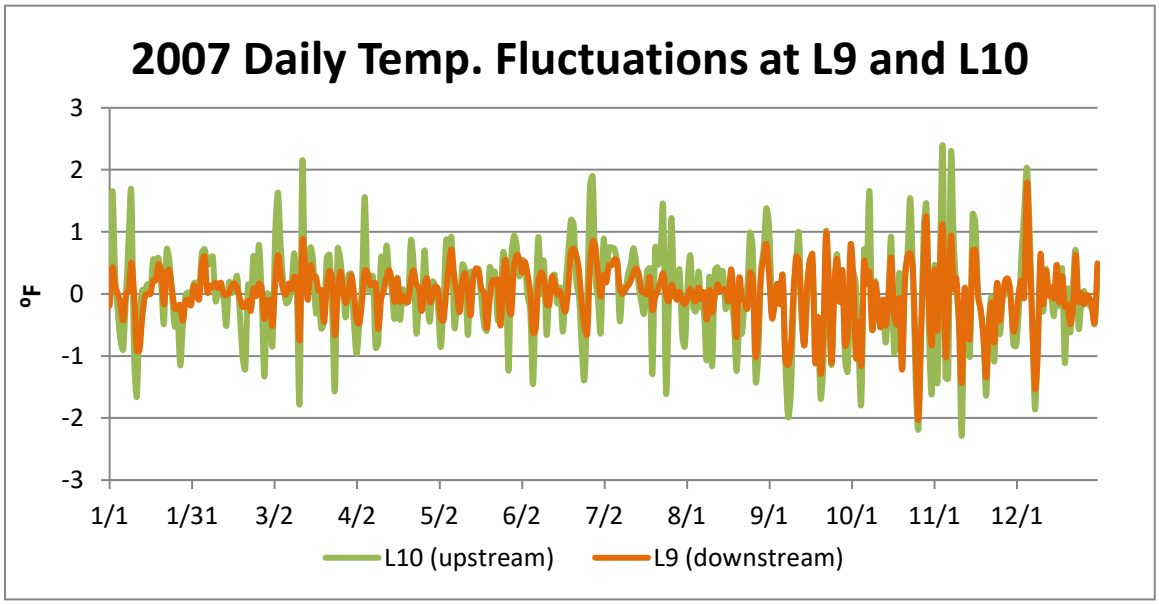
In 2007, the temperature was generally up to 2.5°F warmer at downstream site L9 from January to mid-June than at upstream site L10. Over the 6-month period (January through June), L10 was warmer than L9 for 23 days (13 percent). Starting in mid-June, the upstream site L10 became warmer than L9, reaching a maximum difference of 3.2°F in late July. From late July through December, the difference decreased and by mid-September reversed, with L9 reaching a maximum difference of 2.8°F warmer than L10 by early October (Chart 4). As was observed in the 2006 data, temperatures at upstream site L10 fluctuate considerably more than at L9 (Chart 5).

Chart 4. Temperature Differences between L9 (Downstream) and L10 (Upstream) in 2007.



Source: Kline Environmental Research 2007; MMC 2018c

Chart 5. 2007 Daily Temperature Fluctuations at L9 (Downstream) and L10 (Upstream).



Source: Kline Environmental Research 2007; MMC 2018c

3.13.3.3 Groundwater Temperatures

MMC collects groundwater temperatures at the two monitoring wells (MW07-01 and MW07-02) at the Libby Adit Site monthly (MMC 2018e). The wells are not accessible during some months due to snow conditions. Average monthly groundwater temperatures range from 40.8°F to 48.5°F (Table 330). Temperatures in the well closest to the percolation pond (MW07-02) are warmer than in the other monitoring well in most months (April through December) and cooler in late winter (January through March).

Table 330. Monthly Average Groundwater Temperatures, 2008–2017.

Month	MW07-01 (°F)	MW07-02 (°F)	Difference (°F)
January	43.7	43.2	-0.5
February	43.9	43.0	-1.0
March	42.2	41.8	-0.4
April	41.2	41.4	0.3
May	40.9	41.3	0.4
June	42.0	42.7	0.7
July	42.7	43.5	0.8
August	43.2	45.4	2.2
September	43.8	47.8	3.9
October	43.9	48.5	4.5
November	44.0	46.8	2.8
December	43.5	44.8	1.2

Source: MMC 2018e

3.13.3.4 Relationship between Groundwater Temperatures and Stream Temperature

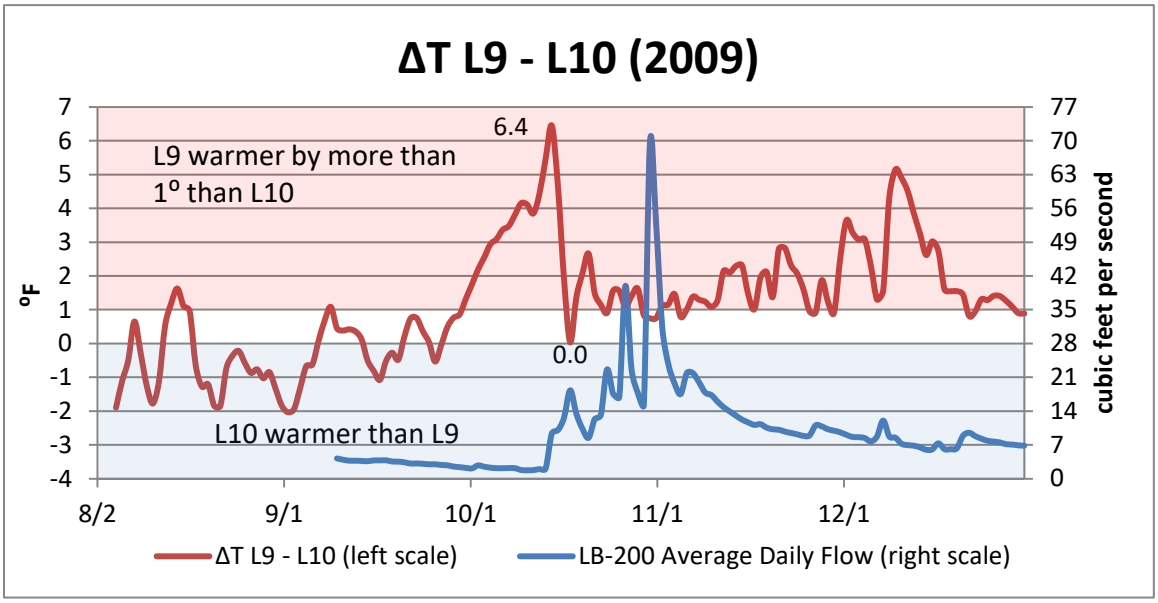
Because groundwater temperature data before discharges began are limited to two sample events, it is not possible to compare groundwater temperatures before groundwater discharges began in

2008 to temperature after discharges began. ERO compared 2009 groundwater and stream temperatures to 2017 groundwater and stream temperatures to assess the effect on discharge volume on stream temperatures. Groundwater discharges in 2009 were over 3 times the volume that occurred in 2017. Despite the considerably larger volume of water discharged in 2009, groundwater and stream temperatures during 2009 and 2017 were very similar. Stream temperatures were higher than the 48°F spawning threshold until mid-September at both the upstream and downstream sites in both years. After stream temperatures were below 48°F, the downstream site was warmer than the upstream site during both years. Groundwater temperatures were below the 48°F spawning threshold during August in both years.

3.13.3.5 Relationship between Air Temperature, Streamflow, and Stream Temperature

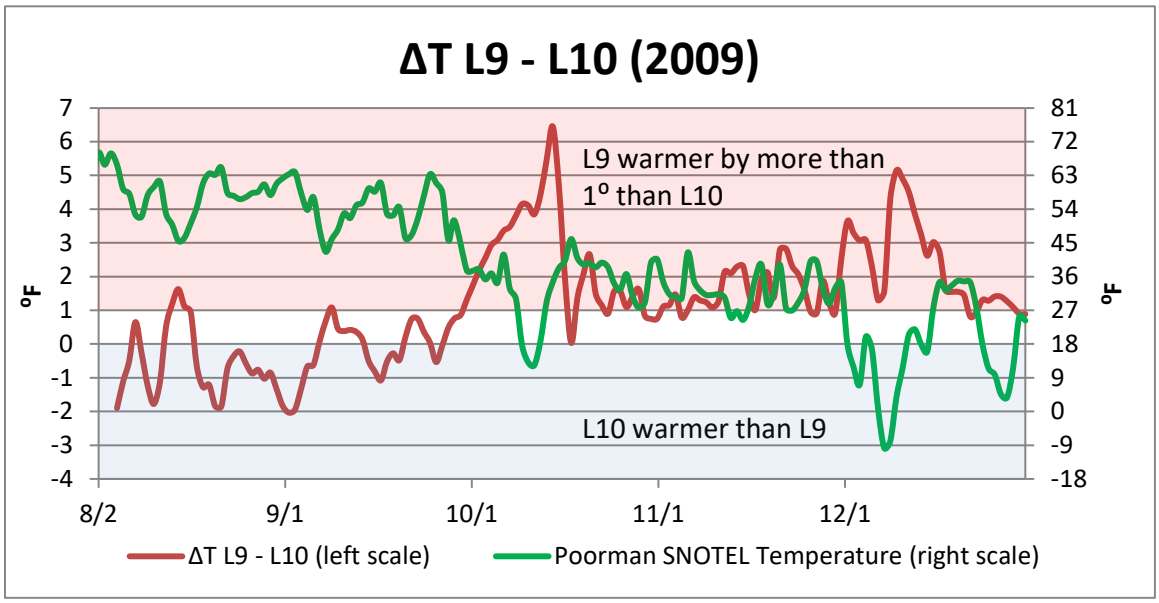
ERO examined the role streamflow and air temperature had on temperature differences at LB-200 and LB-300 using streamflow and air temperature data from 2009, 2010, and 2017. Stream temperature data were collected in 2009 beginning in early August, and twice-daily (noon and midnight) staff gage measurements began in early September. The highest temperature difference between L9 and L10 (6.4°F) occurred 2 days after streamflow at LB-200 reached its low for the year (Chart 6). The September and October 2009 temperature fluctuations also were correlated with changes in air temperature. Beginning in late September, average daily air temperatures dropped from 63°F to a low of 12°F in mid-October (Chart 7). Streamflow and air temperatures increased and temperature differences decreased to 0°F 3 days after lowest flow was reached. After the fall peak flow of 70 cfs, streamflow dropped to about 7 cfs, which corresponded with increases in temperature differences between L9 and L10 until mid-December. Increased temperature differences in December appear to be correlated with changes in air temperature and less influenced by streamflow.

Chart 6. Temperature Differences between L9 (Downstream) and L10 (Upstream) and Average Daily Streamflow at LB-200 during 2009 Spawning Season.



Source: MMC 2015b; MMC 2018c

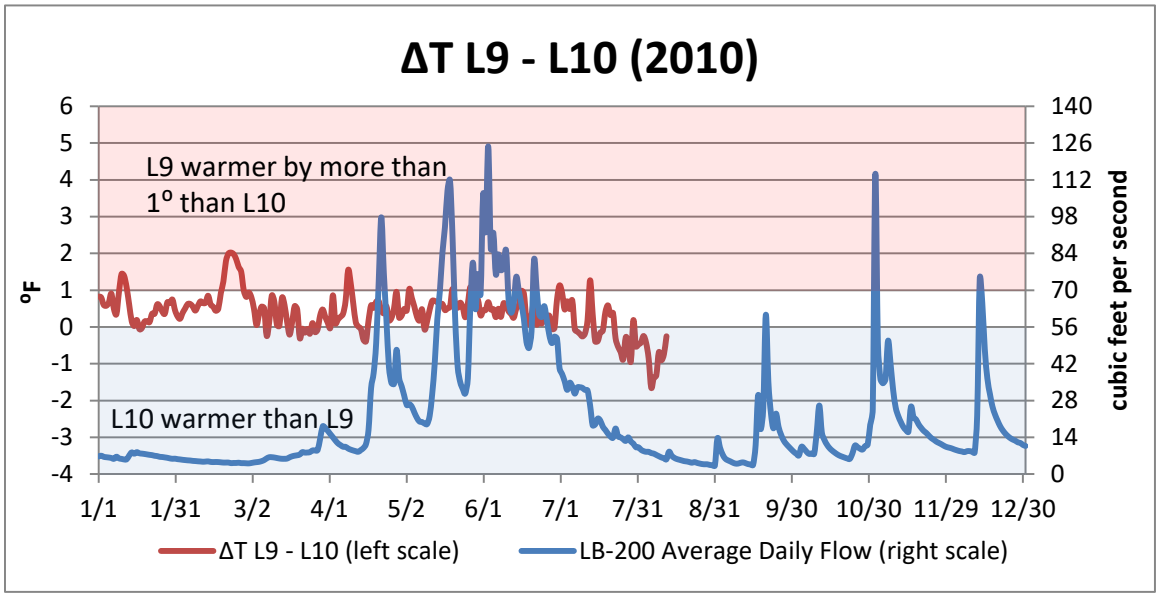
Chart 7. Temperature Differences between L9 (Downstream) and L10 (Upstream) and Average Daily Air Temperature during 2009 Spawning Season.



Source: MMC 2018c; Natural Resources Conservation Service 2018

Stream temperature data collection in 2010 ended in mid-August. Stream temperature differences showed a decline beginning in mid-July, consistent with streamflow decreases (Chart 8).

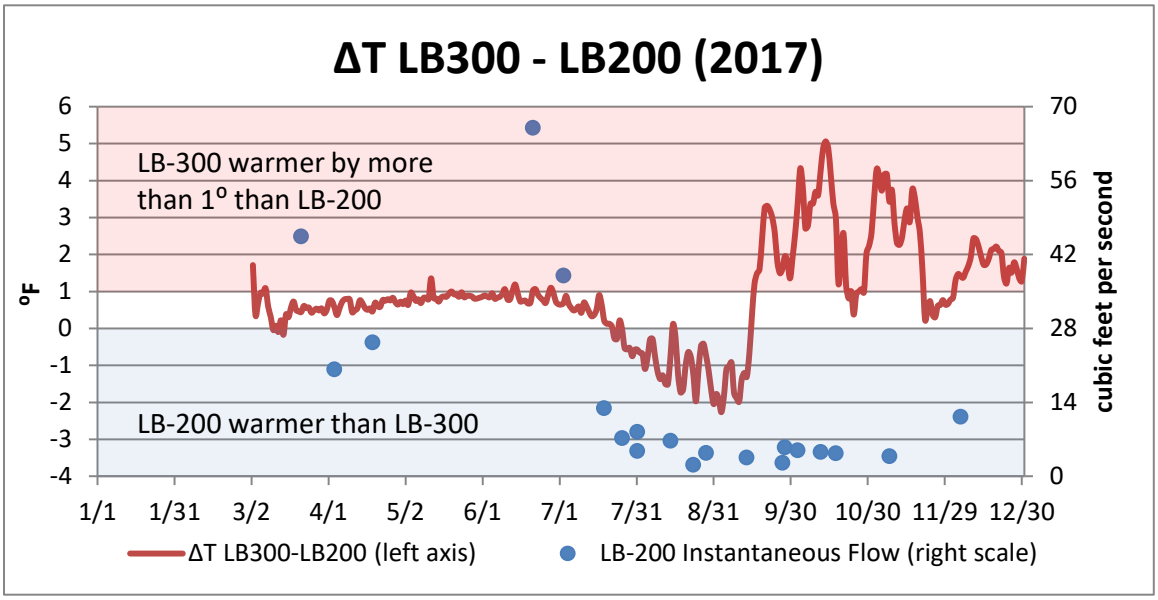
Chart 8. Temperature Differences between L9 (Downstream) and L10 (Upstream) and Average Daily Streamflow at LB-200 in 2010.



Source: MMC 2015b; MMC 2018c

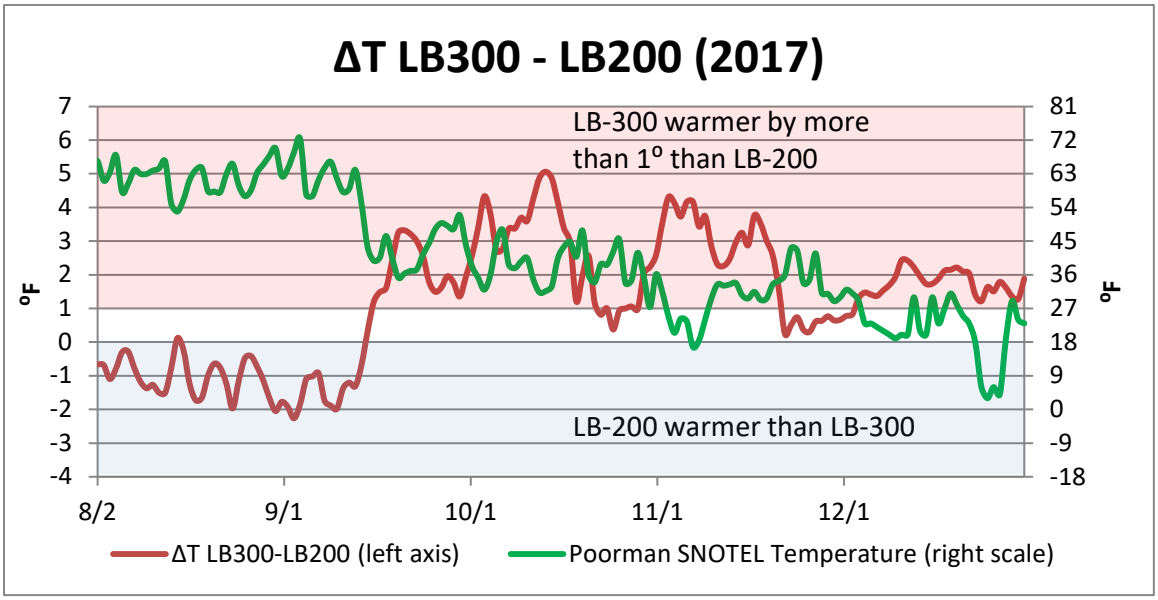
Similar to other years, upstream temperatures in 2017 were warmer starting in mid-July through mid-September, corresponding to decreased streamflow at LB-200 (Chart 9). Higher downstream temperatures after mid-September appear to be correlated with air temperature (Chart 10), similar to 2009 (Chart 7).

Chart 9. Temperature Differences between LB-300 (Downstream) and LB-200 (Upstream) and Instantaneous Streamflow at LB-200 in 2017.



Source: MMC 2018b; MMC 2018e

Chart 10. Temperature Differences between L9 (Downstream) and L10 (Upstream) and Average Daily Air Temperature during 2017 Spawning Season.



Source: MMC 2018c; Natural Resources Conservation Service 2018

3.13.3.6 Impaired Streams

No streams in the analysis area are on DEQ's 2018 303(d) list (DEQ 2019). In the analysis area, three stream segments were listed on DEQ's 2018 list of impaired streams (DEQ 2019). Libby Creek is separated into two segments; the lower segment is outside of the analysis area and is not discussed further. The upper segment is from 1 mile above Howard Creek to the US 2 bridge. This segment is listed as not fully supporting aquatic life. Probable causes of impairment listed

are alteration in streamside or littoral vegetative covers and physical substrate habitat alterations; both are non-pollutant impairment causes. Probable sources of impairment are impacts from abandoned mine lands and placer mining. When multiple causes and sources are listed, there is no implied relationship between the listed causes and sources (DEQ 2019). Alteration in streamside or littoral vegetation covers refers to circumstances where practices along the stream channel have altered or removed riparian vegetation and subsequently affected channel geomorphology or stream temperature. As a result of altering the streamside vegetation, destabilized banks from loss of vegetative root mass could lead to overwidened stream channel conditions and elevated sediment or nutrient loads, and the resultant lack of canopy cover can lead to increased water temperatures. Physical substrate habitat alterations generally describe cases where the stream channel has been physically altered or manipulated, such as through the straightening of the channel or from human-influenced channel downcutting, resulting in a reduction of morphological complexity and loss of habitat (riffles and pools) for fish and aquatic life. For example, this may occur when a stream channel has been straightened to accommodate roads or agricultural fields or through placer mine operations (DEQ and EPA 2014). Sedimentation/ siltation is not a cause of the impairment of the Libby Creek segment in the analysis area. Sediment is a pollutant, and streams impaired because of sedimentation/siltation require a TMDL. A TMDL was not required for the upper Libby Creek segment in the analysis area because no pollutant-related use impairment was identified (DEQ and EPA 2014).

Rock Creek from the headwaters (including Rock Lake and East Fork Rock Creek) to the mouth below Noxon Dam is impaired, with aquatic life not fully supported. DEQ did not separate East Fork Rock Creek and Rock Creek, which begins at the confluence of the East and West forks. Probable cause for the Rock Creek impairment is other anthropogenic substrate alterations, with the probable source listed as silvicultural activities. Sedimentation/siltation is not a cause of the impairment of Rock Creek. A TMDL is not required for East Fork Rock Creek or Rock Creek because no pollutant-related use impairment was identified (DEQ 2010).

3.13.4 Environmental Consequences

3.13.4.1 Alternative 1

In Alternative 1, DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Water quality in Libby Creek would return to pre-adit conditions after the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150.

3.13.4.2 Alternative 2

Effects on impaired streams, effect of nitrogen and sulfur emissions on area lakes, risk of water collection and treatment system failure, and risk of accidental spills or releases would be the same as Alternative 3 and are discussed under Alternative 3.

3.13.4.2.1 Effects of Adit Inflows and Discharges

The effects of adit inflows, discharges (including stream temperatures), and solid waste management while the Libby Adit remained open would be similar to Alternatives 3 and 4 and are discussed under Alternative 3. MMC could use Outfall 002 or 003 in Alternative 2. MMC has not

reported a discharge from Outfalls 002 and 003 during the term of the 2006-issued permit (DEQ 2016c). Outfall 003 has not been constructed (EPA 2003; MMC 2009a). MMC did not propose to install a pipe from the percolation pond to Libby Creek in its minor revision (MR06-002) to its Operating Permit. In issuing MMC a MPDES permit, DEQ set effluent limits and conditions for discharges to Outfalls 001 through 003 that comply with the surface water quality standards, the nondegradation policy, and the BHES Order to ensure that the current and future beneficial uses of state waters are protected (DEQ 2016c). No geotechnical investigations would be conducted. Water quality would not be affected by geotechnical investigation activities proposed in Alternatives 3 and 4.

3.13.4.2.2 Stormwater Runoff and Erosion

Stormwater Control Planning and Implementation

MMC submitted a final SWPPP in 2017 (MMC 2017a). This plan, along with a sediment TMDL in Libby Creek established by DEQ and EPA, is discussed under Alternative 3.

Libby Adit Site

The Libby Adit Site is already constructed, and slopes adjacent to Libby Creek have been revegetated. A lined stormwater collection pond also was constructed near the Libby Adit to collect runoff from the portal area. MMC would expand the existing waste rock storage areas to accommodate additional waste rock from extending the adit and developing the drifts. The storage areas would be lined with a 60-mil PVC liner and designed to slope toward the lined stormwater collection pond, which acts as a sump. Infiltrated precipitation would flow to the pond, which is lined with a 60-mil high-density polyethylene (HDPE) geomembrane liner and designed for the 25-year/24-hour storm. The pond also would continue to be used to store stormwater before conveyance to the Water Treatment Plant for treatment and discharge. Stormwater at the Libby Adit would not adversely affect surface water and groundwater quality.

Stormwater could be discharged without treatment in the unlikely event that a storm greater than the 25-year/24-hour storm would occur at the Libby Adit Site. A 25-year storm has an annual occurrence probability of 4 percent. Because of the natural variability of storm events, it is not possible to predict the frequency, duration, or suspended sediment concentration of the discharge. The pond could discharge during storm events greater than the 25-year/24-hour storm when sediment delivery to streams would already be naturally elevated. Distinguishing the additional sediment load from any discharges during a 25-year storm from existing conditions may not be feasible. Sediment from such discharges would be deposited into the floodplain or low-gradient stream reaches of Libby Creek or would be carried to the Kootenai River.

Libby Creek Road

MMC would use Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) for year-round access to the Libby Adit Site. MMC did not propose improvements to the roads, and existing sediment delivery from the roads would not change. Long-term reduction in sediment delivery also would not occur.

Changes in Road Access for Mitigation

MMC did not proposed road access changes before or during the Project. Existing sediment delivery would not change. Long-term reduction in sediment delivery also would not occur.

Effects on Impaired Streams

The effects on impaired streams would be to the same as Alternatives 3 and 4 and are discussed under Alternative 3.

3.13.4.2.3 Libby Adit Site Closure

After underground evaluation activities were completed, Libby Adit water quality is expected to be similar to existing water quality. Libby Adit water quality in Alternative 2 would be similar to Alternative 3 and is discussed in Section 3.13.4.3.9, *Libby Adit Site Closure and Reclamation of Geotechnical Investigation Disturbances.*

After the Libby Adit was plugged, a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. Any changes in water quality in East Fork Rock Creek, Rock Lake, and the East Fork Bull River would be more likely to be permanent than in Alternatives 3 and 4. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. Any effect on water quality on East Fork Rock Creek, the East Fork Bull River, and Rock Lake would more likely be permanent in Alternative 2 than in Alternatives 3 and 4. Water quality in Libby Creek would return to pre-adit conditions after the adit was plugged. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 306 and sediment conditions would return to pre-Project conditions on the roads.

3.13.4.3 Alternative 3

3.13.4.3.1 Effects of Adit Inflows

Groundwater would flow toward the adit and drifts, rather than away from them. Groundwater quality surrounding the adit and drifts would not be adversely affected by Project activities. In the streams whose baseflow would be reduced, water quality changes may occur. Deeper bedrock groundwater is likely to have higher total dissolved solids concentrations than shallow groundwater or direct runoff to streams. A decrease in the deeper bedrock groundwater contribution to streamflow may result in lower total dissolved solids concentrations in streams. Because predicted baseflow changes are small, changes in stream water quality due to dewatering would be negligible.

Because deep bedrock groundwater is a contributor to Rock Lake throughout the year, Project activities may affect the water quality of Rock Lake. Shallow and deeper groundwater, both of which are source waters for Rock Lake, have subtly different quality (Gurrieri 2001). It may be difficult to differentiate changes in water quality from existing water quality variability. If less groundwater were contributed to Rock Lake, total dissolved solids, silica (needed by diatoms), and nutrient concentrations may decrease in the lake. Because the 3D model predicted small decreases (3 acre-feet per year) in the lake's 1,302 acre-foot volume, the effect on the lake water quality would be negligible.

Water quality changes in springs and seeps may be slight and not detectable, depending on the relative contributions of shallow and deep groundwater to each spring. In the case of springs that receive a large portion of their flow from deep groundwater, total dissolved solids concentrations may decrease as the shallow groundwater accounts for a larger proportion of the total flow. The only springs whose water quality may be adversely affected by Project activities would be those in the analysis area below an elevation of about 5,000 to 5,600 feet (see Springs and Seeps in the Mine Area section in Section 3.10.4.3.1).

3.13.4.3.2 Effects of Discharges

MMC would use Outfall 001 for all discharges from the Libby Adit Site in Alternative 3. Outfall 002 would be covered by expanding the waste rock storage area, and MMC has no plans to develop an infiltration gallery at the site (MMC 2017d). A direct discharge to Libby Creek (Outfall 003) has not been constructed (EPA 2003; MMC 2009b). MMC has no plans to install a pipe from the percolation pond to Libby Creek during the Project, and Outfall 003 could not be used unless a pipe was installed between the pond and Libby Creek (MMC 2017d).

Groundwater Quality

The primary water quality concern during drift development would be residual nitrate residue from blasting. MMC would expand an existing waste rock storage area and develop an adjacent one. Both would be lined, and precipitation that infiltrated or runoff would be collected at a waste rock sump and pumped to the Water Treatment Plant for treatment and discharge. The alteration-zone rock and ore would be placed on lined pads and covered to prevent contact with precipitation. MMC would implement an Explosives Management Plan designed to minimize residual nitrate in the waste rock.

Water discharged from the Water Treatment Plant, when discharged to the percolation pond next to Libby Creek, would mix with groundwater in an approved groundwater mixing zone. After mixing, concentrations of some parameters in groundwater would be greater than ambient conditions but would be below groundwater quality standards, BHES Order limits, and applicable nondegradation criteria in groundwater.

Metals and Nutrients in Surface Water

Mixing of discharges and surface water also would occur within an approved surface water mixing zone in Libby Creek. DEQ approved a surface water mixing zone in Libby Creek for certain parameters at both outfalls in MMC's 2017 MPDES permit (DEQ 2017a). MMC appealed the mixing zone provisions of the 2017 MPDES permit, and the mixing zones of the 2006 MPDES permit are in effect pending resolution of the appeal. DEQ did not authorize an acute mixing zone, meaning no acute water quality standard can be exceeded within or outside of the authorized mixing zone. When evaluating the chronic mixing zone, DEQ applied the most restrictive applicable water quality standard to ensure the mixing zone would be the smallest practicable size and to ensure that beneficial uses would not be impaired. DEQ's assessment considered the impact of the mixing zone on all aquatic life, including bull trout. DEQ's assessment of the mixing zone considered all of the necessary factors and concluded that granting the chronic mixing zone would not threaten or impair existing or future beneficial uses. Those uses include the growth and propagation of salmonid fishes and aquatic life (ARM 17.30.623(1)). The water quality assessment that DEQ is required to make before approving a mixing zone is found in the MPDES Permit Fact Sheet (DEQ 2016c).

The Water Treatment Plant discharges are predicted to increase concentrations of total dissolved solids, nitrogen, total phosphorus, and some metals in Libby Creek at and below LB-300 to above ambient concentrations. Table 331 provides calculated maximum daily concentrations after mixing at LB-300. Although concentrations of some parameters are calculated to increase, water quality standards, BHES Order limits, and applicable nondegradation criteria would not be exceeded. No other streams would be affected by Water Treatment Plant discharges. Actual concentrations in Libby Creek probably would be less than those shown in Table 331 because concentrations in Water Treatment Plant effluent have generally been less than the maximum daily effluent limit used in the analysis, and the effluent discharge rate during most of the Project would be less than the 500 gpm used in the analysis. Discharge rates of 500 gpm would be expected during a 3- to 4-week period when the adit initially was dewatered.

Effluent total nitrogen concentrations could be higher between October 1 and June 30 when the interim MPDES effluent limit does not apply. Higher total nitrogen concentrations between October 1 and June 30 would not lead to nuisance algal growth. Low temperatures in winter and high-flow events during spring runoff tend to mute the local effects of eutrophication. Plant growth slows dramatically in the fall and winter, and spring high-flow events prevent nuisance algal mats from developing (Suplee et al. 2008). DEQ determined the discharge would not create conditions that produced undesirable aquatic life. The MPDES permit has an effluent limit for total nitrogen and requires effluent monitoring for total nitrogen and total phosphorus. Nitrogen effluent limits could be modified in the MPDES permit issued by DEQ at any time if MMC's discharge created conditions that produced undesirable aquatic life (ARM 17.30.637(1)(e)).

Table 331. Calculated Maximum Daily Concentrations after Mixing at LB-300 during Alternative 3.

Parameter	Ambient Concentration (mg/L)	Calculated Maximum Daily Concentration before 2020 (mg/L)	Calculated Maximum Daily Concentration after 2020 (mg/L)
Total dissolved solids	91.9	Not analyzed	110
Ammonia, as N	0.1	Not analyzed	0.71
Nitrate+nitrite, as N	0.2	Not analyzed	0.84
Total inorganic nitrogen	0.2	0.78	0.50
Total nitrogen	0.465	0.73	0.73
Total phosphorus	0.010	0.013	0.013
Antimony	0.003	Not analyzed	0.0026
Cadmium	0.00050	0.00066	0.00039
Chromium	0.004	0.0077	0.0053
Copper	0.002	0.0039	0.0024
Iron	0.050	0.13	0.092
Lead	0.001	0.0010	0.00080
Manganese	0.020	0.050	0.044
Mercury	0.0002	0.00016	0.00016
Zinc	0.020	0.050	0.024

Source: SEIS Appendix G.

Effluent quality may change over the life of the Project. MMC currently is discharging water that flows into the 14,000-foot adit developed primarily in the Prichard Formation. Other rock formations would be encountered in extending the adit and developing the drifts. MMC would monitor the effluent for all regulated metals (DEQ 2017a). According to the reopener provisions of MPDES permits described in ARM 17.30.1361(2)(b), permits may be modified "when the department [DEQ] receives new information that was not available at the time of permit issuance…[which] includes any significant information derived from effluent testing after issuance of the permit." The specific reopener provisions included in the permit are consistent with the various provisions of ARM 17.30.1361 (DEQ 2016c). If the effluent characteristics changed significantly during the Project, DEQ may seek to reopen and modify the permit to adjust permit effluent limits and conditions as appropriate (DEQ 2017b). The KNF would continue to rely on DEQ to issue and enforce a valid MPDES permit.

Stream Temperature

Stream temperature is an important criterion for aquatic life, and Montana has surface water aquatic life standards for temperature that restrict temperature changes. For bull trout, cold water temperatures play an important role in determining habitat, as this species is primarily found in colder streams below 59°F and spawning habitats are generally characterized by temperatures that are below 48°F in the fall. Bull trout typically spawn from late August to early November during periods of decreasing water temperatures (USDA Forest Service 2019). Constant temperatures greater than 60°F have been shown to be intolerable for bull trout (Maret et al. 2005). Direct solar radiation is the primary contributor to daily fluctuations in stream temperature, but stream temperature is influenced by many factors: air temperature, topography, weather, shade, streambed substrate (bedrock versus gravel or sandy bottoms), stream morphology, the amount of subsurface streamflow, and groundwater inflows (USDA Pacific Northwest Research Station 2005). Project activities may affect stream temperatures by discharge of treated water from the Water Treatment Plant, vegetation clearing, and changes in groundwater discharge to area streams.

The KNF analyzed available data from 2007 through 2017 on effluent discharge rates and temperature, stream temperatures and flow, and air temperatures near the Water Treatment Plant discharges at the Libby Adit Site (ERO Resources Corp. 2018a). The effect that Water Treatment Plant groundwater discharges had on temperature differences of more than 1°F during discharge appears to be negligible and would continue to be negligible. Libby Creek stream temperature differences between sites upstream of the Water Treatment Plant groundwater discharges and downstream of those discharges appear to be influenced by a variety of factors including streamflow and air temperatures. Poole and Berman (2001) noted that interactions between external drivers of stream temperature (groundwater temperature and discharge, local weather, and solar angle) and the stream's physical structure (channel and floodplain morphology, riparian vegetation structure, and the alluvial aquifer stratigraphy) determine channel water temperature. Because of factors besides MMC's discharge that influence stream temperatures, the difference between the temperatures of the upstream and downstream Libby Creek sites during Water Treatment Plant discharges is not a useful surrogate for the potential effect of discharges on stream temperatures. The KNF would continue to rely on DEQ to issue and enforce a valid MPDES permit.

3.13.4.3.3 Sanitary Waste Management

MMC would continue to use a septic system consisting of septic tanks for primary treatment, followed by discharge to a leach field at the Libby Adit. Discharges of sewage to groundwater from mining operations subject to operating permits under the Metal Mine Reclamation Act are not subject to groundwater permit requirements (75-5-401(5), MCA). MMC assessed the effect of discharging treated sewage to groundwater (Geomatrix 2010). Expected discharge is 585 gallons per day. Using DEQ guidelines for performing a nitrate sensitivity analysis for the septic system, the resultant nitrate concentration calculated at the end of a groundwater mixing zone was 0.75 mg/L. DEQ guidelines also were used for assessing compliance with nondegradation criteria using a surface water dilution analysis (trigger value calculation) for nitrate and phosphorus. Using the proposed treatment system, the calculated increase in the concentration of nitrate (0.0099 mg/L) and phosphorus (0.0007 mg/L) did not exceed the trigger values of 0.01 mg/L for nitrate and 0.001 mg/L for phosphorus (Geomatrix 2010). The nonsignificance criteria do not apply for nitrate in groundwater or for TIN in surface water for the Project because the BHES Order set limits of 10 mg/L for nitrate in groundwater and 1 mg/L for TIN in surface water. The assessment results showed that the BHES Order limits would not be exceeded for nitrate in groundwater or TIN in nearby Libby Creek. Monitoring locations, such as below the Libby Adit Site at LB-300, and parameters, such as nutrients, chlorophyll a, and periphyton, described in Appendix C would be capable of detecting problems with the septic system.

3.13.4.3.4 Stormwater Runoff and Erosion

Stormwater Control Planning and Implementation

MMC submitted a final SWPPP in 2017 (MMC 2017a). The SWPPP describes stormwater management at the Libby Adit Site, BMPs, control measures, and monitoring procedures that would ensure compliance with the terms and conditions of its MPDES permit. The SWPPP addressed stormwater runoff from the Libby Adit Site. Sediment and runoff from the site would continue to be minimized. MMC would update the SWPPP to cover all permitted discharges. The SWPPP would describe and locate all structural and non-structural BMPs implemented at the site to minimize erosion and sediment transport.

DEQ and EPA established as a TMDL an average annual sediment load of 4,234 tons for Libby Creek from the US 2 bridge to the confluence with the Kootenai River (DEQ and EPA 2014). This segment of Libby Creek is outside of the analysis area. A TMDL is the maximum amount of a pollutant a water body can receive and still meet water quality standards. As part of this TMDL, the Montanore facility was assigned a sediment wasteload allocation of 24 tons/year. MMC's discharges would be small in comparison to the estimated existing sediment load of 1,621 tons/year and the estimated future sediment load of 1,102 tons/year in the upper Libby Creek watershed. DEQ and EPA (2014) anticipate that achievement of the allocated sediment loads in the water quality improvement plan for lower Libby Creek, including the 24 tons/year allocated to the Montanore Project, will allow lower Libby Creek to support and maintain its state-designated beneficial uses (DEQ and EPA 2014). The following sections describe anticipated discharges containing sediment from the Libby Adit, roads, and mitigation activities that would occur.

Libby Adit Site

The Libby Adit Site is already constructed, and slopes adjacent to Libby Creek have been revegetated. A lined stormwater holding pond also was constructed near the Libby Adit to collect runoff from the portal area. One new lined waste rock storage area also would be developed at the

Libby Adit Site and an existing waste rock storage area expanded. The new storage area would be double lined with a 100-mil HDPE liner. Infiltrated precipitation would flow to a pond lined with a 100-mil HDPE geomembrane liner and designed for the 100-year/24-hour storm. Between the two pond liners would be a leachate collection system in the event the upper liner failed. The pond also would be used to store stormwater before conveyance to the Water Treatment Plant for treatment and discharge. All collected stormwater and storage area drainage would be pumped to the Water Treatment Plant, treated, and discharged to Outfall 001. Precipitation and runoff from other locations at the Libby Adit pad area would be collected, treated at the Water Treatment Plant, and discharged to Outfall 001. Stormwater discharges at the Libby Adit would not adversely affect surface water and groundwater quality.

Stormwater could reach Libby Creek without treatment in the unlikely event that a storm greater than the 100-year/24-hour storm occurred at the Libby Adit Site. Because the stormwater and storage area drainage collection system would be sized for a larger storm event than Alternative 2 and the liners would be thicker, the system would be more protective of surface water and groundwater quality at the site than Alternative 2. A 100-year storm has an annual occurrence probability of 1 percent. Because of the natural variability of storm events, it is not possible to predict the frequency, duration, or suspended sediment concentration of the discharge. The pond could discharge during storm events greater than the 100-year/24-hour storm when sediment delivery to streams would already be naturally elevated. Distinguishing the additional sediment load from any discharges during a 100-year storm from existing conditions may not be feasible. Sediment from such discharges would be deposited into the floodplain or low-gradient stream reaches of Libby Creek or would be carried to the Kootenai River.

Libby Creek Road

MMC would use Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) for year-round access to the Libby Adit Site. The KNF identified six locations where Libby Creek Road would cross or intercept a RHCA. A literature review associated with the development of the INFS, which was incorporated into the KFP, concluded that non-channelized sediment flow rarely travels more than 300 feet, and that 200- to 300-foot riparian buffers are generally effective at protecting streams by preventing sediment movement via non-channelized overland flow (Belt et al. 1992). More recent studies cited by Dubé et al. (2004) in development of the Washington Road Surface Erosion Model reported that the maximum travel distance of sediment from culvert outlets or other types of cross drains was 30 to 550 feet, with sediment moving less than 150 feet in nearly all cases. Dubé et al. (2004) also reported that the volume of sediment deposition decreases exponentially downslope. If a water body is located closer than the total sediment travel distance for a site (a culvert, for example), only a fraction of the total sediment supplied from the site reaches the stream. For example, Ketcheson and Megahan (1996) showed that only about 17 percent of the total volume of sediment travels beyond 50 percent of the total travel distance.

The WEPP:Road Batch model predicted an existing average annual sediment load of 128 pounds leaving the buffer at the six assessed crossings (Table 332). MMC would reduce the contributing road surface lengths at the six crossings to 150 feet where the existing lengths were currently greater than 150 feet. The model predicted this mitigation would reduce the average annual sediment leaving the buffer to 87 pounds, a 32 percent reduction from existing conditions. This activity would be implemented before implementing the BMPs shown in Table 311.

Table 332. Changes in Predicted Average Annual Sediment Leaving Road Buffer along Libby Creek Road (NFS Road #231).

Location	Receiving Stream	Average Annual Sediment Leaving Road Buffer (lbs.)		
		Existing Conditions	During Evaluation Project	
		Predicted	Predicted	Change
ID 9 right	Libby Creek	26	13	-13
ID 10 left	Hoodoo Creek	0	0	0
ID 11 left	Unnamed Drainage	23	14	-9
ID 12 left	Unnamed Drainage	5	5	0
ID 12 right	Unnamed Drainage	10	10	0
ID 13 left	Unnamed Drainage	28	14	-14
ID 13 right	Unnamed Drainage	11	11	0
ID 14 left	Unnamed Drainage	1	1	0
ID 14 right	Unnamed Drainage	24	19	-5
Total		**128**	**87**	**-41**

Source: ERO Resources Corp. 2017b.

The WEPP:Road Batch model is best used as a comparative tool between different road designs. It is not an exact numeric predictor. Any predictions of runoff or erosion by any model will at best be within only ±50 percent of the true value (Elliot et al. 1999). Erosion rates are highly variable, and most models can predict only a single value. Replicated research has shown that observed values vary widely for identical plots spatially and temporally (Elliot et al. 1999). In addition, soil properties have considerable variability, which adds to the complexity of erosion prediction. The WEPP:Road Batch model estimates sediment delivery on an average annual basis in units of pounds but cannot be used to model seasonal sediment delivery, specific precipitation events, or higher erosion rates that typically occur during the initial years of vegetation establishment after land disturbance. Other limitations are discussed in KNF's WEPP:Road Batch analysis (ERO Resources Corp. 2017b).

MMC would implement the BMPs, such as installing, replacing, or upgrading culverts, to bring NFS road #231 up to KFP standards and guidelines and Forest Service guidance (USDA Forest Service 2008, 2015a). Limitations on completing instream work within 0.25 mile of a bull trout occupied stream described previously would be implemented. Short- and long-term effects on the streams would be the same as described previously for the Libby Creek Road improvements. The road improvements would reduce sediment in Libby Creek, Midas Creek, and Hoodoo Creek over the long term. Proposed instream activities would be subject to the three permitting processes described previously under *Permitting, Mitigation, and Monitoring* in Section 3.6.4.3.1, *Sediment*.

Roads and Drill Pads Used or Built for Geotechnical Investigations

Sediment delivery from Bear Creek Road would not change. Use of Bear Creek Road to access the area between Poorman Creek and Little Cherry Creek for geotechnical investigations would not change the existing high traffic level of the road.

In the geotechnical investigation area, MMC would use existing open, gated, and barriered roads for access (see Section 2.5.4.2, *Geotechnical Investigations*). In addition, MMC would build 13,747 feet of new roads and 13 drill pads 14 feet by 34 feet in size. Drill pads for boreholes completed as wells or piezometers would be built adjacent to the access road (Figure 311). Test pit locations and drill pads for other boreholes would be within the access road prism.

Except for a 185-foot section of a proposed access road, all new access roads and drill pads would be outside of an RHCA. Except for this one location, sediment from roads, culvert outlets, or other types of cross drains, all of which would be more than 300 feet from a stream channel, would not reach a stream, based on research cited by Belt et al. (1992) and Dubé et al. (2004). The location of the unavoidable construction of a new access road through a RHCA would be west of Little Cherry Loop Road. The RHCA is between two isolated wetlands. Isolated wetlands are not connected by surface flow to jurisdictional waters of the U.S. or to state waters. Where the RHCA would be crossed is relatively flat. Implementing BMPs would minimize or avoid sediment delivery to the adjacent wetlands; sediment delivery to a stream would be avoided. It is unlikely that any sediment that did reach the adjacent wetlands would reach Libby Creek or Poorman Creek, the nearest fish-bearing streams.

Except for one segment of each of two roads (roads #1408 and #6212H), all existing roads proposed for use would avoid and would not intersect a RHCA. Both RHCAs that would be crossed are adjacent to a non-fish-bearing tributary of Libby Creek (Drainage 10). During a 2012 survey, Drainage 10 was unchannelized across a flat area leading to two culverts under road #1408. The flow dispersed and infiltrated in this flat area and did not always reach the culverts (Kline Environmental Research 2012). Increased traffic on unpaved roads can generate or expose fine, easily detached sediment; prevent plant growth on road surfaces; and form ruts to channelize water on the road surface (Elliot et al. 1999). Traffic use would be high for a very short period on any individual road used for the geotechnical investigations (Table 315 in Chapter 2), likely a month or less. BMPs described would be implemented to minimize sediment delivery. It is unlikely that any sediment that did reach Drainage 10 would reach Libby Creek, the nearest fish-bearing stream.

MMC has not applied and is not authorized to discharge stormwater from any areas other than those described for Outfalls 001 through 008 in the 2017 MPDES permit. Before starting the Project, MMC would obtain a permit to discharge stormwater from disturbances associated with the geotechnical investigations if DEQ determined the activity required a stormwater discharge permit. MMC could either amend its MPDES permit or obtain coverage under Montana's General Permit for Storm Water Discharges Associated with Construction Activity if possible stormwater discharges from the geotechnical investigation area were eligible for coverage under the General Permit. DEQ would determine whether stormwater discharges associated with the geotechnical investigation activities were eligible for a general permit.

Sediment and runoff from all disturbed areas in the geotechnical investigation area 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) and the BMP requirements in the MPDES permit. All BMPs would be monitored (see Appendix C) and maintained and would remain in place until DEQ approved MMC's Notice of Termination. Appropriate BMPs for roads during use would be those that (1) disconnect road surfaces, fillslopes, cutslopes, and drainage ditches from streams; (2) shorten road surface lengths draining to surface waters; (3) revegetate disturbed soils and erosive areas;

(4) reduce scouring and stream channel and bank erosion at stream crossings; and (5) harden road surfaces and prevent rutting. BMPs that accomplish these would be the most effective way to minimize sediment delivery from analysis area forest roads. The KNF expects BMPs implemented to minimize sediment delivery from forest roads to be between 70 and 100 percent effective (Burroughs and King 1989; Gucinski et al. 2001; Kennedy 1997; Riedel et al. 2007). The DNRC has conducted field reviews every 2 years since 1990 of BMPs used for forestry, including road construction. The reviews evaluate the effectiveness of mitigation. A BMP's effectiveness was rated adequate if small amounts of material eroded, but material did not reach draws, channels, or a floodplain. In 2016, DNRC rated various BMPs as adequate 99 percent of the time (DNRC 2016).

Changes in Road Access for Mitigation

In Alternatives 3 and 4, MMC would implement or fund yearlong access changes on National Forest System and private roads before starting the Project (Table 309 and Table 310 in Chapter 2) for wildlife mitigation. The roads with access changes would be covered by a Road Management Plan. The plan would describe requirements for pre-, during-, and post-storm inspections and maintenance; implementation and effectiveness monitoring plans for road stability, drainage, and erosion control; and mitigation plans for road failures.

Three mitigation roads, which are currently open and assumed to have low traffic use, would be barriered with an earthen berm and traffic use eliminated. Access changes would eliminate traffic on three currently open roads and reduce sediment delivery. NFS roads #4776A, #4778C, and #14458 were assessed using the WEPP model. The model predicted that closing roads #4776A, #4778C, and #14458 for mitigation before the Project would reduce the average annual sediment leaving the buffers from 298 pounds to 204 pounds, a 32 percent reduction from existing conditions (Table 333). The access changes would reduce sediment in Libby Creek and Midas Creek or their tributaries.

Table 333. Changes in Predicted Average Annual Sediment Leaving Road Buffer from Mitigation Roads Closed before the Project.

Location	Receiving Stream	Average Annual Sediment Leaving Buffer (lbs.)		
		Low Traffic Use	No Traffic	Change with Project
4776A ID 26 left	Tributary to Libby Creek	7	9	+2
4776A ID 27 left	Tributary to Libby Creek	5	5	0
4776A ID 27 right		20	16	-4
4778C ID 28 left	Tributary to Libby Creek	5	2	-3
4778C ID 28 right		31	20	-11
4778C ID 30 left	Tributary to Libby Creek	6	4	-2
4778C ID 32 left	Tributary to Libby Creek	13	7	-6
14458 ID 29 left	Midas Creek	13	12	-1
14458 ID 29 right		198	129	-69
Total		**298**	**204**	**-94**

Source: ERO Resources Corp. 2017b.

MMC would transfer fee title to or place a conservation easement on 742.3 acres of private land and change access on roads for grizzly bear mitigation before starting the Project. Roads on mitigation lands would be decommissioned. Roads would be monitored for stability, drainage, and erosion control. The removal of stream crossing structures on barriered roads would occur prior to barrier construction so as to avoid future adverse effects on streams. Removals of culverts or other structures in a water of the U.S., if they resulted in a discharge of fill, would not proceed without all required permits and authorizations. In accordance with KFP guideline FW-GDL-WTR-02, hydrologic stability would be ensured before storing or decommissioning roads. To minimize sediment movement from stored or decommissioned roads to RHCAs, treatment may include one or more of the following:

- Removing culverts determined by the KNF to be high risk for blockage or failure and laying back streambanks to allow flows to pass without scouring or ponding so that revegetation would have a strong chance of success
- Installing water bars, drain dips, or open top box culverts or outsloping the road prism as necessary to route the water off the road away from drainages or wetlands
- Removing unstable materials to a stable location where stored materials would not present a risk to drainages or wetlands
- Replacing salvaged soil and revegetating with grasses in disturbed areas and unstable road segments to reduce erosion potential
- Conducting noxious weed surveys and performing necessary weed treatments before storage or decommissioning

3.13.4.3.5 Effects on Impaired Streams

Libby Creek from 1 mile above Howard Creek to the US 2 bridge is listed as impaired for aquatic life use due to alteration in streamside vegetative cover and alterations in physical substrate habitat. Effects on Libby Creek flow from the Water Treatment Plant discharge is discussed in Section 3.13.4.3.2, *Effects of Discharges*. The Water Treatment Plant discharge would flow into an unimpaired segment of Libby Creek. All discharges from the Water Treatment Plant would be subject to a MPDES permitted effluent limit on total suspended solids.

Rock Creek and East Fork Rock Creek are listed by DEQ as impaired due to anthropogenic substrate alterations, with the probable source of impairment listed as silvicultural activities. It is unlikely that the predicted flow decreases in East Fork Rock Creek and Rock Creek (0.01 cfs), which are small compared to channel-forming flows, would affect the substrate, including sediment transport, aggradation, or degradation, in East Fork Rock Creek or Rock Creek.

3.13.4.3.6 Effect of Nitrogen and Sulfur Emissions on Area Lakes

As discussed in Section 3.4.4.4.3, *Cabinet Mountains Wilderness Impact Assessment*, modeled nitrogen and sulfur emissions from the Libby Adit would be less than deposition analysis thresholds at Upper Libby Lake, Lower Libby Lake, and Rock Lake.

3.13.4.3.7 Risk of Water Collection and Treatment System Failure

The KNF disclosed the risk and potential effects of water collection and treatment system failure for Alternative 3 of the Montanore Project in JFEIS Section 3.13.4.3.8 and in a memo (ERO Resources Corp. 2015a). The risk and potential effects of water collection and treatment system failure would be similar to those described in the JFEIS. A key difference between what was

described in the JFEIS and water management during the Project is that MMC would not build and operate a tailings impoundment and would not operate a pumpback well system. MMC would use the Water Treatment Plant at the Libby Adit Site to treat all wastewater discharges. The KNF concluded that two scenarios—discharge of untreated water because of a loss of all power and discharge of untreated water because of inadequate capacity—are not supported by credible scientific evidence (ERO Resources Corp. 2015a). The only plausible Water Treatment Plant failure scenario for which credible scientific evidence exists is a brief failure of the Water Treatment Plant to operate as designed. The effects of this scenario were disclosed in the JFEIS and in the ERO memo (2015a).

3.13.4.3.8 Risk of Accidental Spills or Releases

MMC would use small amounts of hazardous materials during the Evaluation Project including lubricants, fuel, and blasting agents. MMC would update its 2007 Emergency Spill Response Plan (Klepfer Mining Services 2007) for the Evaluation Project, incorporating applicable DEQ comments on the draft plan (DEQ 2008).

The EPA maintains the National Response System, a mechanism used to track and respond to a wide range of oil and hazardous substance releases. Oil and hazardous substance releases occur very infrequently. In Montana, statewide reported spills and releases by all entities have decreased substantially over the past 15 years, from a high of 118 reported incidents in 2006 to 41 reported incidents in 2018 (EPA 2019). MMC has not reported a spill or release of oil and hazardous substances since the Libby Adit was reopened in 2007 (EPA 2019).

Potential introduction of oil or hazardous materials to streams would be limited to Libby Creek, Hoodoo Creek, or Midas Creek. During the Montanore Project NEPA evaluation, the KNF evaluated the risk associated with several possible accident scenarios during full operations of the Montanore Project, such as a chemical/fuel spill due to operator error and release of 10,000 gallons of product. The risk level for the evaluated scenarios for the Montanore Project was low or inconsequential (Klohn Crippen Berger 2009).

The KNF evaluated the risk of a spill or release associated with the Evaluation Project. The KNF concluded the risk of a spill or release of oil and hazardous materials during the Evaluation Project would be inconsequential because (1) the amount of oil and hazardous materials that would be transported and stored at the Libby Adit Site during the Evaluation Project would be substantially less than during the Montanore Project, and (2) the duration of the Evaluation Project (18 to 24 months) would be substantially shorter than the Montanore Project (20 years or more). A spill or release could adversely affect water quality and fish habitat in Libby Creek, Hoodoo Creek, or Midas Creek. The magnitude and duration of the effect would depend on the response time for cleanup, the toxicity and persistence of the spilled material, the size of the spill, how much entered the stream, and how much dilution occurred in the stream. MMC would manage any spill or release, should they occur, in accordance with its updated Emergency Spill Response Plan.

3.13.4.3.9 Libby Adit Site Closure and Reclamation of Geotechnical Investigation Disturbances

Water Quality

After underground evaluation activities were completed, Libby Adit water quality is expected to be similar to existing water quality. The JFEIS discussed that nutrient concentrations would

increase during blasting of the adit extension and drifts and decrease substantially during the following year to concentrations near background concentrations. Concentrations of total inorganic nitrogen in Libby Adit water over the past several years have been less than 0.1 mg/L, well under the surface water quality standard of 0.275 mg/L. Although rock formations not currently exposed in the Libby Adit would be exposed to a limited degree in the adit extension and drifts, adit water quality after underground evaluation activities were completed is not expected to be substantially different from existing water quality. Existing metal concentrations in adit water are near or below the detection limit (MMC 2017c, 2018b).

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. The effect of Alternative 2 indicated that a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. MMC would update the 3D model within 2 years of completing data collection from underground, assessing if an additional plug was necessary to avoid or minimize permanent effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River. If needed, a plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed. The KNF estimates the westernmost plug, if needed, would be 1,850 feet from the start of the inclined drift to above the ore body.

After the adit was plugged, Water Treatment Plant discharges would cease, and the adit and drifts would fill with water. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. If an additional plug was needed and installed to minimize post-closure effects, the time to fill the adit and drifts would be about half of what it was with two plugs. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded. Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates that installing a third plug would ensure that water quality in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. The KNF also expects that installing a third plug would ensure that groundwater discharge into Rock Lake and Rock Lake water quality also would return to existing conditions. Alteration-zone waste rock and ore would be returned underground west of the easternmost bedrock plug. Final placement of alteration-zone waste rock and ore would be designed to minimize contact with groundwater.

After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 309 and sediment conditions would return to pre-Project conditions on the roads.

Stormwater Controls

All BMPs would be monitored and maintained throughout the Project (see Appendix C) and remain in place until DEQ approved MMC's Notice of Termination. MMC could submit a Notice of Termination when the disturbance associated with the construction activity had achieved final

stabilization. Final stabilization means the time at which all soil-disturbing activities at a site have been completed and a vegetative cover has been established with a density of at least 70 percent of the pre-disturbance levels, or equivalent permanent, physical erosion reduction methods have been employed. Final stabilization using vegetation must be accomplished using seeding mixtures or forbs, grasses, and shrubs that are adapted to the conditions of the site and consistent with the KNF-approved 2018 seed mix (Savage 2018). Establishment of a vegetative cover capable of providing erosion control equivalent to preexisting conditions at the site would be considered final stabilization. After the Libby Adit Site and geotechnical investigation disturbances were reclaimed, sediment delivery would return to existing conditions within an estimated 4 to 5 years. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 309 and sediment conditions would return to pre-Project conditions on the roads.

3.13.4.3.10 Effectiveness of the KNF's Proposed Monitoring and Design Measures

Monitoring

Alternatives 3 and 4 include monitoring of all surface water bodies and groundwater potentially affected by the Project (Appendix C). Although water quality monitoring would continue, it probably would not be able to detect Project-related changes in stream and lake water quality because the predicted changes are small and stream and lake water quality has natural variability. Spring water quality and other GDE monitoring, when coupled with monitoring of adit inflows and groundwater levels from inside the adit and drifts, would be effective in detecting Project-related effects in the upper watersheds of the analysis area. The Appendix C monitoring plan includes action levels based on monitoring data that would trigger corrective measures to be implemented by MMC.

The quality of the treated effluent would continue to be monitored in accordance with the 2017 MPDES permit. As required by the 2017 MPDES permit, continuous temperature data would be collected at LB-200 and LB-300 to determine whether the temperature aquatic life standard was exceeded in the creek due to effluent discharges. In addition, MMC would measure water levels and temperatures at MW07-01 and MW07-02, monitoring wells downgradient of the percolation pond, with electronic data recorders. In each annual report, MMC would complete a multi-variant analysis of the factors influencing stream temperatures downstream of the Libby Adit discharges. Monitoring requirements in the MPDES permit and those described in Appendix C would be effective in detecting changes in water quality from MMC's Water Treatment Plant discharges.

Mitigation for Potential Changes in Sediment Delivery to Streams

In Alternatives 3 and 4, MMC would develop and implement a Road Management Plan addressing all roads used, closed, and stabilized in the alternative. Twenty-five roads and one trail would be barriered before starting the Project to mitigate for effects on grizzly bears. After changes to the roads were made, sediment delivery to area streams would be minimal. Road closures would have direct and long-lasting beneficial effects on sediment delivery in all analysis area streams.

Mitigation for Other Potential Water Quality Changes

Buffers would be maintained near Rock Lake and the Rock Lake Fault during underground drilling operations. Buffers would minimize flow changes and potential adverse effects on water quality.

Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates that installing a third plug in the Libby Adit, if needed, would ensure that water quality in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. The KNF also expects that installing a third plug would ensure that groundwater discharge into Rock Lake and Rock Lake water quality also would return to existing conditions.

MMC would comply with Forest Service policies when disposing of demolition debris during closure. It is Forest Service policy to discourage the disposal of solid waste on National Forest System lands unless such use is the highest and best use of the land. No solid wastes other than waste rock would be buried underground. Limiting solid waste disposal on National Forest System lands would be effective in minimizing effects on groundwater quality from waste disposal.

3.13.4.4 Alternative 4

The limited nature of the geotechnical investigations in Alternative 4 would reduce the risk of increased sediment delivery compared to Alternative 3. No new roads would be built in a RHCA. One segment of one road (NFS road #6212H) that intersects an RHCA would be used. The RHCA is adjacent to a non-fish-bearing tributary of Libby Creek (Drainage 10). BMPs described for Alternative 3 would be used to minimize sediment delivery to the RHCA. It is unlikely that any sediment that did reach Drainage 10 would reach Libby Creek, the nearest fish-bearing stream. Other effects of Alternative 4 on water quality would be the same as Alternative 3.

3.13.4.5 Uncertainties Associated with the Water Quality Assessment

The uncertainties associated with the water quality assessment are described in the JFEIS.

3.13.4.6 Cumulative Effects

Past and current actions, particularly timber harvest, road construction, and mining, have altered surface water quality in the area by increasing sedimentation, destabilizing stream channels, and removing streamside vegetation. DEQ's listing of impaired streams indicates that Libby Creek between Howard Creek and the US 2 bridge is impaired due to alteration in streamside vegetative covers and physical substrate habitat alterations. Probable sources of impairment were impacts from abandoned mine lands and historical placer mining. The lower impaired segment begins at the US 2 bridge and is impaired for sediment and siltation. Past activities have also impaired water quality in segments of Rock Creek and East Fork Rock Creek.

Suction dredging activities are currently permitted in the Libby Creek drainage. Monitoring by the KNF indicates limited sediment increases in the stream below dredging operations. At low flows, pools tend to accumulate sediment that is transported as bedload. Deposition of bedload would be more pronounced near the dredging sites. Unless substantial bank erosion occurs, increased sediment transport is limited because the overall sediment load delivered to the channel remains the same, and the effects downstream are probably minor (KNF 2007c). Other human activities that may impair surface water quality include septic field installation, livestock grazing, new roads, and other construction. Stream channel and bank stabilization or restoration projects may improve stream water quality.

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities

would not have cumulative effects when combined with Rock Creek's Phase I. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS. Assuming the Montanore and Rock Creek Projects occurred concurrently, they would cumulatively reduce flow in the Rock Creek, East Fork Bull River, and Bull River watersheds. Mine dewatering and the resulting drawdown of bedrock groundwater may subtly change the water quality of East Fork Rock Creek and the East Fork Bull River.

3.13.4.7 Regulatory/Forest Plan Consistency

This section discusses compliance with applicable laws and regulations regarding changes in water quality. Section 3.11.4.6, *Regulatory/Forest Plan Consistency*, in the previous *Surface Water Hydrology* section discusses compliance with laws and regulations regarding changes in streamflow and floodplains.

3.13.4.7.1 Organic Administration Act and Forest Service Locatable Minerals Regulations

The Forest Service is responsible for ensuring that mineral operations on National Forest System lands comply with Forest Service locatable mineral regulations (36 CFR 228 Subpart A) for environmental protection. One of these regulations (36 CFR 228.8) requires that mineral operations be conducted, where feasible, to minimize adverse environmental impacts on National Forest surface resources. 36 CFR 228.8 also requires that mineral operations comply with applicable state and federal water quality standards, including the Clean Water Act; comply with applicable federal and state standards for the disposal and treatment of solid wastes; take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations; construct and maintain all roads so as to assure adequate drainage and to minimize or, where practicable, eliminate damage to soil, water, and other resource values; and reclaim the surface disturbed in operations by taking such measures as preventing or controlling on-site and off-site damage to the environment and forest surface resources. 36 CFR 228.8(h) states that "certification or other approval issued by state agencies or other federal agencies of compliance with laws and regulations relating to mining operations will be accepted as compliance with similar or parallel requirements of these regulations."

Minimize Adverse Environmental Impact (36 CFR 228.8)

The predicted delivery of sediment to analysis area streams from roads in Alternatives 3 and 4 would be less than in Alternative 2. All alternatives would include the use of BMPs to minimize erosion and effects on surface water quality. The required road improvements on Libby Creek Road and Upper Libby Creek Road are predicted to decrease sediment delivery in Alternatives 3 and 4. Alternatives 3 and 4 also would include more frequent BMP monitoring than Alternative 2. Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates that installing a third plug would ensure that water quality in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. The KNF also expects that installing a third plug would ensure that groundwater discharge into Rock Lake and Rock Lake water quality also would return to existing conditions. In summary, Alternative 2 would not fully comply with 36 CFR 228.8 because MMC did not propose to implement feasible measures to minimize adverse environmental impacts on surface water quality. Alternatives 3 and 4 would comply with 36 CFR 228.8 because the modifications are feasible and would minimize adverse environmental impacts on surface water quality.

In Alternatives 3 and 4, Tier 4 engines and ultra-low-sulfur diesel fuel would be used in underground mobile equipment and generators. These measures would minimize nitrogen and

sulfur deposition into wilderness lakes. Alternative 2 would not fully comply with 36 CFR 228.8 because MMC did not propose to implement feasible measures to minimize adverse environmental impacts on surface water quality and fisheries habitat. Alternatives 3 and 4 would comply with 36 CFR 228.8 because the proposed modifications are feasible and would minimize adverse environmental impacts on surface water quality and fisheries habitat.

State and Federal Water Quality Standards (36 CFR 228.8(b))

All alternatives would comply with water quality standards. Alternatives 3 and 4 expand MMC's proposed monitoring plans (Alternative 2) and would include action levels for specific parameters (see Appendix C). Because EPA delegated Montana authority to implement the provisions of the Clean Water Act applicable to surface water and the Project, compliance with state and federal water quality standards is discussed below in Section 3.13.4.7.2, *Clean Water Act and Montana Water Quality Act*.

Solid Waste Disposal (36 CFR 228.8(c))

All alternatives would comply with applicable federal and state regulations for the disposal and treatment of solid wastes. All alternatives would comply with the applicable portions of 36 CFR 228.8(c) regarding federal and state standards for solid waste. In Alternative 2, MMC would occasionally bury certain wastes underground. In Alternatives 3 and 4, MMC would comply with Forest Service policies when disposing of demolition debris during closure. It is Forest Service policy (FSM 2130) to discourage the disposal of solid waste on National Forest System lands unless such use is the highest and best use of the land. No solid wastes other than waste rock would be buried underground. These measures would minimize the impact on the environment and forest surface resources. The plans for waste disposal in Alternatives 3 and 4 would comply with 36 CFR 228.8(c).

Fisheries and Wildlife Habitat (36 CFR 228.8(e))

Alternative 2 would not fully comply with 36 CFR 228.8(e) because MMC did not propose to implement practicable measures to minimize adverse environmental impacts on surface water quality and fisheries habitat. The required road improvements on Libby Creek Road and Upper Libby Creek Road are predicted to decrease sediment delivery in Alternatives 3 and 4. Alternatives 3 and 4 also would include more frequent BMP monitoring than MMC's alternative. Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates that installing a third plug would ensure that water quality in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. The KNF also expects that installing a third plug would ensure that groundwater discharge into Rock Lake and Rock Lake water quality also would return to existing conditions. Alternatives 3 and 4 would comply with 36 CFR 228.8(e) because the modifications are practicable and would minimize adverse environmental impacts on surface water quality and fisheries habitat.

Roads (36 CFR 228.8(f))

The following discussion applies to the requirements of 36 CFR 228.8(f) as they apply to surface water quality. Compliance with 36 CFR 228.8(f) regarding roads management is discussed in Section 3.6.4.6.4, *National Forest Management Act/Kootenai Forest Plan* (RF-2 through RF-5), beginning on page 118.

In all action alternatives, roads would be constructed and maintained to ensure adequate drainage and to minimize or, where practicable, eliminate damage to soil, water, and other resource values.

Alternatives 3 and 4 include specific BMPs to minimize road-related effects on water quality. The predicted delivery of sediment from roads to streams in Alternatives 3 and 4 would be less than in MMC's alternative. Design measures provide more specificity regarding management of roads closed or no longer needed for the Project. Such roads would be either placed in intermittent stored service or decommissioned. Alternative 2 would not fully comply with 36 CFR 228.8(f) as it relates to water quality because MMC did not propose to implement practicable measures to minimize adverse environmental impacts on surface water quality and fisheries habitat. Alternatives 3 and 4 would comply with 36 CFR 228.8(f) as it relates to water quality.

Reclamation (36 CFR 228.8(g))

The following discussion applies to the reclamation requirements of 36 CFR 228.8(g) as they apply to surface water quality. Compliance with 36 CFR 228.8(g) regarding reclamation requirements is discussed in Section 3.19.4.6 under *Soils and Reclamation*, p. 241. All alternatives would comply with the requirements of 36 CFR 228.8(g) regarding controlling erosion, controlling surface water runoff, and isolating toxic materials. Alternative 2 would not fully comply with 36 CFR 228.8(g) to implement practicable measures to prevent or control on-site and off-site damage to the environment and forest surface resources. MMC did not propose to implement practicable measures to minimize erosion and maximize reclamation success. Alternatives 3 and 4 would include developing and implementing a final Road Management Plan and a Vegetation Removal and Disposition Plan, increasing the salvage and replacement of suitable soil materials for reclamation, removing a majority of coniferous forest debris before soil removal, and using native plant species in revegetation. These measures would minimize erosion and ensure reclamation success. Alternatives 3 and 4 would comply with 36 CFR 228(g) as it relates to water quality.

3.13.4.7.2 Clean Water Act and Montana Water Quality Act

The Forest Service is responsible for ensuring that mineral operations on National Forest System lands comply with Forest Service locatable mineral regulations (36 CFR 228 Subpart A) for environmental protection. Operators must comply with applicable federal and state water quality standards, including regulations issued pursuant to the Clean Water Act. DEQ is responsible for ensuring all mineral operations comply with the Montana Water Quality Act and its implementing rules.

The previous sections discussed the differences between Alternative 2 and Alternatives 3 and 4. The modifications in Alternatives 3 and 4 are practicable measures to reduce nonpoint source pollution. All alternatives would include the use of BMPs to minimize erosion and effects on surface water quality. Alternatives 3 and 4 would include more frequent BMP monitoring than MMC's alternative. All alternatives would comply with the USDA Nonpoint Source Water Quality Policy Directive 9500-007.

In 2016, DEQ issued a ROD on the Montanore Project (DEQ 2016b). In the ROD, DEQ determined that activities associated with the Evaluation Phase of the Montanore Project would comply with the Montana Water Quality Act, including the nondegradation provisions, except for the discharges to surface water. DEQ's approval of the amendments to Operating Permit No. 00150 pertaining to the Evaluation Project was conditioned on MMC receiving DEQ's approval of the renewal of MPDES Permit MT0030279. DEQ issued a final renewal MPDES permit in 2017 (DEQ 2017a) along with responses to comments on prior draft permits. MMC appealed various parts of the permit, and those parts are not in effect, pending resolution of the appeal. 36

CFR 228.8(h) states that "certification or other approval issued by state agencies or other federal agencies of compliance with laws and regulations relating to mining operations will be accepted as compliance with similar or parallel requirements of these regulations." DEQ's Hard Rock Operating Permit decision (DEQ 2016b), issuance of a MPDES permit (2017 MPDES permit MT0030279) (DEQ 2017a), or any other state water quality permit or approval (401 certification if needed) constitute compliance with Montana water quality requirements and Clean Water Act requirements regarding water quality.

3.13.4.7.3 National Forest Management Act/Kootenai Forest Plan

Compliance with the KFP is described in the following sections.

GOAL-WTR-01. All alternatives would maintain or improve watershed conditions in order to provide water quality, water quantity, and stream channel conditions that support ecological functions and beneficial uses. DEQ's Hard Rock Operating Permit decision (DEQ 2016b), issuance of a MPDES permit (2017 MPDES permit MT0030279) (DEQ 2017a), or any other state water quality permit or approval (401 certification if needed) constitute compliance with Montana water quality requirements and Clean Water Act requirements regarding water quality. Changes in streamflow in west side streams would be negligible and would have no effect on ecological functions and beneficial uses, The increased habitat availability during low-flow conditions downstream of the Water Treatment Plant discharge to Libby Creek and a long-term decrease in sediment delivery from roads would improve Libby Creek watershed conditions.

FW-DC-WTR-01. Watersheds and associated aquatic ecosystems would retain their inherent resilience to respond and adjust to disturbance without long-term, adverse changes to their physical or biological integrity in Alternatives 3 and 4. Alternatives 3 and 4 include appropriate mitigation for all reasonably foreseeable adverse water quality effects on watersheds and associated aquatic ecosystems. Alternatives 3 and 4 would be neutral with regard to progress toward this desired condition.

FW-DC-WTR-02. DEQ's Hard Rock Operating Permit decision (DEQ 2016b), issuance of a MPDES permit (2017 MPDES permit MT0030279) (DEQ 2017a), or any other state water quality permit or approval (401 certification if needed) constitute compliance with Montana water quality requirements and Clean Water Act requirements regarding water quality. Effects of geotechnical activities on water quality would be negligible. All alternatives would be neutral with regard to progress toward this desired condition.

FW-DC-WTR-04. The alternatives would not affect municipal watersheds or public water supplies. The alternatives would be neutral with regard to progress toward this desired condition.

FW-STD-WTR-01. See prior discussion on desired condition FW-DC-WTR-04. The alternatives would not affect municipal watersheds or public water supplies.

FW-GDL-WTR-01. The intent of wasteload allocation for the Montanore facility would be met by adhering to the MPDES permit requirements in all alternatives. MMC would monitor all discharges to surface water for sediment and would report sediment concentrations to DEQ monthly (see Appendix C). Any failures of the sediment BMPs detected through monitoring would require MMC to implement corrective measures in accordance with the MPDES permit.

No streams in the analysis area are on DEQ's 303(d) list. All alternatives would be designed in accordance with this guideline.

FW-GDL-WTR-02. All alternatives would ensure that decommissioned and stored roads had hydrologic stability and would be designed in accordance with this guideline.

FW-GDL-WTR-03. Project-specific BMPs would be incorporated in all alternatives as a principle mechanism for controlling nonpoint pollution sources, meeting soil and water goals, and protecting beneficial uses. Ditch and road surface runoff would be disconnected from streams and other water bodies to the extent practicable. Alternatives 3 and 4 would require more extensive monitoring of BMP effectiveness. All alternatives would be designed in accordance with this guideline.

GA-DC-WTR-LIB-02. See prior discussion on desired condition FW-DC-WTR-04 and standard FW-STD-WTR-01. The alternatives would be neutral with regard to progress toward this desired condition.

FW-GDL-RIP-01. Alternatives 3 and 4 would be in accordance with this guideline, but Alternative 2 would not be in accordance with this guideline. As described in 2.5.3.1.2, *Road Management Plan Development and Implementation*, MMC would be required to develop a Road Management Plan for KNF approval before starting the Project. 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 bull trout watersheds. MMC would install or fund the installation of signage where sidecasting would be avoided. Use of salt would be prohibited on roads during winter plowing operations.

3.13.4.8 Irreversible and Irretrievable Commitments

No irreversible or irretrievable commitments of surface water resources would occur.

3.13.4.9 Short-Term Uses and Long-Term Productivity

Any change in stream water quality due to discharging adit water to area streams would be a short-term use of the resource. No changes in the long-term productivity of surface water resources are expected.

3.13.4.10 Unavoidable Adverse Environmental Effects

If less groundwater were contributed to Rock Lake, the total dissolved solids, silica, and nutrient concentrations may decrease in the lake.

3.14 Geotechnical Engineering

3.14.1 Analysis Area and Methods

The analysis area and the methods used for data collection and impact analysis of subsidence are the same as described in the JFEIS. Impoundment stability was not analyzed for the SEIS because activities in the impoundment sites would be limited to geotechnical investigations.

3.14.2 Affected Environment

The existing seismicity and seismic hazards and avalanche chutes, landslides, and unstable slopes that may be affected by Project activities are described in JFEIS Section 3.14.2, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.14.3 Environmental Consequences

3.14.3.1 Subsidence

3.14.3.1.1 Alternative 1

In Alternative 1, no expansion of underground voids would occur. The potential for Project-induced subsidence would not change. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Potential subsidence from the Libby Adit would be mitigated by backfilling the entire adit length that occurred in unconsolidated bedrock. The potential for roof failure over time, especially after adit closure, would be the same as Alternative 2.

3.14.3.1.2 Alternative 2

The geologic setting of the location where underground activities would occur in all alternatives is described in JFEIS Section 3.14.3.1.2, *Alternative 2*. All underground activities would have a depth of cover of at least 2,100 feet. Due to the depth of cover over the underground workings and the high strength of the rock overlying the proposed adit extension and drift, it is unlikely that chimney subsidence would breach the surface to form sinkholes (Agapito Associates, Inc. 2007). Some roof failure would be likely over time, especially after adit closure. Caving propagation (incremental upward movement of rock fragmentation) to some height above the workings would likely occur, but the strength of the overlying rock and the magnitude of the in situ tectonic forces likely would lead to the formation of a stable arch of rock over the collapsed area. The adit extension, drift, and drill pads would be 18 feet high. Based on estimates of caving propagation height relative to opening height (Call and Nicholas 2006), caving propagation heights of up to 100 feet could occur. To reduce possible subsidence risk and the interception of groundwater near the drifts and drill pads, MMC would maintain a 500-foot vertical and horizontal buffer zone where the ore body outcrops near Rock Lake. In addition, a 100-foot barrier pillar is planned as a buffer to the Rock Lake Fault. Due to the thickness of rock overlying the drifts and drill pads, and

the buffers proposed by MMC, these caving propagation heights would not breach the surface. Any groundwater intercepted by the caved strata would be rapidly transmitted to the underground openings. A fractured zone with increased hydraulic conductivity may exist for some distance above the caved zone, but given the likely diameter of the caved zone (a few feet to tens of feet), the thickness of the fractured zone would be limited and not likely to reach the surface based on the amount of rock overlying the underground openings. No other direct impacts are anticipated should chimney subsidence occur.

Trough subsidence is associated with total extraction or pillar failure over a large area and is characterized by the formation of a broad, elliptical basin without continuous fracturing between the opening and the surface. Because underground Project activities would consist of developing 18-foot wide openings, trough subsidence would occur only if widespread roof failure was initiated. Given the opening size, widespread roof failure is unlikely.

3.14.3.1.3 Alternative 3 and Alternative 4

Alternative 3 and Alternative 4 would have the same risk of subsidence and are discussed together. The height and width of the adits, drift, and underground drill pads would be 15 feet. All underground activities would have a depth of cover of at least 2,100 feet. Caving propagation heights would be smaller than Alternative 2, and potential subsidence would be less. To reduce possible subsidence risk and the interception of groundwater near the drifts and drill pads, MMC would maintain a 1,000-foot vertical and horizontal buffer zone where the ore body outcrops near Rock Lake. In addition, a 300-foot barrier pillar is planned as a buffer to the Rock Lake Fault.

The KNF completed a Failure Modes and Effects Analysis (FMEA) of the Rock Creek Project underground mine, Phase I of which would be similar to the Project. The FMEA considered the Troy Mine subsidence events and developed mitigations as part of agency-modified alternatives (Agapito Associates, Inc. 2014a, 2014b). The FMEA specifically considered the risk of chimney subsidence of adits due to inadequate cover. The KNF concluded that the risk of adit failure, after applying compensating factors, was inconsequential. Because similar compensating factors considered in the FMEA of the Rock Creek Project underground mine would be incorporated into the Montanore mine plan, the KNF concluded the risks of subsidence at Montanore also would be inconsequential.

In Alternatives 3 and 4, MMC would conduct surface surveys over the ore body and collect underground geotechnical monitoring data, including rock mechanics data and other geologic information pertinent to mine design and employee safety (Appendix C, Section C.4, *Rock Mechanics*). The geotechnical monitoring would be an update to geotechnical monitoring procedures and methods specified in DEQ Operating Permit No. 00150, which is the basis for Alternative 2. Data would be used for development of the underground mine design and the underground geotechnical (subsidence) monitoring plan. MMC would fund an independent technical advisor to assist the KNF in review of MMC's underground data collection plan, surface surveys, results of underground geotechnical monitoring, and other underground evaluation activities pertinent to mine design and subsidence monitoring.

The design feature of increasing the buffer zones near Rock Lake and the Rock Lake Fault would effectively minimize the risk of subsidence and associated effects on surface resources in the CMW. In addition to the design features, MMC would fund and facilitate a survey of the adit extension and drifts that would be completed by an independent qualified mine surveyor. Subsidence risk would be effectively monitored and managed with the assistance of an expert

independent technical advisor (funded by MMC). Based on the design features and funding of independent technical assistance, the KNF concludes the risk of subsidence would be less than in Alternative 2.

3.14.3.2 Cumulative Effects

None of the reasonably foreseeable future actions would result in cumulative effects of subsidence risk with the Project.

3.14.3.3 Regulatory/Forest Plan Consistency

The KFP does not have specific goals, objectives, and standards for subsidence. It includes desired conditions, standards, and guidelines for the CMW. Goals can be found in the CMW Management Plan (USDA Forest Service 2009b). In all alternatives, potential subsidence affecting wilderness lakes and wilderness character would be negligible. Mitigation measures and monitoring requirements in Alternatives 3 and 4 are reasonable stipulations for protection of the wilderness character and are consistent with the use of the land for mineral development. Alternatives 3 and 4 would be conducted to protect the surface resources in accordance with the general purpose of maintaining the wilderness unimpaired for future use and enjoyment as wilderness, and to preserve the wilderness character consistent with the use of the land for mineral operations in compliance with 36 CFR 228.15 and the Wilderness Act. Alternatives 3 and 4 would comply with the Wilderness Act. Alternatives 3 and 4 would minimize adverse environmental impacts on surface resources in the wilderness and thereby comply with the regulations (36 CFR 228 Subpart A) for locatable mineral operations on National Forest System lands.

3.14.3.4 Irreversible and Irretrievable Commitments

This section is not applicable to geotechnical engineering.

3.14.3.5 Short-Term Uses and Long-Term Productivity

This section is not applicable to geotechnical engineering.

3.14.3.6 Unavoidable Adverse Environmental Effects

Some roof failure would occur in all action alternatives.

3.15 Land Use

3.15.1 Regulatory Framework

3.15.1.1 Kootenai Forest Plan

The KFP describes desired conditions, objectives, standards, guidelines, and land suitability for project and activity decision making on the KNF, guiding all resource management activity (USDA Forest Service 2015a). KFP direction applies either to National Forest System lands forestwide or to specific management or geographic area allocations. KFP requirements are not applicable to state or private lands. Unincorporated Lincoln County has no comprehensive or general plan, zoning regulations, or growth policies. KFP direction is described in the following sections.

3.15.1.1.1 Goals

Goals are concise statements that describe an overall desired condition the KNF strives to achieve. Goals are expressed in broad, general terms and are timeless in that a goal has no specific date by which it is to be accomplished.

3.15.1.1.2 Desired Conditions

Desired conditions are the social, economic, and ecological attributes that are used to guide management of the land and resources. Desired conditions are not commitments or final decisions approving projects and activities. The desired condition for some resources may currently exist, or for other resources may be achievable only over a long period.

3.15.1.1.3 Standards

Standards are limitations or requirements that are applied to project and activity decision making to help achieve goals and objectives. Standards are for forestwide application or for specific areas and may be applied to all management activities or selected activities.

3.15.1.1.4 Guidelines

Guidelines are operational practices and procedures that are applied to project and activity decision making to achieve goals, desired conditions, and objectives. Guidelines are for forestwide application or for specific areas and may be applied to all management activities or selected activities.

3.15.1.1.5 Geographic and Management Areas

In addition to forestwide goals, desired conditions, standards, and guidelines, the KFP includes geographic area (GA)– and management area (MA)–specific desired conditions and guidelines. The Project would be primarily within the Libby GA; grizzly bear mitigation lands and associated access changes are also in the Clark and Fisher GAs. Project activities would primarily occur on private land not subject to KFP direction (Libby Adit Site) or on lands managed as MA 6-General Forest (see Section 3.15.2, *Analysis Area and Methods*). The CMW, where certain monitoring activities would occur (see Appendix C), is MA1a and is managed to protect wilderness character as defined in the Wilderness Act and as outlined in the Cabinet Mountains Wilderness Management Plan (USDA Forest Service 2009b). Most of the analysis area outside of the CMW in the upper East Fork Rock Creek drainage is managed as MA1b-Recommended Wilderness, but some is managed as MA5b-Backcountry and MA3-Botanical, Geological, Historical, Recreational, Scenic, or Zoological Areas.

3.15.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, locations where the KNF would change road access, and grizzly bear mitigation lands. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and land use in the Fisher River watershed would not be affected.

3.15.3 Affected Environment

Uses of federal, state, and private lands are described in the JFEIS. KFP direction for management of National Forest System lands also is described in the JFEIS. The analysis area, including the locations of the Libby Adit Site, proposed geotechnical investigation area (Alternatives 3 and 4 only), and access roads, is primarily managed as MA 6-General Forest or is private land. In the upper East Fork Rock Creek drainage, most of the area outside of the CMW is managed as MA1b-Recommended Wilderness. A narrow area paralleling NFS road #150 and East Fork Rock Creek in the upper drainage is managed as MA5b-Backcountry. Within the MA1b in the upper East Fork Rock Creek drainage is the Rock Creek Meadows botanical area, which is managed as MA3-Botanical, Geological, Historical, Recreational, Scenic, or Zoological Areas. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on existing land uses in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.15.4 Environmental Consequences

3.15.4.1 Alternative 1

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Land use at the Libby Adit would depend on MMC's future plans for the site. Use of National Forest System lands would continue to be managed in accordance with the KFP. Existing land use of private land in the analysis area would continue.

3.15.4.2 Alternative 2

Alternative 2 would not affect land use. In Alternative 2, MMC would snowplow Libby Creek Road and Upper Libby Creek Road in the winter to provide access to the Libby Adit Site from US 2 until the site was reclaimed and the bond released. After the Libby Adit Site was reclaimed and closed, land use at the Libby Adit Site would depend on MMC's future site plans.

3.15.4.3 Alternative 3

In Alternative 3, MMC would snowplow Libby Creek Road and Upper Libby Creek Road in the winter to provide access to the Libby Adit Site from US 2 until the site was reclaimed and the

bond released. After the Libby Adit was reclaimed and closed, land use at the site would depend on MMC's future plans for the site.

All of the new disturbance from the geotechnical investigations (6.4 acres) would be on National Forest System lands outside of the CMW within MA6-General Forest. New disturbances associated with road access changes on lands protected for grizzly bear mitigation also would be outside of the CMW and would be minor.

MMC would transfer fee title to or place a conservation easement on 727.8 acres of private land for grizzly bear mitigation in Alternative 3. The 14.5-acre Rock Lake parcel would be secured or protected through a perpetual conservation easement conveyed to the Forest Service or a private conservation organization independent of MMC. The conveyance of title or placing a conservation easement on private land would restrict future residential and commercial development on these lands. If fee title was transferred on the 4.5-acre parcel at the southern end of the Rock Creek Meadows biological area, the KNF would manage the parcel as MA3. The risk of development on the parcel would be eliminated, and the sites' manageability would be improved. If fee title was transferred, the KNF would manage the remaining 723.3 acres of mitigation lands as MA 5b or MA6. If ownership was not transferred, National Forest System lands would not be affected.

3.15.4.4 Alternative 4

The effects of Alternative 4 on land use would be the same as Alternative 3; for the geotechnical investigations, 1.5 acres of National Forest System lands within MA6-General Forest would be disturbed.

3.15.4.5 Cumulative Effects

Past actions, such as past mining and road construction, have altered the existing land use. Areas disturbed by past mining and road construction do not provide for timber production or wildlife habitat. The Rock Creek Project and the Montanore Project, if they were approved and implemented, would cumulatively increase the amount of National Forest System lands on the KNF managed for transmission line corridors and mineral development.

3.15.4.6 Regulatory/Forest Plan Consistency

Alternatives 3 and 4 would be consistent with the KFP. With project-specific plan amendments suspending the following guidelines (RF-2, RF-4, MM-1, FW-GDL-RIP-01, FW-GDL-WL-01, FW-GDL-WL-15, and Guideline HU G8), Alternative 2 would be consistent with all pertinent KFP direction (see Section 2.7, *Forest Plan Consistency*).

3.15.4.7 Irreversible and Irretrievable Commitments

Timber would be harvested sooner in areas cleared for new roads and drill pads. Timber resources would be irretrievably affected.

3.15.4.8 Short-Term Uses and Long-Term Productivity

Alternatives 3 and 4 would require the short-term use of National Forest System lands, and all action alternatives would require short-term use of National Forest System roads. After the Libby Adit Site was reclaimed and closed, land uses would return to existing uses. In addition, 742.3

acres of private land would be protected and managed for long-term grizzly bear habitat in Alternatives 3 and 4.

3.15.4.9 Unavoidable Adverse Environmental Effects

The KNF did not identify any unavoidable adverse environmental effects on land uses.

3.16 Recreation

3.16.1 Regulatory Framework

The KFP includes goals and desired conditions for recreation settings, experiences, and opportunities. Generally, the recreation-related plan direction calls for providing a range of recreational opportunities while minimizing impacts on wildlife, allowing responsible development of mineral resources, meeting domestic livestock grazing needs where feasible, and providing for legitimate special needs on National Forest System land. The KFP direction considered in the analysis of recreation is:

> **FW-DC-AR-01.** Quality, well-maintained recreation facilities exist at key locations to accommodate concentrations of use, enhance the visitor's experience, and protect the natural resources of the area. Day use access is available for relaxation, viewing scenery and wildlife, and for water and snow-based play. Recreation rental cabins and lookouts provide safe, comfortable, overnight facilities that allow visitors to experience and learn about the rich history of the area. Dispersed camping opportunities are available for a wide variety of users while considering resource concerns, activity conflicts, or over-use. Food and garbage storage do not contribute to conflicts between recreation users and wildlife.
>
> **FW-DC-AR-03.** Opportunities for outdoor recreation, such as hunting, fishing, wildlife viewing, berry picking, firewood gathering, and bird watching are available for a wide variety of users. Interpretation and education opportunities enrich the visitors experience and promote a land ethic that preserves the cultural and natural resources of the Forest for future generations.
>
> **FW-DC-AR-04.** Provide year-round outdoor recreation opportunities and experiences in a range of settings as described by the recreation opportunity spectrum (ROS). The desired distribution of forestwide ROS settings are displayed in table 7 [of the KFP].
>
> **FW-DC-AR-05.** A variety of motorized and non-motorized winter and summer recreation opportunities are available. Well-designed and maintained trailheads exist and offer adequate parking and turnaround areas. Trails are designed and maintained for the given users (saddle stock, snowmobiles, OHV users, hikers, mountain bikers, etc.).
>
> **FW-DC-AR-06.** Solitude and non-motorized experiences are available in remote settings. Non-motorized areas are of sufficient size and configuration to minimize disturbance from other uses. Non-motorized use is also available in more developed areas, but provides less opportunity for solitude and challenge than in the more remote settings. A well-maintained non-motorized trail network accesses locations of interest for a variety of users.
>
> **GA-DC-AR-LIB-02.** Opportunities for winter motorized access are maintained or considered in areas such as Pipe Creek, East Face of the Cabinets, and Bear Creek. Opportunities for changing snowmobile routes are considered as vegetation or other conditions change over time.

Executive Order 12962 mandates disclosure of effects on recreational fishing as part of a nationwide effort to conserve, restore, and enhance aquatic systems and provide for increased recreational fishing opportunities.

3.16.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and recreational resources in the Fisher River watershed would not be affected. None of the alternatives would affect recreational fishing opportunities, and those opportunities are not discussed further.

The analysis of potential changes in Recreational Opportunity Spectrum (ROS) classes was based on ROS delineation procedures developed by the Forest Service (USDA Forest Service 2003a). The analysis only considered National Forest System lands in the analysis area. Changes in ROS classes along existing roads and roads with proposed access changes were mapped and quantified (ERO Resources Corp. 2019).

3.16.3 Affected Environment

Existing recreational opportunities and uses are described in the JFEIS. Updated hunting use data through 2016 (FWP 2016) and updated fishing use data (FWP 2014) indicate that hunting and fishing recreational opportunities are similar to those described in the JFEIS. The ROS class of most of the analysis area is Roaded Natural/Rural in the summer and either Roaded Natural/Rural or Semiprimitive Motorized in the winter. Areas where access changes are proposed primarily have a summer ROS class of Semiprimitive Motorized or Semiprimitive Nonmotorized (ERO Resources Corp. 2019). The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on recreational resources in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.16.4 Environmental Consequences

3.16.4.1 Alternative 1

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Visitors to the area may experience increased noise levels from reclamation activities at the Libby Adit Site. These effects would be temporary, and there would be no long-term effects on visitors' recreational experiences if Project activities were not implemented.

3.16.4.2 Alternative 2

3.16.4.2.1 Recreation Opportunities and Uses

In Alternative 2, Libby Creek Road and Upper Libby Creek Road (4.5 miles) would be plowed in the winter, eliminating snowmobile and cross-country skiing use of Libby Creek Road and parts of Upper Libby Creek Road (Table 334). Snowplowing would improve winter recreation access to areas off the roads. Except for MMC traffic, all motor vehicle use, including over-snow vehicles, would be restricted on Libby Creek Road and Upper Libby Creek Road seasonally from April 1 to May 15. MMC also would implement seasonal access changes on Midas-Howard Creek Road and its spur (NFS roads #4778 and #4778E) totaling 7.7 miles in the Midas Creek drainage (Table 334). NFS road #4778E is currently impassable to motor vehicles. These closures would eliminate motorized recreational access and use between April 1 and June 15, but would not affect the overall quality or accessibility of recreation in the analysis area. Nonmotorized access would be maintained. These access changes would improve the springtime opportunities for solitude and primitive recreation in the analysis area. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 306 and winter and spring recreational opportunities would return to pre-Project conditions on the roads.

Table 334. Summary of Access Changes Relative to Recreation Uses, Alternative 2.

Recreation Change Associated with Road Access Change	Road Length (miles)	Duration
Eliminate all motor vehicle use April 1 to May 15 except for MMC traffic[1] Eliminate winter use by snowplowing	4.5	Would cease after Libby Adit Site closure
Eliminate all motor vehicle use April 1 to June 15[2]	7.7	

[1]Since 2007, seasonal closures have been temporarily implemented on these roads with the KNF's approval (KNF 2007a) to MMC for snowplowing segments of NFS roads #231 and #2316.
[2]0.83 mile of road in this category is impassable to motor vehicles.

The noise levels are predicted to reach the existing ambient daytime noise level of 30 dBA at 3.3 miles from the Libby Adit Site. Noise levels at the Libby Creek Recreational Gold Panning Area would range from 35 to 45 dBA, which would be audible to users of the area (Big Sky Acoustics 2015). After the Libby Adit Site was reclaimed and closed, noise levels at the Libby Creek Recreational Gold Panning Area would return to existing conditions. Alternative 2 would not affect recreational fishing opportunities.

3.16.4.2.2 Recreation Opportunity Spectrum

In Alternative 2, the proposed road access changes would result in changes to the summer ROS class along NFS road #2316 and to the winter ROS class for NFS roads #231 and #2316 (Table 335). Snowplowing and Project traffic along NFS road #2316 would increase the number of potential social encounters along the road, despite the season closure from April 1 to May 15. The summer and winter ROS classes along NFS road #2316 would change from Semiprimitive Motorized to Roaded Natural/Rural. Snowplowing and Project traffic along NFS road #231 would also result in a winter ROS class change from Semiprimitive Motorized to Roaded Natural/Rural. After the Libby Adit Site is reclaimed and closed, snowplowing would cease, seasonal access changes on the two roads would no longer be required, and ROS classes adjacent to these roads would return to existing conditions.

Table 335. Alternative 2 ROS Class Changes by Road.

NFS Road Number	Road Name	Existing ROS Class Summer	Existing ROS Class Winter	ROS Class Summer with Alternative	ROS Class Winter with Alternative
231	Libby Creek	Roaded Natural/Rural	Semiprimitive Motorized	No change	Roaded Natural/Rural
2316	Upper Libby Creek	Semiprimitive Motorized	Semiprimitive Motorized	Roaded Natural/Rural	Roaded Natural/Rural

Source: ERO Resources Corp. 2019

Overall, in Alternative 2, the amount of Summer Roaded Natural/Rural lands in the analysis area would increase, and the amount of Summer Semiprimitive Motorized and Summer Semiprimitive Nonmotorized would decrease (Table 336). Part of the increase in Summer Roaded Natural/Rural lands is due to the 0.25-mile analysis buffer along NFS road #2316, which would change Summer Semiprimitive Nonmotorized lands adjacent to Semiprimitive Motorized lands to Roaded Natural/Rural lands. Similar to the Summer ROS class changes, Alternative 2 would decrease Winter Semiprimitive Motorized and increase Roaded Natural/Rural (Table 336; ERO Resources Corp. 2019).

Table 336. Changes in ROS Class in Alternative 2.

ROS Class	Existing		Alternative 2		Change in ROS	
	Summer (acres)	Winter (acres)	Summer (acres)	Winter (acres)	Summer (acres)	Winter (acres)
Primitive	288	0	288	0	0	0
Semiprimitive Nonmotorized	15,759	3,058	15,617	3,057	-142	-2
Semiprimitive Motorized	1,451	24,840	1,105	23,329	-346	-1,511
Roaded Natural/Rural	11,851	1,449	12,339	2,962	488	1,513
Total	29,348	29,348	29,348	29,348	0	0

Source: ERO Resources Corp. 2019

3.16.4.3 Alternative 3

3.16.4.3.1 Recreation Opportunities and Uses

The effect of snowplowing of Libby Creek Road and Upper Libby Creek Road and the seasonal closures of Libby Creek Road, Upper Libby Creek Road, and Midas-Howard Creek Road and its spur would be the same as Alternative 2. MMC would conduct geotechnical investigations in an area between Poorman Creek and Little Cherry Creek. Currently open and gated roads and one barriered road would be used for drilling access (Table 315 in Chapter 2). No hiking trails are between Poorman Creek and Little Cherry Creek, and roads in the area do not lead to upper drainages of the Cabinet Mountains. Noise from short-term drilling operations would be audible to recreationalists using the area and people fishing along Libby Creek. The effect on recreational fishing and other types of recreation would be negligible.

Noise sources and general magnitude of effects at the Libby Adit Site and along Libby Creek Road in Alternative 3 would be similar to Alternative 2. Expanding the existing waste rock storage area, constructing a new storage area, and constructing an expanded waste rock sump would have a similar but slightly longer effect on noise levels at the Libby Creek Recreational Gold Panning Area as Alternative 2. After the Libby Adit Site was reclaimed and closed, noise levels at the Libby Creek Recreational Gold Panning Area would return to existing conditions.

In Alternatives 3 and 4, MMC would transfer fee title to or place a conservation easement on 742.3 acres of private land and change access on roads for grizzly bear mitigation. Existing public access would not change. Mitigation lands may be used for nonmotorized recreation, provided such use was consistent with grizzly bear recovery.

In Alternatives 3 and 4, MMC would implement or fund yearlong access changes on National Forest System and private roads before starting the Project. These changes are summarized in Table 337. Nonmotorized access on all roads with access changes would be maintained. The greatest change would be to reduce winter access for over-snow vehicles by a month (from April 30 to March 31) on 12.4 miles of road and to allow access for over-snow vehicles on 1.6 miles of road. These access changes would improve the springtime opportunities for solitude and primitive recreation in the analysis area. Other access changes, such as changing access restrictions from a gate to an earthen barrier or converting restricted roads to trails, would not affect public motorized recreation access.

Upper Bear Creek Road (NFS road #4784) in the Bear Creek drainage is currently open from July 1 to October 14 to motor vehicles, and gated with access restricted to administrative uses other times of the year. It is currently open to over-snow vehicles from December 1 through April 30 (Table 309 in Chapter 2). MMC would barrier 2.7 miles of the road if it was not already closed by the Rock Creek Project (Phase I). Regardless of which company closed the road, the KNF would reduce winter use of over-snow vehicles by a month, from December 1 through April 30 to December 1 through March 31. The access change would remain in place for one of the following possible scenarios: (1) a minimum of 10 years, or (2) if either project was permitted, the longer of (a) life of Montanore Project or (b) life of Rock Creek Project. The access change would eliminate access for motor vehicles and reduce access for over-snow vehicles. The change would improve the opportunities for solitude and primitive recreation in the Cabinet Face East Inventoried Roadless Area (IRA) as long as the access change remained in place. Ultimately, Upper Bear Creek Road would return to existing conditions, and the improved opportunities for solitude and primitive recreation and the reduction in access for over-snow vehicles in the upper Bear Creek drainage would cease.

During the project, roads and trails throughout the analysis area would have increased use by Project personnel conducting required monitoring (see Appendix C). Increased use would result in a minor decrease in opportunities for solitude or a primitive and unconfined type of recreation in the CMW and the Cabinet Face East IRA.

Table 337. Summary of Access Changes Relative to Recreation Uses, Alternatives 3 and 4.

Recreation Change Associated with Road Access Change	Road Length (miles)	Duration
Eliminate all motor vehicle use April 1 to May 15 except for MMC traffic[1] Eliminate winter use by snowplowing	4.5	Would remain until Libby Adit Site closure
Eliminate all motor vehicle use April 1 to June 15[2]	7.7	
Decrease winter access for over-snow vehicles from April 30 to March 31	12.4	At least 10 years
Eliminate all motor vehicle use except for over-snow vehicles December 1 to March 31	2.7	
Eliminate all motor vehicle use except for over-snow vehicles; decrease winter access for over-snow vehicles from December 1 to April 30 to December 1 to March 31	2.7	Either (1) a minimum of 10 years, or (2) if either project was permitted, the longer of (a) life of Montanore Project or (b) life of Rock Creek Project
Eliminate all motor vehicle use	0.3	At least 10 years
Increase winter access for over-snow vehicles December 1 to March 31	1.6	

[1]Since 2007, seasonal closures have been temporarily implemented on these roads with the KNF's approval (KNF 2007a) to MMC for snowplowing segments of NFS roads #231 and #2316.
[2]0.83 mile of road in this category is already impassable to motor vehicles.

3.16.4.3.2 Recreation Opportunity Spectrum

Access and road access changes in Alternatives 3 and 4, including the fee title mitigation lands option, would change the ROS classes along 19 roads (Table 338). Road access changes and changes in summer and winter ROS classes for NFS roads #2316 and #231 would be the same as Alternative 2. As in Alternative 2, snowplowing would cease after the Libby Adit Site was reclaimed and closed, and seasonal access changes on the two roads would no longer be required. ROS classes adjacent to these roads would return to existing conditions.

Although public access along mitigation land roads would not change, the summer and winter ROS classes would change along some roads. For mitigation lands under the fee title option, both the summer and winter ROS classes would become Semiprimitive Nonmotorized. Mitigation land roads #2315, #2315B, #2315D, and #99812B are partially located on National Forest System lands. The existing winter ROS class for areas adjacent to these roads was changed from Semiprimitive Motorized to Semiprimitive Nonmotorized in Alternatives 3 and 4 to reflect the appropriate ROS class.

Due to the decrease in motor vehicle access, including over-snow vehicles, along NFS roads #4776A, #14458, #4778C, #4776C, #4776F, and #4784, summer ROS classes would change from Roaded Natural/Rural or Semiprimitive Motorized to Semiprimitive Nonmotorized (ERO Resources Corp. 2019). See Table 338 below for more information.

Table 338. Alternatives 3 and 4 ROS Class Changes by Road, with Fee Title Mitigation Lands.

NFS Road Number	Road Name	Existing ROS Class in Summer	Existing ROS Class in Winter	ROS Class in Summer with Alternatives	ROS Class in Winter with Alternatives
231	Libby Creek	Roaded Natural/Rural	Semiprimitive Motorized	No change	Roaded Natural/Rural
2316	Upper Libby Creek	Semiprimitive Motorized	Semiprimitive Motorized	Roaded Natural/Rural	Roaded Natural/Rural
4776A	Horse Mtn Lookout A	Roaded Natural/Rural	Roaded Natural/Rural, Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
14458	Midasize	Roaded Natural/Rural	Semiprimitive Motorized	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized
4778C	Midas Howard Creek C – Lower	Roaded Natural/Rural, Semiprimitive Nonmotorized	Roaded Natural/Rural, Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4778C	Midas Howard Creek – Upper	Roaded Natural/Rural, Semiprimitive Nonmotorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4776C	Horse Mtn Lookout C	Roaded Natural/Rural, Semiprimitive Nonmotorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4776F	Horse Mtn Lookout F	Roaded Natural/Rural, Semiprimitive Nonmotorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4784	Upper Bear Creek	Semiprimitive Motorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
2315[2]	Trail Creek	Semiprimitive Nonmotorized	Semiprimitive Motorized	No change	Semiprimitive Nonmotorized
2315A[1]	Spotted Trail	None	None	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized
2315B[2]	Kicking Bear	None, Semiprimitive Nonmotorized	None, Semiprimitive Motorized	No change	Semiprimitive Nonmotorized
2315D[2]	Wounded Knee	None, Semiprimitive Nonmotorized	None, Semiprimitive Motorized	No change	Semiprimitive Nonmotorized
99812[1]	Teton 99812	None	None	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized
99812B[2]	Teton 99812B	None, Semiprimitive Nonmotorized	None, Semiprimitive Motorized	No change	Semiprimitive Nonmotorized
99812C[1]	Teton 99812C	None	None	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized

NFS Road Number	Road Name	Existing ROS Class in Summer	Existing ROS Class in Winter	ROS Class in Summer with Alternatives	ROS Class in Winter with Alternatives
99821[1]	Trail Creek 99821	None	None	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized
99822[1]	Trail Creek 99822	None	None	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized
99822A[1]	Trail Creek 99822A	None	None	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized

[1]Roads entirely on private property.
[2]Roads on private and NFS lands.
Source: ERO Resources Corp. 2019.

Overall, the changes in road access under the fee title option would decrease the amount of Summer Semiprimitive Motorized and Roaded Natural/Rural and increase Summer Semiprimitive Nonmotorized and Primitive. Increases in the amount of Summer Primitive would be the result of inclusion of the Upper Trail Creek mitigation parcel, located southwest of NFS road #2315A adjacent to the CMW. Winter Semiprimitive Nonmotorized and Roaded Natural/Rural would increase, and Winter Semiprimitive Motorized would decrease (Table 339).

Table 339. Changes in ROS Class in Alternatives 3 and 4, Fee Title Option.

ROS Class	Existing		Alternative 3 and 4 Fee Title Option		Change in ROS	
	Summer (acres)	Winter (acres)	Summer (acres)	Winter (acres)	Summer (acres)	Winter (acres)
Primitive	288	0	371	0	83	0
Semiprimitive Nonmotorized	15,759	3,058	18,416	4,607	2,657	1,548
Semiprimitive Motorized	1,451	24,840	366	22,486	-1,084	-2,354
Roaded Natural/Rural	11,851	1,449	10,937	2,997	-914	1,548
Total	29,348	29,348	30,090	30,090	742	742

Totals may vary due to rounding.
Source: ERO Resources Corp. 2019.

In Alternatives 3 and 4, with the conservation easement mitigation lands option, changes in ROS classes along 13 roads would occur (see Table 340). These changes would be the same as under the fee title option, except for the access roads entirely on private land. Roads on these lands would remain private property, with no ROS class assigned. See Table 340 below for more information.

Table 340. Alternatives 3 and 4 ROS Class Changes by Road, with Conservation Easement Mitigation Lands.

NFS Road Number	Road Name	Existing ROS Class in Summer	Existing ROS Class in Winter	ROS Class in Summer with Alternatives	ROS Class in Winter with Alternatives
231	Libby Creek	Roaded Natural/Rural	Semiprimitive Motorized	No change	Roaded Natural/Rural
2316	Upper Libby Creek	Semiprimitive Motorized	Semiprimitive Motorized	Roaded Natural/Rural	Roaded Natural/Rural
4776A	Horse Mtn Lookout A	Roaded Natural/Rural	Roaded Natural/Rural, Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
14458	Midasize	Roaded Natural/Rural	Semiprimitive Motorized	Semiprimitive Nonmotorized	Semiprimitive Nonmotorized
4778C	Midas Howard Creek C – Lower	Roaded Natural/Rural, Semiprimitive Nonmotorized	Roaded Natural/Rural, Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4778C	Midas Howard Creek – Upper	Roaded Natural/Rural, Semiprimitive Nonmotorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4776C	Horse Mtn Lookout C	Roaded Natural/Rural, Semiprimitive Nonmotorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4776F	Horse Mtn Lookout F	Roaded Natural/Rural, Semiprimitive Nonmotorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
4784	Upper Bear Creek	Semiprimitive Motorized	Semiprimitive Motorized	Semiprimitive Nonmotorized	No change
2315[1]	Trail Creek	None, Semiprimitive Nonmotorized	None, Semiprimitive Motorized	No change	Semiprimitive Nonmotorized
2315B[1]	Kicking Bear	None, Semiprimitive Nonmotorized	None, Semiprimitive Motorized	No change	Semiprimitive Nonmotorized
2315D[1]	Wounded Knee	None, Semiprimitive Nonmotorized	None, Semiprimitive Motorized	No change	Semiprimitive Nonmotorized
99812B[1]	Teton 99812B	None, Semiprimitive Nonmotorized	None, Semiprimitive Motorized	No change	Semiprimitive Nonmotorized

[1]Roads on private and NFS lands.
Source: ERO Resources Corp. 2019.

Overall, Summer Semiprimitive Motorized and Roaded Natural/Rural would decrease, and Summer Semiprimitive Nonmotorized would increase under the conservation easement option compared to existing conditions. Winter Semiprimitive Motorized would decrease, and Winter

Semiprimitive Nonmotorized and Roaded Natural/Rural would increase (Table 341; ERO Resources Corp. 2019).

Table 341. Changes in ROS Class in Alternatives 3 and 4, Conservation Easement Option.

ROS Class	Existing		Alternative 3 and 4 Conservation Easement Option		Change in ROS	
	Summer (acres)	Winter (acres)	Summer (acres)	Winter (acres)	Summer (acres)	Winter (acres)
Primitive	288	0	288	0	0	0
Semiprimitive Nonmotorized	15,759	3,058	17,757	3,955	1,998	897
Semiprimitive Motorized	1,451	24,840	366	22,396	-1,084	-2,445
Roaded Natural/Rural	11,851	1,449	10,937	2,997	-914	1,549
Total	29,348	29,348	29,348	29,348	0	0

Source: ERO Resources Corp. 2019

3.16.4.3.3 Effectiveness of the KNF's Proposed Mitigation

The KNF did not identify significant adverse effects and did not propose any mitigation.

3.16.4.4 Alternative 4

The effects of Alternative 4 on recreational resources would be the same as Alternative 3.

3.16.4.5 Cumulative Effects

Past actions within the analysis area include the establishment of forest access roads and logging roads and the development of the Howard Lake Campground and Libby Creek Recreational Gold Panning Area. These past actions have resulted in the existing recreation setting described in JFEIS Section 3.16.3, *Affected Environment*. Population increases would slightly increase demand for recreational opportunities in the region. Even with this increased demand, an abundance of outdoor recreational opportunities would remain for residents and visitors. Access changes in Alternatives 3 and 4 would be implemented in the Trail Creek and Standard Creek drainages; both creeks are tributaries of West Fisher Creek. Because the access changes would not change the existing public motorized access status (Table 309 and Table 310), they would not have cumulative effects with the Miller-West Fisher Vegetation Management Project.

3.16.4.6 Regulatory/Forest Plan Consistency

All action alternatives would maintain forestwide progress toward desired condition FW-DC-AR-01. None of the alternatives would directly affect recreation facilities or forestwide dispersed camping opportunities. Proposed food and garbage storage would not contribute to conflicts between recreation users and wildlife. All alternatives would contribute to achieving progress toward desired conditions.

All action alternatives would maintain forestwide progress toward achieving desired condition FW-DC-AR-03. All action alternatives would have short-term effects on the outdoor recreation

activities in the analysis area. The effect on forestwide recreational opportunity would be negligible.

The forestwide desired condition to provide year-round outdoor recreation opportunities and experiences in a range of settings as described by the ROS is to increase Semiprimitive Motorized recreation and decrease Primitive, Semiprimitive Nonmotorized, and Roaded Natural/Rural recreation in the summer, and to decrease Semiprimitive Motorized recreation and increase Semiprimitive Nonmotorized recreation in the winter. In all action alternatives, the proposed road access changes along NFS roads #231 and #2316 and resulting ROS class changes would be short-term changes. After the Libby Adit Site was reclaimed and closed, snowplowing would cease, seasonal access changes on the two roads would no longer be required, and ROS classes adjacent to these roads would return to existing conditions. Therefore, Alternative 2 would be neutral toward helping achieve the ROS desired condition over the long term. When compared to forestwide desired ROS conditions, Alternatives 3 and 4 would result in minor decreases in summer Semiprimitive Motorized and Roaded Natural/Rural and minor increases in summer Primitive and Semiprimitive Nonmotorized. Alternatives 3 and 4 would also result in minor increases in winter Semiprimitive Nonmotorized and Roaded Natural/Rural and a minor decrease in winter Semiprimitive Motorized. The decrease in summer Roaded Natural/Rural, decrease in winter Semiprimitive Motorized, and increase in winter Semiprimitive Nonmotorized would make progress toward the forestwide ROS desired conditions. All increases and decreases in ROS classes in Alternatives 3 and 4 would be less than 1 percent of all ROS classes on the KNF. All alternatives would be neutral toward achieving desired conditions FW-DC-AR-05 and 06. A variety of motorized and nonmotorized winter and summer recreation opportunities would remain available throughout the KNF. Solitude and nonmotorized experiences would remain available in remote settings throughout the KNF.

All alternatives would be neutral toward achieving desired condition GA-DC-AR-LIB-02. Alternative 3 and 4 access changes would reduce winter access for over-snow vehicles by a month (from April 30 to March 31) on 12.4 miles of road and would allow access for over-snow vehicles on 1.6 miles of road on the East Face of the Cabinet Mountains. Considering the access changes in comparison to forestwide conditions, Alternatives 3 and 4 would be neutral in regard to progress toward this desired condition.

This analysis complies with Executive Order 12962, which mandates disclosure of effects on recreational fishing.

3.16.4.7 Irreversible and Irretrievable Commitments

The recreational experience of some users may be irretrievably affected by the Project, due to loss of access to particular areas, increased noise, or visual impacts. These effects, combined with increased knowledge of and access to the general analysis area, would likely displace some dispersed recreation (hunting, hiking, and dispersed camping) to other areas of the forest. Long-term road closures for grizzly bear mitigation in Alternatives 3 and 4 would result in an irretrievable loss of recreational access.

3.16.4.8 Short-Term Uses and Long-Term Productivity

All action alternatives include both short-term and long-term road closures in the analysis area. Long-term road closures in Alternatives 3 and 4 would reduce recreation access; the long-term effects of the Project on recreation access in the analysis area would be small.

The noise and visual effects of the Project would be most noticeable during the 12 weeks that geotechnical activities would occur and during the 5 years while the Libby Adit Site was used. Noise would return to existing levels when reclamation activities ceased, and visual effects would be reduced over time as revegetation efforts were completed and the forest cover reestablished in disturbed areas. Over the long term, the Project would not affect the ability of the analysis area to provide a variety of forest recreation opportunities.

3.16.4.9 Unavoidable Adverse Environmental Effects

The reduction in recreational opportunity in Alternatives 3 and 4 due to access changes would be an unavoidable adverse effect.

3.17 Scenery

3.17.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the Forest Service's Locatable Mineral Regulations (36 CFR 228 Subpart A) are described in the JFEIS.

The KFP direction considered in the analysis of scenic resources is:

> **FW-DC-AR-02.** The scenic resources of the KNF complement the recreation settings and experiences while reflecting healthy and sustainable ecosystem conditions.
>
> **FW-GDL-AR-01.** Management activities should be consistent with the mapped scenic integrity objective, see Plan set of documents. The scenic integrity objective is High to Very High for scenic travel routes, including Pacific Northwest National Scenic Trail, designated Scenic Byways, and National Recreation Trails.
>
> **MA6-GDL-AR-05.** Management activities should be consistent with the Scenic Integrity Objective of Low to High.

3.17.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis of the Libby Adit Site are the same as described in the JFEIS. A transmission line would not be constructed, and scenic resources in the Fisher River watershed would not be affected. The effects analysis of the geotechnical investigations between Poorman Creek and Little Cherry Creek was based on the Scenery Management System (USDA Forest Service 1995) and the Forest Service Manual (FSM 2380). The Scenery Management System recognizes natural disturbance processes and ecological processes; the resulting landscapes are dynamic ecosystems with some human-made components of the landscape that contribute to the landscape's valued character.

3.17.3 Affected Environment

The existing landscape character of the analysis area is described in the JFEIS. The Libby Adit Site is on private land, and the KFP's scenic integrity objectives do not apply to the site. The area between Poorman Creek and Little Cherry Creek has a scenic integrity objective of moderate or low (Figure 320). High levels of road construction to facilitate harvest occurred in the geotechnical investigation area through the 1980s. Most of the roads in the area are gated and may receive some administrative use. About half of the geotechnical investigation area is previously harvested coniferous forest. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on scenic resources in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.17.4 Environmental Consequences

3.17.4.1 Alternative 1

The existing views from Key Observation Points (KOPs) and existing scenic integrity would not change in Alternative 1. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. The existing Libby Adit Site disturbances would remain and would be visible from one KOP in a montane forest at a NFS road #231 pullout. Disturbances on private land at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Regrading and revegetating the site would create areas with similar landscape characteristics to the surrounding area over the long term.

3.17.4.2 Alternative 2

The existing disturbance at the Libby Adit Site is on private land, and no additional disturbance at the site is anticipated. Alternative 2 would not alter the scenic integrity of any National Forest System lands. Activities at the Libby Adit Site, such as expansion of an existing waste rock storage area, within the existing 11.6-acre disturbance area would not alter the existing visual effects. The existing Libby Adit Site would continue to alter views from the scenic overlook at KOP 2, Elephant Peak (KOP 3), the south NFS road #231 pullout (KOP 4), a portion of NFS roads #231 and #4776, portions of the CMW, and a portion of a private land parcel along Libby Creek northeast of the adit site. Viewing significance, as defined by the Concern Levels from the three KOPs and two roads, would remain high due to high visitor use and long viewing duration due to stationary viewers or a high viewing angle above the site's location.

Existing disturbance visible from KOP 4 would remain due to a direct unobstructed line of sight to the adit and long duration views. Because of the screening effects of trees and topography, a relatively small portion of the adit site remains visible from a private land parcel southeast of the site. Because the Libby Adit Site is on private land, scenic integrity objectives do not apply. At closure, MMC would reclaim the Libby Adit Site. Regrading and revegetating the site would create areas with similar landscape characteristics to the surrounding area over the long term.

MMC did not propose conducting any geotechnical investigations or closing any roads. Scenic integrity in locations other than the Libby Adit Site would not be affected.

3.17.4.3 Alternative 3

3.17.4.3.1 Effects on Scenic Integrity

The effects of Alternative 3 on scenic resources at the Libby Adit Site would be the same as Alternative 2. The expansion of an existing waste rock storage area, construction of a new storage area, and modifications to the waste rock sump within the existing 11.6-acre disturbance at the Libby Adit Site would not alter the existing visual effects. MMC would reclaim the Libby Adit Site as described for Alternative 2. Regrading and revegetating the site would create areas with similar landscape characteristics to the surrounding areas.

The geotechnical investigations would require 6.4 acres of vegetation clearing between Poorman Creek and Little Cherry Creek. Clearing would be the minimum necessary to complete the investigations. In Alternatives 3 and 4, MMC would implement measures to harmonize operations with scenic values. These measures would be described in an Evaluation Project Vegetation Removal and Disposition Plan. MMC would complete a review of proposed new roads with a KNF representative to minimize visual contrasts of required vegetation clearing. MMC would mark only trees to be removed with water-based paint and would not mark any trees to remain.

The clearings would be in previously harvested coniferous forest or undisturbed coniferous forest. The clearings would be in 1.6 acres with a scenic integrity objective of low and 4.8 acres with a scenic integrity objective of moderate. The clearings would alter scenic integrity from KOPs 1, 2, and 3; a portion of NFS roads #231 and #4776; and portions of the CMW (Figure 320). The geotechnical investigation area would be in the middleground viewing distance from KOP 1, NFS road #231 pullout, and KOP 2. The geotechnical investigation area would be in the background viewing distance from KOP 3, the top of Elephant Peak. From all KOPs, linear vegetation clearing for seven roads and rectangular clearing for 13 drill pads contiguous to the roads would repeat the line of existing roads. Form, texture, and color would remain dominant. From KOP 2, the scenic overlook, some of the clearing would be obstructed from view due to the screening effects of topography and vegetation. The visual absorption capability of the site is moderate. The clearings may be noticeable, but with the required mitigation, they would be visually subordinate. The geotechnical investigations in Alternative 3 would comply with scenic integrity objectives of low and moderate.

Reclamation of disturbed ground would commence as soon as practical after completion of investigations. Reconstructed roads would be rehabilitated and access would return to existing conditions. Without maintenance, the segment of NFS road #1408 used for access would become impassable as trees grew in the roadbed. New roads would be covered with suitable soils and then seeded with a seed mix approved by the KNF and consistent with the KNF-approved 2018 seed mix (Savage 2018). Regrading and revegetating the new roads would create areas with similar landscape characteristics to the existing timber harvested areas and unpaved, abandoned roads. Over the long term, as vegetation on the reclaimed new roads became established, the scenic integrity of the geotechnical investigation area would return to existing conditions.

In Alternatives 3 and 4, MMC would implement or fund yearlong access changes on National Forest System and private roads before the Project (Table 309 and Table 310 in Chapter 2). Decommissioned roads would be revegetated. Over the long term, as vegetation on the decommissioned roads became established, the scenic integrity of decommissioned roads would return to conditions before the roads were constructed.

3.17.4.3.2 Effectiveness of the KNF's Proposed Mitigation

The mitigation would reduce contrasts of line, color, and texture of the required vegetation clearing for the geotechnical investigations.

3.17.4.4 Alternative 4

The effects of Alternative 4 on scenic resources at the Libby Adit Site would be the same as Alternative 2. The geotechnical investigations would require 1.5 acres of clearings between Poorman Creek and Little Cherry Creek. The mitigation in Alternative 4 would be the same as Alternative 3. Clearings would be the minimum necessary to complete the investigations. The

clearings would be in previously harvested coniferous forest or undisturbed coniferous forest. The clearings would be in 0.1 acre with a scenic integrity objective of low and 1.4 acres with a scenic integrity objective of moderate. For the reasons discussed under Alternative 3, the clearings may be noticeable but would be visually subordinate. The geotechnical investigations in Alternative 4 would comply with scenic integrity objectives of low and moderate. Regrading and revegetating the new roads would create areas with similar landscape characteristics to the existing timber harvested areas and unpaved, abandoned roads. Over the long term, as vegetation on the reclaimed new roads became established, the scenic integrity of the geotechnical investigation area would return to existing conditions. The effect of road decommissioning on scenic integrity would be the same as Alternative 3.

3.17.4.5 Cumulative Effects

The cumulative effects of the alternatives on scenic resources are described in the JFEIS.

3.17.4.6 Regulatory/Forest Plan Consistency

3.17.4.6.1 Organic Administration Act and Forest Service Locatable Minerals Regulations

The Forest Service is responsible for ensuring that mineral operations on National Forest System lands comply with Forest Service locatable mineral regulations (36 CFR 228 Subpart A) for environmental protection. One of these regulations (36 CFR 228.8) requires that mineral operations be conducted, where feasible, to minimize adverse environmental impacts on National Forest surface resources. 36 CFR 228.8(d) also requires that mineral operations, to the extent practicable, harmonize operations with scenic values through such measures as the design and location of operating facilities, including roads and other means of access; vegetative screening of operations; and construction of structures and improvements that blend with the landscape.

Alternative 2 would not fully comply with 36 CFR 228.8(d). In this alternative, MMC did not propose to implement practicable measures to harmonize operations with scenic values. The KNF's alternatives (Alternatives 3 and 4) were developed and incorporated feasible and practicable measures to minimize adverse environmental impacts and harmonize operations with scenic values.

3.17.4.6.2 National Forest Management Act/Kootenai Forest Plan

Alternative 2 would not alter the scenic integrity of any National Forest System lands and would comply with all KFP direction regarding scenery. Alternatives 3 and 4 would be designed and implemented in accordance with guidelines FW-GDL-AR-01 and MA6-GDL-AR-05. Project activities would be consistent with the mapped scenic integrity objective of low or moderate. Project activities would be neutral with regard to progress toward achieving desired condition FW-DC-AR-02.

3.17.4.7 Irreversible and Irretrievable Commitments

Changes in scenery from the Libby Adit Site facilities would be an irretrievable commitment of resources. Disturbed areas would be regraded and revegetated, and all buildings and other constructed facilities would be removed. Reclaimed areas would have noticeably different lines, colors, and textures than the adjacent undisturbed landscape.

3.17.4.8 Short-Term Uses and Long-Term Productivity

Long-term effects on scenery would be clearing of vegetation. Reclamation would create areas similar in appearance to abandoned roads and timber harvest areas.

3.17.4.9 Unavoidable Adverse Environmental Effects

Visual impacts of all action alternatives would be unavoidable. Existing settings and landscapes in the analysis area would be altered for several decades after reclamation.

3.18 Social/Economics

3.18.1 Regulatory Framework

The KFP includes the forestwide desired condition to "contribute to the economic strength and demands of the nation by supplying mineral and energy resources while assuring that the sustainability and resiliency of other resources are not compromised or degraded" (FW-DC-MIN-01), as well as desired conditions to generate outputs and values that contribute "to sustaining social and economic systems" (FW-DC-SES-01), "contribute to the local economy through the generation of jobs and income" (FW-DC-SES-02), and "contribute to community stability or growth, and the quality of lifestyles in the Plan area" (FW-DC-SES-03). The Hard Rock Mining Impact Act is designed to assist local governments in handling financial impacts caused by large-scale mineral development projects. Project activities would not be considered a large-scale mineral development project, and the Act would not apply; the Act's requirements for the Montanore Project are described in the JFEIS.

3.18.2 Analysis Area and Methods

The socioeconomic analysis area is Lincoln County, Montana. Potentially affected jurisdictions in the analysis area would include the incorporated municipalities of Libby and Troy. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and social and economic effects of transmission line construction and decommissioning would not occur.

3.18.3 Affected Environment

Except as described in this section, the existing social and economic environment is described in the JFEIS. Information regarding certain socioeconomic parameters, such as population, employment, and income, was through 2010 in the JFEIS and was updated in the SEIS with currently available data, generally between 2015 and 2017. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on socioeconomic resources in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

The estimated population of Lincoln County decreased by 428 persons between 2010 and 2016. The population of Libby increased by 50 persons, and the population of Troy increased by 4 persons during the same period. Employment in Lincoln County decreased between 2010 and 2016 (U.S. Census Bureau 2017). In 2016, the top three employment sectors in Lincoln County were government and government enterprises, retail trade, and construction (U.S. Bureau of Economic Analysis 2017a). The government and government enterprises sector, with 14.3 percent of total employment, was the largest sector in Lincoln County. The retail trade sector was the next largest with 13 percent of total employment, followed by the construction sector with 8.9 percent of total employment (Table 342). Contributing to many sectors is a recreation industry that provides visitors numerous camping, hiking, skiing, snowmobiling, hunting and fishing, wildlife viewing, and other recreation opportunities.

Table 342. 2010 and 2016 Lincoln County Employment for Major Industrial Sectors.

Industrial Sector	2010		2016	
	Persons	%	Persons	%
Forestry, Fishing, and Related Activities	388	4.2	332	3.8
Mining	273	3.0	92	1.1
Construction	788	8.6	770	8.9
Manufacturing	353	3.8	331	3.8
Retail Trade	1,088	11.9	1,127	13.0
Government and Government Enterprises	1,373	15.0	1,234	14.3
Other Sectors	4,913	53.5	4,773	55.1
Total Employment	9,176		8,659	

Employment based on the number of full- and part-time jobs.
Source: U.S. Bureau of Economic Analysis 2012, 2017a.

The labor force in Lincoln County, defined as persons working or seeking work, decreased by 5.8 percent between 2010 and 2017, compared to an increase of 4.9 percent statewide over the same period (Table 343). In Lincoln County, the average annual unemployment rate, the number of unemployed persons as a percentage of the labor force, decreased from 11.8 percent in 2010 to 6.1 percent in 2017. The Lincoln County unemployment rate was about twice the rate of Montana, which was 3.4 percent during 2017 (Department of Labor and Industry 2017).

Table 343. 2010 and 2017 Montana and Lincoln County Civilian Labor Force and Employment.

Variable	Lincoln County			Montana		
	2010	2017	Change (%)	2010	2017	Change (%)
Number Employed	7,409	7,436	<1	467,949	506,634	8.3
Number Unemployed	993	482	-51.5	31,849	17,618	-44.7
Civilian Labor Force	8,402	7,918	-5.8	499,798	524,252	4.9
Unemployment Rate	11.8	6.1		6.4	3.4	

Values are for September of the years shown.
Source: Department of Labor and Industry 2017.

The 2015 median family income in Lincoln County was $45,735, 25 percent lower than the statewide median family income of $61,271 (U.S. Census Bureau 2017). Lincoln County's per capita personal income, adjusted for inflation, was $33,464 in 2016 compared to $42,947 in Montana (U.S. Bureau of Economic Analysis 2017b). The top-paying sectors of the Lincoln County economy have remained mining, forestry and logging, and government. In 2015, Lincoln County had a greater percentage (23.9 percent) of families earning less than $25,000 a year than did the state of Montana (14.9 percent) (U.S. Census Bureau 2017).

3.18.4 Environmental Consequences

3.18.4.1 Alternative 1

Existing trends and conditions would continue to drive the social structure and economy of the area. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Economic effects associated with activities at the Libby Adit Site would remain until the site was reclaimed in accordance with Operating Permit No. 00150.

3.18.4.2 Alternative 2

3.18.4.2.1 Employment and Income Effects

Project activities are anticipated to last 18 to 24 months; the duration of the Project, including closure, may be up to 5 years. During dewatering and adit rehabilitation, MMC would employ 6 to 10 employees at the Libby Adit Site, working two 10-hour shifts 7 days per week. During drift development and drilling, MMC would employ 30 to 35 people at the Libby Site, working two 10-hour shifts 7 days per week. Mining-related jobs typically are higher-paying than average; in 2015, Lincoln County mining sector wages averaged $55,815 per year (U.S. Bureau of Labor Statistics 2017a). Secondary employment is estimated be 18 to 21 people. The relationship between direct employment and income and total employment and income for Montanore Project years 25 to 42 described in JFEIS Section 3.18.4.2.3, *Post-mining Closure, and Reclamation and Monitoring Employment and Income Effects*, would be similar to the relationship expected for the Project. Based on this relationship, the total estimated income, including secondary income, would be $3.25 million in 2010 dollars. The national consumer price index (CPI) produced by the U.S. Bureau of Labor Statistics indicates that the value of the dollar has declined by 13 percent between 2010 and 2017 (U.S. Bureau of Labor Statistics 2017b). Total estimated income, including secondary income, would be $3.67 million in 2017 dollars.

3.18.4.2.2 Population Effects

Population effects were not specifically estimated for the Project but were extrapolated from analysis completed for the JFEIS and the Montanore Project Hard Rock Mining Impact Plan (Western Economic Services, LLC 2005). A local hire ratio of 80 percent for direct workers and 90 percent for secondary workers was assumed. The U.S. Bureau of Economic Analysis indicates a total of 8,835 jobs were in Lincoln County, Montana, in 2016 (U.S. Bureau of Economic Analysis 2017a). The in-migration of 8 to 10 people into Lincoln County would have a short-term, negligible population effect.

3.18.4.2.3 Community Effects

MMC workers would have jobs with above-average wages that would allow them to purchase or build homes. Some in-migrants hired into secondary and replacement jobs would be in the same situation. Others would be more likely to prefer rental housing or mobile home spaces. The 18- to 24-month duration of Project activities would likely reduce the likelihood of workers purchasing homes. The in-migration of 8 to 10 people into Lincoln County would have a short-term, negligible effect on housing and the social structure of Libby, Troy, and surrounding rural areas in terms of local values, school attendance, and community character.

3.18.4.2.4 Public Services

The in-migration of 8 to 10 people into Lincoln County would have a short-term, negligible effect on public services.

3.18.4.2.5 Fiscal Effects

Property taxes on the Libby Adit Site would not change. Property taxes would increase due to site improvements and business equipment purchased during the Project. Montana levies a metal mines license tax on a mine's annual gross revenues in excess of $250,000. The metal mines license tax is a percentage tax on the value of ore concentrate shipped to the refinery. No ore concentrate would be shipped to a refinery, and the metal mines license tax would not be levied. Increased housing for the in-migration of 8 to 10 people into Lincoln County would have a short-term, negligible effect on government finances. Property taxes would increase and accrue to local governments but would have a short-term, negligible effect on local government finances.

3.18.4.3 Alternative 3

Effects of underground activity at the Libby Adit Site in Alternative 3 would be similar to Alternative 2. Proposed site improvements different from Alternative 2 may increase the assessed property value more than in Alternative 2. The geotechnical investigations would be completed by contractors and last an estimated 12 weeks, including reclaiming drill pads and access roads. On an annualized basis, employment is estimated to be 2.5 man-years. Direct labor income for the contract individuals is estimated to range from $200,000 to $250,000. Total Project cost is estimated to range from $650,000 to $950,000 with non-labor costs allocated to equipment rental, materials, and other contractor indirect charges.

MMC would transfer fee title to or place a conservation easement on 4.5 acres in Sanders County and 723.3 acres in Lincoln County. MMC would convey a perpetual conservation easement on the 14.5-acre Rock Lake parcel to the Forest Service or a private conservation organization independent of MMC. If fee title was transferred, the permanent reduction in property tax revenue would be $1,884 in Lincoln County (based on 2018 valuation), reducing the increased property taxes on business equipment purchased during the Project. The effect in Sanders County would be $161. If fee title was transferred, federal payments in lieu of taxes would offset some of the property tax reduction. The reduction in property taxes would be less if a conservation easement was used and MMC retained ownership. These changes would have a long-term, negligible effect on local government finances.

3.18.4.3.1 Effectiveness of the KNF's Proposed Mitigation

The KNF did not identify significant adverse effects and did not propose any socioeconomic mitigation.

3.18.4.4 Alternative 4

Effects of underground activity at the Libby Adit in Alternative 4 would be the same as Alternative 3. The effect of transferring fee title to or placing a conservation easement on private land would be the same as Alternative 3. The geotechnical investigations would be completed by contractors and last an estimated 4 weeks, including completing reclamation of drill pads and access roads. On an annualized basis, employment is estimated to be 0.75 man-years. Direct labor income for the contract individuals is estimated to range from $60,000 to $75,000. Total Project

cost is estimated to range from $200,000 to $290,000 with non-labor costs allocated to equipment rental, materials, and other contractor indirect charges.

3.18.4.5 Cumulative Effects

The Troy Mine was closed in 2015 and currently is being reclaimed. Other mineral activities in the area (primarily small exploration projects) and the regional timber industry are not expected to lead to major changes in population, employment, or income in the reasonably foreseeable future. The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. If both the Rock Creek Project and the Montanore Project were approved and implemented concurrently, the cumulative effect of both projects would be as described in the JFEIS.

3.18.4.6 Regulatory/Forest Plan Consistency

The Project would contribute to progress toward FW-DC-MIN-01 and FW-DC-SES-01 through 03 of the KFP.

3.18.4.7 Irreversible and Irretrievable Commitments

Economic productivity for timber or other resources from disturbed lands would be irretrievably lost.

3.18.4.8 Short-Term Uses and Long-Term Productivity

The Project would not affect long-term productivity.

3.18.4.9 Unavoidable Adverse Environmental Effects

Under all alternatives, increased employment and population would place increased demands on housing and some public services, including schools.

3.19 Soils and Reclamation

3.19.1 Regulatory Framework

3.19.1.1 Federal Requirements

Federal requirements under the Organic Administration Act and the Forest Service's Locatable Mineral Regulations (36 CFR 228 Subpart A) are described in the JFEIS. The requirements of 36 CFR 228.8 and KFP direction do not apply to activities on the Libby Adit Site because it is on private land and not National Forest System lands. The KFP direction considered in the analysis of soil is:

> **GOAL-SOIL-01.** Maintain soil productivity and ecological processes where functioning properly, and restore where currently degraded. Maintain the physical, chemical, and biological properties of soils to support desired vegetation conditions and soil-hydrologic functions and processes within watersheds.
>
> **FW-DC-SOIL-01.** Soil organic matter, physical conditions, and down woody debris maintain soil productivity and hydrologic function. Physical, biological, and chemical properties of soil are within the recommended levels by soil type as described in the KNF soil inventory. These soil properties enhance nutrient cycling; maintain the role of carbon storage, and support soil microbial and biochemical processes.
>
> **FW-DC-SOIL-02.** Areas with sensitive and highly erodible soils or landtypes with mass failure potential are not destabilized as a result of management activities.
>
> **FW-DC-SOIL-03.** Soil impacts are minimized and previous activity areas that have incurred detrimental soil disturbance recover through natural processes and/or restoration activities. Organic matter and woody debris, including large diameter logs, tops, limbs, and fine woody debris, remain on site after vegetation treatments in sufficient quantities to retain moisture, maintain soil quality, and enhance soil development and fertility by periodic release of nutrients as they decompose (refer to FW-GDL-VEG-03).
>
> **FW-DC-SOIL-04.** Soil organic matter and down woody debris support healthy mycorrhizal populations, protect soil from erosion due to surface runoff, and retain soil moisture. Volcanic ash-influenced soils that occur on most of the Forest are not compacted and retain unique properties, such as low bulk density and high water holding capacity, to support desired vegetative growth.
>
> **FW-GDL-SOIL-01.** Ground-based equipment should only operate on slopes less than 40 percent, in order to avoid detrimental soil disturbance. Where slopes within an activity area contain short pitches greater than 40 percent, but less than 150 feet in length, ground-based equipment may be allowed, as designated by the timber sale administrator.
>
> **FW-GDL-SOIL-03.** On nutrient-limited landtypes, harvesting organics should remain on site for at least 6 months or over a winter season to allow foliage nutrients to leach into

the soil, except where site-specific analysis indicates the fuels would present an unacceptable hazard.

FW-GDL-SOIL-04. Ground-disturbing management activities on landslide prone areas should be avoided. If activities cannot be avoided, they should be designed to maintain soil and slope stability.

FW-GDL-SOIL-05. Project specific best management practices (BMPs) should be incorporated into all land management activities as a principle mechanism for protecting soil resources.

Region 1 soil quality standards (FSM 2500—Watershed and Air Management, R1 Supplement No. 2500-2014-1) and Chapter 2550—Soil Management contain soil management objectives and policies applicable to activities on the KNF. Soil quality standards apply to lands where vegetation and water resource management (i.e., timber sales, grazing pastures or allotments, wildlife habitat, and riparian areas) are the principal objectives. The standards would apply to the geotechnical investigations because the disturbances would be short-term and reclaimed in the same year as they were created. The reclamation plan for the Project would include meeting the soil quality standards as one of the long-term reclamation goals. The standards would not apply to activities at the Libby Adit Site because it is entirely on private lands. Additional guidance is included in the USDA Forest Service's Region 1 guidance for soils (USDA Forest Service 2011a).

3.19.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and soil resources in the Fisher River watershed would not be affected.

3.19.3 Affected Environment

Soil resources that may be affected by Project activities are described in JFEIS Section 3.19.3, *Affected Environment*. Soils affected by geotechnical investigations are continental glacial soils (landtype 322) as described in the KNF soil survey (USDA Forest Service and Natural Resources Conservation Service 1995). The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on soil resources in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.19.4 Environmental Consequences

This section addresses soil impacts resulting from the action alternatives (Alternatives 2, 3, and 4). The impacts are typical of any operation where soil would be removed, stored, and replaced. The effects on soils that are common to all action alternatives are presented first, followed by the

effects on soils that would be unique to each alternative. Soil impacts resulting from all action alternatives would include:

1) Soil loss from erosion of disturbed areas and losses of salvageable materials through erosion and handling
2) Changes in soil physical, chemical, and biological characteristics
3) Reduction in plant growth due to potentially harmful metals in some subsoils because of the potentially acid pH levels, and in wastes that would be part of the revegetated plant community rooting zone

Identification of these impacts, followed by the incorporation of the appropriate mitigation measures included in the Project's operating plan and the Project's reclamation plan, determines the potential success of reclaiming the land to forest cover and wildlife habitat after the Project.

3.19.4.1 Alternative 1

Soil resource impacts would be limited in comparison to the other alternatives. Soil loss due to erosion would be restricted to continued road use for access or data collection disturbances. MMC would reclaim all existing soil disturbances in accordance with Operating Permit No. 00150, except for seed mixtures. MMC intends to use locally sourced seed when possible. MMC may substitute specific species in the final seed mixtures at the Libby Adit Site if approved by DEQ. Erosion and sedimentation would occur at existing rates along NFS roads #231 and #2316 and other existing roads. Soil erosion losses due to rainfall, runoff, and wind would continue at natural rates at other locations in the analysis area.

3.19.4.2 Alternative 2

MMC would not conduct any geotechnical investigation activities in Alternative 2. Effects would be similar to Alternative 1. Increased traffic on Libby Creek Road and Upper Libby Creek Road, particularly when the roads normally would be closed during the winter, would lead to some increased soil loss. No additional physical, chemical, or biological changes in soils stockpiled at the Libby Adit Site would occur. No existing reclaimed areas would be affected. MMC would use KNF- and DEQ-approved seed mixtures for all revegetation activities at the Libby Adit Site. MMC would reclaim all existing soil disturbances in accordance with Operating Permit No. 00150, except for seed mixtures. MMC intends to use locally sourced seed when possible. MMC may substitute specific species in the final seed mixtures at the Libby Adit Site if approved by DEQ.

After the Libby Adit Site was reclaimed, sediment delivery would return to existing conditions within an estimated 4 to 5 years. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 306 and sediment conditions would return to pre-Project conditions on the roads.

3.19.4.3 Alternative 3

3.19.4.3.1 Soil Disturbance and Reclamation

MMC would disturb existing revegetated areas and an existing soil stockpile in the 11.6-acre disturbance area at the Libby Adit Site (Figure 310). MMC would create a new soil stockpile at the site. To the extent feasible, soils on reclaimed areas at the Libby Adit Site would be removed before disturbance and moved to the new soil stockpile. Some soil material would be

irretrievable, resulting in less soil available for final reclamation. Reclamation of the Libby Adit Site would be the same as Alternative 2; the KNF has no authority to regulate activities on the surface of the Libby Adit Site.

MMC would disturb 6.4 acres between Poorman Creek and Little Cherry Creek for geotechnical investigations. Because of the observed metal leaching and low pH problems from soil stockpiles containing large amounts of coniferous vegetation at other mine sites in Montana, most coniferous forest debris would be removed before soil salvage. Suitable soils would be temporarily stockpiled adjacent to the alignments for use in subsequent reclamation activities. This measure also would minimize soil nutrient losses, because low pH conditions can result in complex nutrient deficiency or phytotoxicity problems. Physical, chemical, or biological changes in soils stored at the geotechnical investigation area would be negligible because of the short duration of soil storage.

MMC would decommission and revegetate all new roads no longer required as soon as practical after completion of the geotechnical investigations. New roads would be covered with suitable soils and any vegetation stripped during construction. To reduce compaction, severely compacted areas, such as roads, would be ripped before soil placement, and seedbeds would be disked and harrowed before seeding. Soil compaction would be short-term in all disturbed areas with these mitigation measures, and after reclamation, compaction in respread soils that are ripped would be similar to existing soils.

Boreholes that would not be completed as piezometers would be backfilled with the material removed from the hole. On all disturbed sites, MMC would amend the top 0 to 4 inches of soil before seeding with a KNF-approved wood-based organic amendment to raise the organic matter level in the soil to a minimum of 1 percent by volume. Disturbed areas associated with the geotechnical investigations would be reseeded using a seed mix approved by the KNF and consistent with the KNF-approved 2018 seed mix (Savage 2018). Post-Project disturbances for the geotechnical investigations would be completed in compliance with Region 1 soil quality standards. MMC would use KNF detrimental soil disturbance field forms to assess pre-disturbance and post-disturbance soil conditions (see Appendix C). The reclamation plan for the Project would include meeting the soil quality standards as one of the long-term reclamation goals. These measures would ensure that the physical, chemical, and biological properties of soils were maintained to support desired vegetation conditions.

3.19.4.3.2 Soil Erosion

MMC would implement before the Project and maintain during the Project the BMPs shown in Table 311 in Chapter 2, such as installing, replacing, or upgrading culverts, to bring access road NFS road #231 up to KFP standards and guidelines and Forest Service guidance (USDA Forest Service 2008, 2015a). All ditches on NFS roads #231 and #2316 would be cleaned out to enhance drainage and reduce sedimentation. MMC would implement and maintain BMPs on roads required to be closed or stabilized for wildlife mitigation. MMC would develop and implement a Road Management Plan addressing all roads used in the alternative. Successful implementation of the plan would ensure that erosion and sediment delivery from roads would be minimized.

MMC would reduce the contributing road surface lengths at six RHCA crossings to 150 feet where the existing lengths were currently greater than 150 feet. The WEPP:Road Batch model predicted this mitigation would reduce the average annual sediment leaving the buffer to 87

pounds, a 32 percent reduction from existing conditions (Table 333). This activity would be implemented before implementing the BMPs shown in Table 311.

MMC submitted a final SWPPP in 2017 (MMC 2017a). The SWPPP describes stormwater management at the Libby Adit Site, BMPs, control measures, and monitoring procedures that would ensure compliance with the terms and conditions of its MPDES permit. The SWPPP addressed stormwater runoff from the Libby Adit Site. Sediment and runoff from the site would continue to be minimized. MMC would update the SWPPP to cover all permitted discharges. The SWPPP would describe and locate all structural and non-structural BMPs implemented at the site to minimize erosion and sediment transport.

BMPs have proved to be an effective tool in limiting nonpoint source pollution (DNRC 2016). If properly constructed and located, BMPs keep soil erosion to a minimum, capture sediment before it enters waterways, and protect water quality by controlling the flow of surface water over exposed areas. Additionally, BMPs help keep soil particles in place and thereby provide a better plant growth medium for reclamation. The proper use of BMPs prevents any eroded soil from making its way to the watershed outlet, where it would create problems downstream.

After the Libby Adit Site and geotechnical investigation disturbances were reclaimed, sediment delivery would return to existing conditions within an estimated 4 to 5 years. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 309 and sediment conditions would return to pre-Project conditions on the roads.

3.19.4.3.3 Effectiveness of the KNF's Mitigation Measures

MMC's implementation of the design features described in Chapter 2 would be effective in ensuring the surface disturbed in operations was reclaimed by taking such measures as preventing or controlling on-site and off-site damage to the environment and forest surface resources.

3.19.4.4 Alternative 4

Alternative 4 would have similar effects on soils as Alternative 3. Disturbed acreage would be less in Alternative 4 than Alternative 3. Alternative 4 would have the same additional mitigation measures and effects as Alternative 3.

3.19.4.5 Cumulative Effects

Past actions, particularly road construction, timber harvest, and mining activities, have increased erosion rates in comparison to undisturbed areas in the analysis area. As vegetation in timber harvest areas return to pre-harvest conditions, erosion rates have decreased and would continue to decrease. The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Cumulative effects from concurrent development of the Rock Creek Project and the Montanore Project, if they were approved and implemented, are described in the JFEIS. Cumulative effects on soils from other current and reasonably foreseeable actions would be associated primarily with potential soil loss from erosion and loss of soil productivity. These actions would potentially occur on both public and private lands. The primary soil disturbance of many of these activities would be from road construction and soil removal. These actions would result in an increase in erosion and sedimentation within the Libby Creek watershed and a loss of soil productivity in areas where soil was removed, stored for prolonged periods, and then replaced.

The KNF requires the implementation of BMPs for logging, mineral operations, and road-building operations. Private landowners are not required to use BMPs unless they are subject to surface water discharge requirements. By properly implementing and maintaining BMPs, on-site erosion and potential increases in sedimentation to creeks would be minimized, and soil erosion losses would be a minor cumulative impact.

3.19.4.6 Regulatory/Forest Plan Consistency

3.19.4.6.1 Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental impacts on National Forest surface resources; construct and maintain all roads so as to assure adequate drainage and to minimize or, where practicable, eliminate damage to soil, water, and other resource values; and reclaim, where practicable, the surface disturbed in operations by taking such measures as preventing or controlling on-site and off-site damage to the environment and forest surface resources. The requirements of 36 CFR 228.8 do not apply to activities on the Libby Adit Site because it is on private land.

Minimize Adverse Environmental Impact (36 CFR 228.8)

Alternative 2 would not fully comply with 36 CFR 228.8 to minimize adverse environmental impacts. MMC did not propose to implement practicable measures to minimize effect of road usage. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental impacts. These measures include developing and implementing a final Road Management Plan and a Vegetation Removal and Disposition Plan, removing a majority of coniferous forest debris before soil removal, and using a more appropriate seed mixture in revegetation.

Roads (36 CFR 228.8(f))

The predicted delivery of sediment from roads to streams in Alternatives 3 and 4 would be less than in Alternative 2. At the end of the 12 weeks of the geotechnical investigations (or 4 weeks in Alternative 4), new roads would be reclaimed, and existing roads used during the investigations would return to their existing status. Alternative 2 would not fully comply with 36 CFR 228.8(f) as it relates to water quality because MMC did not propose to implement practicable measures to minimize adverse environmental impacts on soils. Alternatives 3 and 4 would comply with 36 CFR 228.8(f) as it relates to soils.

Compliance with 36 CFR 228.8(f) regarding roads management is discussed in Section 3.6.4.6.4, *National Forest Management Act/Kootenai Forest Plan* (RF-2 through RF-5), beginning on page 118.

Reclamation (36 CFR 228.8(g))

Alternative 2 would not fully comply with 36 CFR 228.8(g) to implement practicable measures to prevent or control on-site and off-site damage to the environment and forest surface resources. MMC did not propose to implement practicable measures to minimize erosion along the proposed access roads. Alternatives 3 and 4 would include developing and implementing a final Road Management Plan and a Vegetation Removal and Disposition Plan, implementing BMPs along the proposed access roads, removing a majority of coniferous forest debris before soil removal, and using an appropriate seed mixture. These measures would minimize erosion and ensure reclamation success. Alternatives 3 and 4 would comply with 36 CFR 228.8(g) as it relates to soils.

3.19.4.6.2 National Forest Management Act/Kootenai Forest Plan

Compliance with the KFP is described in the following sections. KFP direction does not apply to activities on the Libby Adit Site because it is on private land.

GOAL-SOIL-01. Alternative 2 would not fully comply with this goal and would not contribute to progress toward achieving this forestwide goal. Alternatives 3 and 4 would incorporate site-specific BMPs to maintain the physical, chemical, and biological properties of soils to support desired vegetation conditions and soil-hydrologic functions and processes within the Libby Creek watershed. On a forestwide scale, Alternatives 3 and 4 would be neutral toward achieving this goal.

FW-DC-SOIL-01. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this desired condition. Reclamation activities of soil disturbances in Alternatives 3 and 4 would contribute to making progress toward this desired condition in the long term on portions of the analysis area.

FW-DC-SOIL-02. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this desired condition. No areas with sensitive and highly erodible soils or land types with mass failure potential would be disturbed in Alternatives 3 and 4. They would be neutral toward achieving this desired condition.

FW-DC-SOIL-03. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this desired condition. All vegetation removal in Alternatives 3 and 4 would be done in accordance with the Vegetation Removal and Disposition Plan; vegetation and suitable soils would be temporarily stockpiled adjacent to the roads for use in subsequent reclamation activities. MMC would use KNF methods to document the extent of detrimental soil disturbance before and after geotechnical investigations were completed. Detrimental soil disturbance would not exceed 15 percent. Reclamation activities of soil disturbances in Alternatives 3 and 4 would contribute to making progress toward this desired condition in the long term on portions of the analysis area.

FW-DC-SOIL-04. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this desired condition. Reclamation activities of soil disturbances in Alternatives 3 and 4 would contribute to making progress toward this desired condition in the long term on portions of the analysis area.

FW-GDL-SOIL-01. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this guideline. Operation of all ground-based equipment in Alternatives 3 and 4 would be on slopes less than 40 percent to avoid detrimental soil disturbance. Alternatives 3 and 4 would comply with this guideline.

FW-GDL-SOIL-03. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this guideline. No nutrient-limited land types would be disturbed in Alternatives 3 and 4. They would be neutral toward achieving this guideline.

FW-GDL-SOIL-04. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this guideline. No ground-disturbing activities on landslide-prone areas would occur in Alternatives 3 and 4. Alternatives 3 and 4 would comply with this guideline.

FW-GDL-SOIL-05. No additional disturbance of National Forest System lands would occur in Alternative 2, and it would be neutral toward achieving this guideline. Project-specific BMPs would be incorporated into Alternatives 3 and 4. Alternatives 3 and 4 would comply with this guideline.

3.19.4.7 Irreversible and Irretrievable Commitments

Some soil would be irreversibly lost under all action alternatives from road use and in Alternatives 3 and 4 from road construction.

3.19.4.8 Short-Term Uses and Long-Term Productivity

Soil losses due to erosion would be short-term and would return to natural rates once vegetation was reestablished and stabilized reclaimed areas, in about 3 to 5 years after reclamation. Decreases in soil productivity would be long-term in all reclaimed areas.

3.19.4.9 Unavoidable Adverse Environmental Effects

Loss of soil development in the area would occur in all action alternatives. Soil erosion to some degree would occur under all action alternatives, even with implementation of proposed mitigation measures. Loss of soil productivity would be unavoidable in Alternatives 3 and 4 where soil was removed, stored, and replaced.

3.20 Sound

3.20.1 Regulatory Framework

Noise is generally defined as unwanted sound and can be intermittent or continuous, stationary, or transient. Noise levels heard by humans and animals depend on several variables, including distance and ground cover between the source and receiver and atmospheric conditions. Noise can influence humans or wildlife by interfering with normal activities or diminishing the quality of the environment. Noise levels are quantified using units of A-weighted decibels (dBA). The dBA scale begins at zero—the sound intensity at which sound becomes audible to a young person with normal hearing. Each 10 dBA increase in sound approximates a doubling in loudness, so that 60 dBA is twice as loud as 50 dBA. People generally have difficulty detecting sound level differences of 3 dBA or less.

No federal, KNF, or county regulations govern noise levels in the analysis area (Big Sky Acoustics 2006). Federal guidance for noise is described in the JFEIS. The requirements of MDT's traffic noise analysis and abatement policy (MDT 2016) apply to all projects in Montana that receive federal-aid funds or are otherwise subject to federal approval. MDT does not currently extend the federal noise regulations to projects that are 100 percent state funded, nor does MDT have authority over locally funded projects (MDT 2016). No modifications to US 2 would occur, and MDT's traffic noise analysis and abatement policy does not apply. A transmission line would not be constructed, and electric fields, magnetic fields, and television and radio reception would not be affected.

3.20.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and sound levels in the Fisher River watershed would not be affected.

3.20.3 Affected Environment

Existing sound levels that may be affected by Project activities are described in JFEIS Section 3.20.3.1, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on sound levels in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.20.4 Environmental Consequences

3.20.4.1 Alternative 1

The analysis area would continue to have quiet sound levels characteristic of rural areas and wilderness lands. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. In Alternative 1, noise

associated with MMC's use of Libby Creek Road and Upper Libby Creek Road would continue until the site was reclaimed and the bond released. Noise levels at the Libby Adit Site would be slightly higher during site reclamation. The noise levels are predicted to reach the existing ambient daytime noise level of 30 dBA at 3.3 miles from the Libby Adit Site. Noise levels at the Libby Creek Recreational Gold Panning Area would range from 35 to 45 dBA (Big Sky Acoustics 2015). After the site was reclaimed, sound levels would return to existing conditions.

3.20.4.2 Alternative 2

Existing noise sources at the Libby Adit Site, such a ventilation fans and vehicular traffic, would continue. Increased activity, such as use of heavy equipment to expand the waste rock storage areas and increased traffic, would slightly increase noise levels in the area surrounding the Libby Adit Site. Noise produced by diesel-powered equipment typically is 85 dBA at a distance of 50 feet from the equipment. The noise levels are predicted to reach the existing ambient daytime noise level of 30 dBA at 3.3 miles from the Libby Adit Site. Noise levels at the Libby Creek Recreational Gold Panning Area would range from 35 to 45 dBA (Big Sky Acoustics 2015). Equipment noise can vary considerably depending on age, condition, manufacturer, use during a time period, and a changing distance from the equipment to a listener location. To minimize equipment noise, MMC would supplement backup beepers on surface equipment with strobe-light type warning devices, and the sound level of the backup beepers would be reduced to the minimum level necessary to comply with safety regulations. After the Libby Adit Site was reclaimed and closed, noise levels at the Libby Adit Site and the Libby Creek Recreational Gold Panning Area would return to existing conditions.

Underground blasting more than 14,000 feet from the Libby Adit portal would occur periodically after the Libby Adit was completely dewatered and rehabilitated. Blasting would cease after the adit extension and drift development was completed. Noise from blasting the adit extension and drifts probably would not be audible at the surface of the Libby Adit Site (Big Sky Acoustics 2006).

Residences and users of private land along Libby Creek Road would experience slightly increased traffic noise. Noise levels would return to current conditions after the underground activities were completed. Activity at the Libby Adit Site would continue until the adit was plugged. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. These activities would increase ambient noise levels near the adit. After the site was reclaimed, sound levels would return to existing conditions. MMC did not propose geotechnical investigations or access changes, and noise levels in the areas used for these activities would remain the same.

3.20.4.3 Alternative 3

Noise sources and general magnitude of effects at the Libby Adit Site and along Libby Creek Road in Alternative 3 would be similar to Alternative 2. Expanding the existing waste rock storage area, constructing a new storage area, and constructing an expanded waste rock sump would have a similar but slightly longer effect on noise levels at the Libby Adit Site as Alternative 2. The design features would minimize noise effects from the Libby Adit Site. The effect on noise levels during and after closure of the Libby Adit and reclamation of the site would be the same as Alternative 2.

Increased noise from road construction and drilling would occur in the geotechnical investigation area, between Poorman Creek and Little Cherry Creek. The noise produced by diesel-powered equipment typically is 85 dBA at a distance of 50 feet from the equipment. Noise levels typically decrease by about 6 dBA every time the distance between the source and receptor is doubled, depending on the characteristics of the source and the conditions over the path that the noise travels. The distance from the closest drill hole to private property is 900 feet. Outdoor users of private property east of the geotechnical investigation area would experience noise levels between 55 and 60 dBA and would perceive a substantial increase in noise levels from ambient levels. The design features would minimize noise effects from the geotechnical investigation area. At the end of the 12-week geotechnical investigation, noise levels would return to existing conditions.

Mitigation activities, such as culvert removals and other activities associated with access changes, would have a minor short-term effect on sound levels. The noise produced by diesel-powered equipment typically is 85 dBA at a distance of 50 feet from the equipment. After mitigation activities were completed, noise levels would return to existing conditions.

3.20.4.4 Alternative 4

The effects of Alternative 4 on sound levels at the Libby Adit Site and along Libby Creek Road would be the same as Alternative 3. The distance from the closest drill hole to private property would be 2,500 feet. The effects of the geotechnical investigations and mitigation activities on sound levels would be similar to Alternative 3.

3.20.4.5 Cumulative Effects

The cumulative effects of the alternatives on sound levels are described in the JFEIS.

3.20.4.6 Regulatory/Forest Plan Consistency

No federal, KNF, or county regulations govern noise levels in the analysis area.

3.20.4.7 Irreversible and Irretrievable Commitments

The quiet sound levels characteristic of the analysis area would be irretrievably lost. Sound levels would return to existing levels after reclamation of the Libby Adit Site.

3.20.4.8 Short-Term Uses and Long-Term Productivity

Elevated noise levels in all action alternatives would cease at Libby Adit Site closure and would be a short-term use of the existing environment. Long-term productivity would not be affected.

3.20.4.9 Unavoidable Adverse Environmental Effects

Elevated noise levels in upper Libby Creek would occur at the Libby Adit Site, at the Libby Creek Recreational Gold Panning Area, and along Libby Creek Road in all alternatives. Increased noise levels during the 12-week geotechnical investigations would be unavoidable. After the Libby Adit Site was reclaimed and closed and the geotechnical investigations completed, noise levels at the Libby Adit Site and the Libby Creek Recreational Gold Panning Area would return to existing conditions.

3.21 Transportation

3.21.1 Regulatory Framework

3.21.1.1 Forest Service Requirements

Federal requirements under the Forest Transportation System (36 CFR 212), the Forest Service Travel Management Policy FSM Chapter 7700 (2010c), and the Forest Service's locatable minerals regulations (36 CFR 228.8) are described in the JFEIS. In 2015, the USDA amended its travel management rule to require designation of roads, trails, and areas on National Forest System lands to provide for over-snow vehicle use (36 CFR 212, Subpart C). An over-snow vehicle is defined as "a motor vehicle that is designed for use over snow and that runs on a track and/or a ski or skis, while in use over snow." The KNF established a system of routes and areas to provide for over-snow vehicle use. The regulations will continue to exempt over-snow vehicle use from the travel management rule, which provides for designation of a system of routes and areas for other types of motor vehicle use.

The KFP direction considered in the analysis of transportation is:

> **FW-DC-AR-07.** A transportation system is in place that provides safe and efficient public and administrative access to the Forest for recreation, special uses, forest resource management, and fire management activities. It is efficiently maintained, environmentally compatible, and responsive to public needs and desires. The transportation system and its use have minimal impacts on resources including threatened and endangered species, sensitive species, heritage and cultural sites, watersheds, and aquatic species. Newly constructed or reconstructed roads do not encroach into streams and riparian areas in ways that impact channel function, geometry, or sediment delivery. Roads in intermittent stored service pose minimal risks to water quality and aquatic ecosystems. Drainage structures have a minimal risk of failure, and provide adequate drainage that prevents accelerated runoff, erosion, and sediment delivery to streams. In addition, stream crossings provide for passage of aquatic organisms. Unauthorized roads and trails are no longer created.

KFP standards and guidelines establish stream, wetland, and landslide-prone area protection zones called RHCAs, and set standards and guidelines for managing activities that potentially affect conditions within the RHCAs. Direction for inland native fish and RHCAs is discussed in Section 3.6, *Aquatic Life and Fisheries*.

3.21.1.2 State Requirements

US 2 is a federal highway owned and maintained by the MDT. Related state requirements are described in the JFEIS.

3.21.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads used for access, and locations where the KNF would change road access. Except as described in the following section, methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and transportation in the Fisher River watershed would not be affected.

3.21.3 Affected Environment

The transportation resource consists of a network of roadways that would be used during Project activities. Except as described in this section, the transportation resources that may be affected by the Project (US 2, NFS road #231, NFS road #2316, NFS road #278, and other National Forest System roads) are described in JFEIS Section 3.21.3, *Affected Environment*. For all action alternatives, MMC would use Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) as the primary year-round access to the surface facilities at the Libby Adit Site. MMC would snowplow these roads to provide winter access to the Libby Adit Site from US 2. MMC would maintain a gate on Libby Creek Road, and the KNF would seasonally restrict access on the two roads for the duration of the Project. Access to the geotechnical investigation area from US 2 would be via Libby Creek Road and then Bear Creek Road (NFS road #278), Little Cherry Creek Loop Road (NFS road # 6212), and short spur roads (Figure 309 and Figure 311).

3.21.3.1 US 2

US 2 is a Non-Interstate National Highway and the northernmost U.S. highway. It provides access for eastbound and westbound travel across the continental United States. In Montana, the MDT classifies US 2 as a principle arterial. Average annual daily traffic along US 2 near the intersection of US 2 and NFS road #278 (Bear Creek Road) from 2002 through 2016 ranged from 1,740 vehicles per day in 2002 to 1,873 vehicles per day in 2016 (MDT 2018), for an average annual growth of 0.5 percent over the 15-year period.

3.21.3.2 NFS Road #231 (Libby Creek Road)

Libby Creek Road intersects US 2 at milepost 42.0, 9.3 miles southeast of Libby. It functions as a recreational road providing access to the KNF. The Forest Service does not post speed limits on the road. Lincoln County owns two segments of Libby Creek Road that would be used in all action alternatives: a 0.7-mile segment beginning at the northern intersection with US 2, and a 2.8-mile segment from the intersection with Bear Creek Road south to the intersection of NFS road #4779 near Howard Creek. The remainder of Libby Creek Road is owned by the Forest Service. The KNF holds easements for those segments that cross private or state land.

Since approval of a temporary closure order in 2007 (KNF 2007a), Libby Creek Road between milepost 8.5 and milepost 10 has been seasonally restricted each year to all motor vehicles, including over-snow vehicles, except MMC traffic, from April 1 to May 15. A gate is located just below the Libby Adit Site. MMC plows portions of Libby Creek Road and Upper Libby Creek Road in the winter to provide access to the Libby Adit Site from US 2.

Traffic levels on Libby Creek Road were described in Attachment 9 of the KNF ROD. Traffic levels on Libby Creek Road were based on estimates in 1990 and 1991 (Marcoe 2015), which increased by 1.2 percent annually. For analysis purposes, the KNF assumed the Project would occur between 2020 and 2025. The KNF estimated average annual traffic of 49,166 vehicles in 2020 and 52,188 vehicles in 2025.

3.21.3.3 NFS Road #278 (Bear Creek Road)

Bear Creek Road intersects US 2 at milepost 39.7, 7.0 miles east of the Libby city limit boundary. It functions primarily as a recreational road, providing access to the KNF. For the JFEIS, yearly traffic volumes from 1986 through 1991 were supplied by the KNF. MDT measured average

annual daily traffic on Bear Creek Road 0.2 mile west of US 2 in 2013 (MDT 2018). Average annual daily traffic was 80 vehicles, 5 percent less than reported in the JFEIS.

3.21.4 Environmental Consequences

In the SEIS, the analysis period is 5 years, which includes Project activities (18 to 24 months) and reclamation associated with Project activities (up to 3 years). Although the actual timeline for these activities may change from the timeline proposed, the magnitude and duration of the effects of Project-related traffic on the transportation system would remain nearly the same.

This section discusses the effects on roadway level of service (LOS) and safety. Effects on public access in the analysis area are discussed in Section 3.16, *Recreation*.

3.21.4.1 Congestion

3.21.4.1.1 Alternative 1

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Any traffic and congestion associated with activities at the Libby Adit Site would remain until the site was reclaimed in accordance with Operating Permit No. 00150. Traffic and congestion probably would increase slightly during site reclamation and decrease from current conditions after the site reclamation was completed and site monitoring ceased.

3.21.4.1.2 Alternative 2

The low volume of traffic generated by Project activities would not adversely affect the operation of US 2. Alternative 2 Project activities would generate more vehicles per day on US 2 than in Alternative 3 as there would be no limitations on the use of personal vehicles. During dewatering and adit rehabilitation, MMC would employ 6 to 10 employees at the Libby Adit Site, working two 10-hour shifts 7 days per week. During drift development and drilling, MMC would employ 30 to 35 people at the Libby Site, working 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. This analysis assumes 20 trips per day during adit dewatering and 70 trips per day during drift development based on numbers of employees during these Project activities. US 2 would continue to function as described in the JFEIS. The US 2/Libby Creek Road intersection would remain similar to current conditions with the addition of Project-related traffic to the existing traffic entering US 2 from Libby Creek Road.

In all action alternatives, MMC would plow and use Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) year-round for the duration of the Project. Plowing in winter would improve winter recreation access to areas off the roads (Table 334), increasing traffic on the two roads and keeping open roads previously closed in the winter. With employees using personal vehicles to access the Libby Adit Site, increased traffic would be higher than in Alternative 3. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 306 and traffic conditions would return to pre-Project conditions.

3.21.4.1.3 Alternative 3

Alternative 3 activities at the Libby Adit Site would be similar to those in Alternative 2, but would have reduced effects on traffic and congestion compared to Alternative 2. Project activities

would generate 10 or fewer additional vehicle trips per day on US 2 as there would be limitations on the use of personal vehicles and employees would be transported to the Libby Adit Site by buses, vans, and pickup trucks. Managers would also be required to carpool to the extent practicable. During the 12-week geotechnical investigations between Poorman Creek and Little Cherry Creek, traffic in the analysis area would be expected to be slightly higher in Alternative 3 than in Alternative 2 for the following reasons: (1) increased use of US 2 and the main access roads (NFS roads #231 and #2316) by contract workers; (2) increased use of county road 1408 and open NFS roads, primarily Little Cherry Loop (NFS road #6212) and Bear Creek Road (NFS road #278), to access the geotechnical investigation site; and (3) reconstruction of existing impassable or closed NFS roads and construction of new access roads to access drilling and testing locations. Geotechnical investigation work would be completed by 6 individuals on-site at any given time working up to 7 days per week, 10 hours per day over a 12-week period. Road use proposed during Alternative 3 geotechnical investigations is described in Section 2.5.4.2.4, *Road Construction or Reconstruction*, and shown on Figure 311 (MMC 2017b). Table 315 in Chapter 2 lists existing impassable or closed roads that would be used for the work. Use of reconstructed and new access roads would be limited to MMC traffic. Increase in daily traffic on Bear Creek Road from Libby Creek Road to the geotechnical investigation area would be 5 percent or less. Traffic on other segments of Bear Creek Road would not be affected. Reconstructed roads would be rehabilitated, and access and traffic levels would return to existing conditions. Without maintenance, the segment of NFS road #1408 used for access would become impassable as trees grew in the roadbed.

Traffic on some NFS roads in the analysis area would be less under either Alternative 3 or 4 than in Alternative 2 due to wildlife mitigation access changes (see Section 2.5.2, *Access and Road Access Changes*). Before starting the Project, three currently open roads would be gated or barriered as part of the KNF's wildlife design features (see Table 309 in Chapter 2; Figure 312). These closures would eliminate motor vehicle access and use, except for over-snow vehicles, reducing recreation-related motor vehicle traffic on NFS roads as compared to Alternative 2.

In Alternatives 3 and 4, MMC would implement a Transportation Plan and a Road Management Plan during the Project. MMC also would implement and maintain the BMPs shown in Table 311 in Chapter 2, such as installing, replacing, or upgrading culverts, to bring NFS road #231 up to KFP standards and guidelines and Forest Service guidance (USDA Forest Service 2008, 2015a).

After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 309 and traffic conditions would return to pre-Project conditions.

Effectiveness of the KNF's Proposed Mitigation

Implementing BMPs and developing and implementing a Transportation Plan and a Road Management Plan would be effective in minimizing Project-related traffic and indirect environmental effects, such as sediment impacts on streams and RHCAs (see discussions under *Water Quality* in Section 3.13.4, *Environmental Consequences*, and under *Aquatic Life and Fisheries* in Section 3.6.4, *Environmental Consequences*). Creation of a supply staging area in Libby and consolidating shipments to the Libby Adit Site consistent with the Transportation Plan would slightly reduce traffic from that estimated for Alternative 2. Access changes for wildlife mitigation would lead to reduced traffic on some NFS roads in the analysis area.

3.21.4.1.4 Alternative 4

Alternative 4 would have similar effects on traffic and congestion as Alternative 3. The period necessary for completion of geotechnical investigations would be 4 weeks instead of the 12 weeks needed in Alternative 3. Road use, reconstruction, and construction for Alternative 4 geotechnical investigations would be less extensive than in Alternative 3 and confined to a smaller area (Figure 316). Existing impassable or closed roads proposed for use during the Alternative 4 geotechnical investigations are listed in Table 317 in Chapter 2.

3.21.4.2 Safety

3.21.4.2.1 Alternative 1

Alternative 1 would have no impact on safety in the analysis area. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Any safety impacts associated with activities at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150.

3.21.4.2.2 Alternative 2

The low volume of traffic generated by Project activities would not adversely affect safety on US 2; however, Alternative 2 Project activities would generate more vehicles per day on US 2 than under Alternative 3. Project activities likely would not impact accident rates on US 2.

The addition of Project-related traffic to the existing traffic entering US 2 from Libby Creek Road would not affect the LOS on the road, which is a measure of the amount of traffic congestion on a roadway for a particular volume of traffic. The current LOS B, which represents minimal congestion for peak hour traffic, would remain. Libby Creek Road is a public approach to US 2. The intersection meets current MDT sight distance requirements for left- and right-turning vehicles from Libby Creek Road onto US 2. It also meets the stopping sight distance requirements for vehicles turning from US 2 onto Libby Creek Road.

On Libby Creek Road, no accident data are available to calculate the anticipated number of accidents due to the increase in traffic from Project activities.

3.21.4.2.3 Alternative 3 and Alternative 4

Alternatives 3 and 4 would have a reduced effect on the number of accidents on US 2 and Libby Creek Road compared to Alternative 2 due to implementation of the Transportation Plan and limitations on personal vehicle use. The risk of accidents may be slightly higher during the period when geotechnical investigations were being completed. The number of accidents on Bear Creek Road would not change.

MMC would implement before starting the Project and maintain the BMPs shown in Table 311 in Chapter 2, such as installing, replacing, or upgrading culverts, to bring NFS road #231 up to KFP standards and guidelines and Forest Service guidance (USDA Forest Service 2008, 2015a). MMC also would implement and maintain BMPs on roads required to be closed or stabilized for wildlife mitigation. Such BMPs would improve road safety compared to Alternative 2.

Effectiveness of the KNF's Proposed Mitigation

Implementing BMPs and developing and implementing a Transportation Plan and a Road Management Plan would be effective in minimizing Project-related traffic and indirect

environmental effects. Creation of a supply staging area in Libby and consolidating shipments to the Libby Adit Site consistent with the Transportation Plan would slightly reduce traffic from that estimated for Alternative 2.

3.21.4.3 Cumulative Effects

MDT completed multiple projects on US 2 south of Libby over the past 5 years. The most recent project, Swamp Creek East, was completed in May 2018 (MDT 2017). Other cumulative effects of the alternatives on transportation are described in the JFEIS.

3.21.4.4 Regulatory/Forest Plan Consistency

All action alternatives would make progress toward the KFP FW-DC-AR-07 and comply with regulations governing the administration of the forest transportation system (36 CFR 212). All roads to be built for the Project would be constructed, maintained, and decommissioned to minimize adverse environmental impact, in accordance with the Forest Service locatable minerals regulations (36 CFR 228.8). Only the minimum number of roads would be constructed to the minimum standard necessary. Compliance with 36 CFR 228.8(f) regarding roads management is discussed in Section 3.6.4.6.4, *National Forest Management Act/Kootenai Forest Plan* (RF-2 through RF-5), beginning on page 118.

3.21.4.5 Irreversible and Irretrievable Commitments

All alternatives would slightly increase traffic on the roadways, thereby increasing the fuel used by vehicles beyond the No Action Alternative. Fuel is a nonrenewable resource; thus, an increase in traffic related to the alternative would result in an irreversible commitment of resources.

3.21.4.6 Short-Term Uses and Long-Term Productivity

Slightly increased traffic congestion and accidents could occur on roads and highways used in the Project and would cease at the end of the closure period.

3.21.4.7 Unavoidable Adverse Environmental Effects

Traffic congestion and accidents may occur on roads and highways used in the Project. Any increased congestion and accidents would cease at the end of the closure period.

3.22 Vegetation

3.22.1 Vegetation Communities

3.22.1.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS. Vegetation goals, desired conditions, and objectives in the KFP, unless specific to vegetation management activities, would apply to the Evaluation Project, and compliance has been documented in the administrative record and relevant vegetation subsections in the SEIS (see Section 3.22.2, *Old-Growth Ecosystems*; Section 3.22.3, *Threatened, Endangered, and Sensitive Plant Species*; Section 3.22.4, *Noxious Weeds*; and Section 3.23, *Wetlands and Other Waters of the U.S.*). Applicable KFP standards and guidelines for vegetation are described in the following SEIS sections:

> FW-GDL-VEG-01 and FW-GDL-VEG-02, which provide KFP direction for old growth, are discussed in Section 3.22.2, *Old-Growth Ecosystems*;
>
> GDL-VEG-07, which provides KFP direction for ESA-listed plant species, is discussed in Section 3.22.3, *Threatened, Endangered, and Sensitive Plant Species*;
>
> FW-GDL-VEG-09, which provides KFP direction for peatland and bogs, is discussed in Section 3.23, *Wetlands and Other Waters of the U.S.*;
>
> FW-GDL-VEG-07, which provides KFP direction for key habitats, is discussed in Section 3.25.2, *Key Habitats (Snags and Woody Debris)*; and
>
> FW-STD-RIP-01, FW-STD-RIP-02, and FW-GDL-RIP-05, which provide KFP direction for inland native fish and RHCAs, are discussed in Section 3.6 Aquatic Life and Fisheries.

Sensitive species are designated by the Regional Forester (FSM 2670.5). FSM 2672.42 directs the Forest Service to conduct a biological evaluation (BE) to analyze impacts on sensitive species. The sensitive species analysis in this document meets the requirements for a BE as outlined in FSM 2672.42. FSM 2670.22 requires that the Forest Service develop and implement management practices to ensure that sensitive species do not become threatened or endangered because of Forest Service actions and maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands. Any decision on the Project cannot result in loss of sensitive species viability or create significant trends toward federal listing (FSM 2670.32). Sensitive plant species identified in the analysis area are the northern beechfern and the crenulated moonwort.

3.22.1.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and vegetation resources in the Fisher River watershed would not be affected.

3.22.1.3 Affected Environment

Vegetation communities that may be affected by Project activities are described in JFEIS Section 3.22.1.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on vegetation communities in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.22.1.4 Environmental Consequences

3.22.1.4.1 Alternative 1

Alternative 1 would not remove or affect any vegetation communities or individual species. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150, except for seed mixtures. MMC intends to use locally sourced seed when possible. MMC may substitute specific species in the final seed mixtures at the Libby Adit Site if approved by DEQ. Regrading and revegetating the site would create areas with similar landscape characteristics to the surrounding area over the long term.

3.22.1.4.2 Alternative 2

No additional ground disturbance would occur in Alternative 2, and no vegetation communities would be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1.

3.22.1.4.3 Alternative 3

Effects on Vegetation Communities

MMC would disturb existing revegetated areas and an existing soil stockpile in the existing 11.6-acre disturbance area at the Libby Adit Site, which is on private land (Figure 310). MMC would create a new soil stockpile at the site. To the extent feasible, soils on currently reclaimed areas would be removed before disturbance and moved to the new soil stockpile. Some soil material would be irretrievable, resulting in less soil available for final reclamation. Because existing revegetated areas would be disturbed, reestablishment of a community with a diversity of plants similar to the original plant community would be delayed. The process of reclaiming the Libby Adit Site would be the same as Alternative 1; the KNF has no authority to regulate activities on the surface of the Libby Adit Site.

Alternative 3 geotechnical investigations would disturb 6.4 acres of vegetation on National Forest System Lands (3.4 acres of previously harvested coniferous forest vegetation communities and 3 acres of mature coniferous forest vegetation communities). Alternative 3 would require some vegetation clearing and removal. Reclamation would reestablish plant communities, but the biodiversity would be less, introduced species would be more common, species composition would not be the same, and timber production would be lost until the seral forest reestablished after several decades. After reclamation of disturbances, a forest can take many years to reestablish a community with a diversity of plants similar to but less than the original plant

community. Competitive introduced species may limit the ability of native grasses and especially forbs to reestablish after the disturbance. Changes to MMC's reclamation plan, such as elimination of nonnative species and modification of soil salvage, handling, and replacement, would facilitate revegetation of disturbed areas, minimize introduced species, and ensure long-term reclamation success of reclaimed areas. Implementation of the Alternative 3 Weed Control Plan would reduce impacts on native vegetation caused by increased weed infestation.

Effectiveness of the KNF's Proposed Mitigation

Implementation of the KNF-approved Vegetation Removal and Disposition Plan, changes to MMC's reclamation plan, elimination of nonnative species, and modification of soil salvage, handling, and replacement would be effective in facilitating revegetation of disturbed areas, minimizing introduced species, and ensuring long-term reclamation success. Revegetation success and recovery time of affected vegetation communities would depend on reclamation stage (interim or post-closure), vegetation community type, proper implementation, and environmental factors such as climate and soil conditions. Implementation of the Alternative 3 Weed Control Plan would reduce impacts on native vegetation caused by increased weed infestation. The reclamation monitoring plan in Appendix C describes measures that would be implemented to assess the effectiveness of reclamation and actions that would be taken if reclamation success criteria were not met. MMC's bond would not be released unless the specified reclamation objectives were met.

3.22.1.4.4 Alternative 4

The effect at the Libby Adit Site would be the same as Alternative 3. Alternative 4 geotechnical investigations would disturb 1.5 acres of vegetation (1.1 acres of coniferous forest and 0.4 acres of previously harvested coniferous forest). Effects, including loss of biodiversity, an increase in introduced species, and a change in species composition, would be similar to Alternative 3.

3.22.1.4.5 Cumulative Effects

The cumulative effects of the alternatives on vegetation resources are described in the JFEIS.

3.22.1.4.6 Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental impacts on National Forest surface resources. Alternative 2 would comply with 36 CFR 228.8 to minimize adverse environmental impacts. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental impacts. These measures include developing and implementing a final Road Management Plan and a Vegetation Removal and Disposition Plan, increasing the salvage and replacement of suitable soil materials for reclamation, and using primarily native species in revegetation.

Kootenai Forest Plan

Vegetation goals, desired conditions, and objectives in the KFP, unless specific to vegetation management activities, would apply to the Evaluation Project. Where the land was being cleared for Project activities, there would be no site-specific movement toward forestwide vegetation goals, desired conditions, and objectives. Considering the disturbance of National Forest System lands by the Project in comparison to forestwide vegetation management practices and natural disturbance processes, Alternatives 3 and 4 would be neutral in regard to progress toward

forestwide KFP vegetation goals and desired conditions and would not prevent attainment of forestwide objectives.

Over the long term, reclaimed plant communities would eventually be reestablished. Planting would follow silvicultural prescriptions designed to address forestwide desired conditions for species composition. Although initial vegetation diversity would be less than the original plant communities, use of local native seed mixes and other mitigation would aid in reclamation consistent with KFP goals and desired conditions. Over the long term, plant communities in the analysis area would trend toward the forestwide desired conditions for composition, structure, patterns, and processes.

3.22.1.4.7 Irreversible and Irretrievable Commitments

Alternatives 1 and 2 would not increase disturbance of vegetation communities. Alternatives 3 and 4 would disturb vegetation communities dominated by native species, most of which would be subsequently mitigated by revegetation. Revegetated areas would eventually return to pre-disturbance productivity, but vegetation diversity would be less than existing conditions. The loss of native plant species and increase in introduced species in all alternatives would be an irreversible resource commitment.

3.22.1.4.8 Short-Term Uses and Long-Term Productivity

Mineral operations for Alternatives 3 and 4 would result in long-term impacts on vegetation communities and productivity. Productivity for forested areas would remain low after reclamation until new timber stands were established. A long-term loss of vegetation diversity from loss of native species would occur for Alternatives 3 and 4. Introduced species cover and production would increase in the disturbed areas.

3.22.1.4.9 Unavoidable Adverse Environmental Effects

An unavoidable loss of native species and species composition would occur in areas affected by geotechnical investigations. Reclamation of disturbed areas after geotechnical investigations would revegetate all disturbed areas to existing forested vegetation production over the long term; vegetation communities would be altered, and not all native species would reestablish. Introduced species would increase. This loss of some native species and increase in introduced species would be unavoidable impacts of mineral operations.

3.22.2 Old-Growth Ecosystems

This section describes vegetative characteristics of old-growth forests and features particularly important to wildlife. The KFP defines old-growth stands as those that meet the definitions in Green et al. 1992 (errata corrected December 2011). In general, old-growth stands are in the late stages of stand development and are distinguished by old trees and related structural attributes. Old growth is recognized for its unique ecological characteristics that serve as important habitat for both wildlife and some species of rare plants on the KNF. Although many wildlife species on the KNF use habitat in old-growth forest for breeding or feeding, no wildlife species are solely dependent on this habitat on the KNF (Castaneda 2004).

3.22.2.1 Regulatory Framework

As described in Section 3.22.1.1, vegetation goals, desired conditions, objectives, standards, and guidelines in the KFP, including those specific to old growth, apply to the Evaluation Project. Applicable KFP old-growth direction is:

> **FW-DC-VEG-03.** The amount of old growth increases at the forestwide scale. At the finer scale of the biophysical setting, old growth amounts increase for the Warm/Dry and Warm/Moist settings while staying close to the current level for the Subalpine setting. Relative to other tree species, there is a greater increase in old growth stands that contain substantial amounts (*i.e.*, 30% or more of the total species composition) of one or more of the following tree species: ponderosa pine, western larch, western white pine, and whitebark pine. Old growth stands are more resistant and resilient to disturbances and stressors such as wildfires, droughts, insects and disease, and potential climate change effects. The size of old growth stands (or patches of multiple contiguous old growth stands) increase and they are well-distributed across the five Geographic Areas on the Forest.
>
> **FW-GDL-VEG-02.** Road construction (permanent or temporary) or other developments should generally be avoided in old growth stands unless access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances.

3.22.2.2 Analysis Area and Methods

The analysis area for evaluating direct, indirect, and cumulative impacts on old growth in the KNF includes the Crazy PSU, which is a watershed-based planning area that encompasses Project activities for all alternatives. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and old growth in the Silverfish PSU would not be affected.

3.22.2.3 Affected Environment

Old-growth forest that may be affected by Project activities is described in JFEIS Section 3.22.2.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on old-growth forest in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.22.2.4 Environmental Consequences

3.22.2.4.1 Alternative 1

Alternative 1 would not affect the current proportion of old growth at either the PSU or forestwide scale. All old-growth areas would maintain their existing conditions and continue to provide habitat for those species that use the area over a long term. In the Crazy PSU, 8,350 acres of old growth would remain.

3.22.2.4.2 Alternative 2

The effect of Alternative 2 on old growth would be the same as Alternative 1.

3.22.2.4.3 Alternative 3

Alternative 3 would affect less than 0.1 acre of old growth in the Crazy PSU where a new access road for the geotechnical investigations would be constructed. The new access road would bisect a patch of old-growth habitat for 165 feet, increasing old-growth habitat fragmentation. This disturbance was necessary to avoid additional impacts on RHCAs. At the PSU scale, Alternative 3 would result in much less than 1 percent loss of old growth in the Crazy PSU. The effect of Alternative 3 on old-growth habitat would be negligible because a small amount would be affected relative to surrounding available old growth and because the road would cross the old-growth patch at an already narrow habitat area with a relatively high proportion of edge. Alternative 3 would not modify the affected stand to the extent that it would no longer meet the definition of old growth.

3.22.2.4.4 Alternative 4

The effect of Alternative 4 on old growth would be the same as Alternatives 1 and 2.

3.22.2.4.5 Cumulative Effects

Past actions, particularly timber harvest, road construction, and fire suppression activities, have altered the old-growth ecosystems in the analysis area, resulting in reductions in early and late succession habitats; conditions favoring shade-tolerant, fire-intolerant species; loss of large snags and down wood; and increases in tree density and a shift to a largely mid-seral structural stage (USDA Forest Service 2003b). Firewood cutting would continue to occur where open roads provide access to old growth, contributing to snag removal. Continuing development of private lands, including timber harvest, home construction, and land clearing, would contribute to losses of old growth in the analysis area but would not affect the proportion of old growth on National Forest System lands. In addition, it is likely that limited amounts of old growth occur on private and state lands, based on past and current harvest practices. Alternative 1, Alternative 2, and Alternative 4 would not contribute to cumulative impacts on old growth. The contribution of Alternative 3 to cumulative effects on old growth would be negligible due to the small amount of habitat affected relative to the surrounding available habitat. The amount of old growth that is predicted to occur across the KNF in the future increases substantially during the next 50 years. In the absence of large-scale dramatic disturbances over the KNF, old-growth amounts should increase in the future due to the large number of acres of forest stands on the KNF that currently meet every old-growth criterion except age, but that will meet the age criterion relatively soon (USDA Forest Service 2013). Phase I of the Rock Creek Project would affect less than 1 acre of old growth along NFS road #150, and no old growth would be affected during Phase II. While the action alternatives would result in some losses and degradation of old growth, the Project and all reasonably foreseeable actions would not substantially reduce the amount of old growth in the Crazy PSU or across the KNF.

3.22.2.4.6 Regulatory/Forest Plan Consistency

The KFP desired condition is to increase old growth at the forestwide scale (FW-DC-VEG-03). Although a small area of old growth would be unavoidably cleared in Alternative 3, none of the alternatives would preclude achievement of the forestwide desired condition over the long term. The amount of old growth that is predicted to occur across the KNF in the future increases substantially during the next 50 years. In the absence of large-scale dramatic disturbances over the KNF, old-growth amounts should increase in the future due to the large number of acres of forest stands on the KNF that currently meet every old-growth criterion except age, but that will meet the age criterion relatively soon (USDA Forest Service 2013).

Alternatives 2 and 4 would be implemented in accordance with guideline FW-GDL-VEG-02. Road construction or other developments in old-growth stands would be avoided. Alternative 3 would generally avoid road construction in old growth and is affective in meeting the intent of the guideline. The less than 0.1 acre of disturbance was necessary to avoid additional impacts on RHCAs.

3.22.2.4.7 Irreversible and Irretrievable Commitments

Alternative 3 would result in an irreversible commitment of less than 0.1 acre of old-growth forest in the Crazy PSU. The recovery time of old-growth forest would preclude restoration for centuries following disturbance (200 to 250 years). Other alternatives would not affect old-growth forest.

3.22.2.4.8 Short-Term Uses and Long-Term Productivity

Losses of old growth resulting from implementation of Alternative 3 would be long-term and would be in the Crazy PSU. Given the recovery time of old-growth forest, direct elimination of effects after disturbance would likely require centuries (200 to 250 years). Other alternatives would not affect old-growth forest.

3.22.2.4.9 Unavoidable Adverse Environmental Effects

Unavoidable adverse effects would occur from Alternative 3 in the Crazy PSU where old-growth forest would be removed. Other alternatives would not affect old-growth forest.

3.22.3 Threatened, Endangered, and Sensitive Plant Species

The KNF monitors plant species considered to be of concern. Plant species of concern are characterized as threatened, endangered, sensitive, or Category 4 watch species. T&E species are species listed by the USFWS and protected under the ESA. Forest Service sensitive species are those species the Regional Forester determines to be a concern on National Forest System lands in the Region due to declining numbers. Plant species listed by the USFWS and protected under the ESA and Forest Service sensitive species listed by the Regional Forester have not changed since the JFEIS.

3.22.3.1 Regulatory Framework

JFEIS Section 3.22.3, *Threatened, Endangered, and Sensitive Plant Species*, discussed the regulatory framework for federally listed T&E plant species and Forest Service sensitive plant species. Applicable KFP direction is:

> **FW-DC-VEG-09.** Habitat for plant species listed under the Endangered Species Act (ESA) is maintained or restored on NFS lands, thus contributing to species recovery or delisting. Ecological conditions and processes that sustain the habitats currently or potentially occupied by sensitive plant species are retained or restored. The geographic distributions of sensitive plant species in the Forest Plan area are maintained.
>
> **FW-GDL-VEG-07.** Evaluate proposed management activities and project areas for the presence of occupied or suitable habitat for any plant species listed under the Endangered Species Act or on the regional sensitive species list. If needed, based on pre-field review, conduct field surveys and provide mitigation or protection to maintain occurrences or habitats that are important for species sustainability.

3.22.3.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and threatened, endangered, and sensitive plant species in the Fisher River watershed would not be affected.

3.22.3.3 Affected Environment

No threatened, endangered, and sensitive plant species would be affected by Project activities. Habitat for sensitive plant species is described in JFEIS Section 3.22.3.3, *Affected Environment*. The Regional Forester last updated the Forest Service sensitive species list for Region 1 in 2011 (USDA Forest Service 2011b). MMC would update surveys for Forest Service sensitive species before any ground-disturbing activities in Alternatives 3 and 4. The survey results would be submitted to the KNF for approval. If sensitive plants were identified and adverse effects could not be avoided, MMC would develop appropriate mitigation plans for the KNF's approval. The mitigation would be implemented before any ground-disturbing activities. To the extent feasible, MMC would adjust disturbance locations and other disturbing activities to reduce impacts.

The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on threatened, endangered, and sensitive plant species in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.22.3.4 Environmental Consequences

3.22.3.4.1 Alternative 1

Alternative 1 would not affect any Forest Service sensitive species. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150.

3.22.3.4.2 Alternative 2

Alternative 2 would not affect any Forest Service sensitive species.

3.22.3.4.3 Alternative 3

Alternative 3 would not affect any Forest Service sensitive species because no sensitive species were identified during field surveys. MMC would update surveys for Forest Service sensitive species before any ground-disturbing activities in Alternatives 3 and 4. If a Forest Service sensitive species was identified and adverse effects could not be avoided, MMC would develop appropriate mitigation plans for the KNF's approval. The mitigation would be implemented before any ground-disturbing activities.

Effectiveness of the KNF's Proposed Mitigation

Updating surveys and developing avoidance and mitigation measures would effectively minimize or mitigate effects on Forest Service sensitive species.

3.22.3.4.4 Alternative 4

The effect on Forest Service sensitive species for Alternative 4 would be the same as Alternative 3.

3.22.3.4.5 Cumulative Effects

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. If the Montanore and Rock Creek projects were approved and implemented, they would not cumulatively affect threatened, endangered, or Forest Service sensitive species. Forest Service sensitive species potentially affected by the Rock Creek Project have not been identified in the Montanore Project analysis area. No other reasonably foreseeable actions would directly impact threatened, endangered, or Forest Service sensitive species.

3.22.3.4.6 Regulatory/Forest Plan Consistency

All alternatives have been designed in compliance with FW-GDL-VEG-07. None of the alternatives would impact individuals or habitat, and none would likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

3.22.3.4.7 Irreversible and Irretrievable Commitments

None of the alternatives would result in an irretrievable or irretrievable commitment of resources.

3.22.3.4.8 Short-Term Uses and Long-Term Productivity

None of the alternatives would affect long-term productivity.

3.22.3.4.9 Unavoidable Adverse Environmental Effects

None of the alternatives would result in an unavoidable adverse environmental effect. Pre-disturbance surveys and development of mitigation for unavoidable impacts in Alternatives 3 and 4 are discussed in Section 2.5.3.2, *Surveys and Plans.*

3.22.4 Noxious Weeds

3.22.4.1 Regulatory Framework

Federal and state requirements regarding noxious weeds under the Federal Plant Protection Act, Executive Order 13112, and the Montana County Weed Control Act are described in the JFEIS. KFP direction does not apply to activities on the Libby Adit Site because it is on private land. As described in Section 3.22.1.1, vegetation goals, desired conditions, objectives, standards, and guidelines in the KFP, including those specific to noxious weeds, apply to the Evaluation Project. Applicable KFP noxious weed species direction is:

> **FW-DC-VEG-10.** Newly invading, non-native invasive plant species are treated and populations are contained or eradicated. The weed program on the Forest uses integrated pest management approaches, including prevention and control measures that limit introduction, intensification, and spread due to management activities. Agreements with

cooperative weed management areas assist control efforts across jurisdictional boundaries.

FW-OBJ-VEG-02. Non-native Invasive Plant Species–Over the life of the Plan, the outcome per decade is:

> All sites that are discovered with newly invading non-native invasive species are treated.
>
> The treatment of approximately 15,000 to 30,000 acres to reduce non-native invasive plant density, infestation size, and/or occurrence (these areas are also included in FW-OBJ-VEG-01).

GA-DC-VEG-LIB-03. Populations of new noxious weed species are treated promptly and eradicated. Established noxious weed infestations are reduced and habitat conditions are improved for native grasses, forbs, and shrubs. Private, county, state, and federal organizations work cooperatively to prevent, control, and manage noxious weed infestations. Weed infestations on big game winter range and in the Cabinet Mountains Wilderness area are emphasized. Established rush skeltonweed sites in the Quartz Creek area are eradicated.

3.22.4.2 Analysis Area and Methods

The analysis area consists of the existing Libby Adit Site, existing roads (Libby Creek Road and Upper Libby Creek Road) used for access, an area between Poorman Creek and Little Cherry Creek used for geotechnical investigations, and locations where the KNF would change road access. The methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and noxious weed distribution in the Fisher River watershed would not be affected.

3.22.4.3 Affected Environment

Noxious weeds found in areas that may be affected by Project activities are described in JFEIS Section 3.22.4.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on noxious weeds in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.22.4.4 Environmental Consequences

3.22.4.4.1 Alternative 1

Introduced species such as cheatgrass and noxious weeds have increased in the analysis area between the time the available vegetation surveys were conducted in 1988 and 1989 and the time they were updated in 2005. This increase would continue in the future with or without Project activities because of the competitiveness of the introduced species. Alternative 1 would not involve new land-disturbing activities and would minimize the increase in number and distribution of introduced species and noxious weeds. Noxious weeds at the Libby Adit Site would continue to be controlled in accordance with the Weed Control Plan approved by the Lincoln County Weed Control District. Noxious weed control using herbicides can cause an indirect effect on adjacent native species ranging from minimal to severe depending on the type

of herbicide and quality of application. Inadequate reseeding efforts to replace native species after treatment cause additional indirect effects on native plant species. Private landowners are not required to control introduced species that are not classified as noxious weeds.

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150.

3.22.4.4.2 Alternative 2

Alternative 2 would have similar effects as Alternative 1. Alternative 2 would not involve new land-disturbing activities and would minimize the increase in number and distribution of introduced species and noxious weeds.

MMC's weed control program would minimize weed infestations at the Libby Adit Site and along the access roads. All off-highway vehicles and earth-moving equipment entering Lincoln County would be washed at a commercial facility. Special emphasis would be taken to remove soil and other plant material from the vehicle or equipment. MMC would notify the KNF at least 24 hours in advance of equipment delivery to the site to provide an opportunity to inspect the equipment. Weed control during Project activities would primarily be through the use of herbicides. Criteria in the reclamation plan for Alternative 2 require that vegetation composition would have less than 10 percent cover of noxious weeds. MMC would not be required to control other introduced species.

3.22.4.4.3 Alternative 3

Weed control at the Libby Adit Site would be the same as Alternatives 1 and 2. KFP direction does not apply to activities on the Libby Adit Site because it is on private land.

With 6.4 acres of disturbance in the geotechnical investigation area, Alternative 3 would have similar potential to increase the infestation and spread of noxious weeds and other introduced species as Alternative 2, although distribution would likely be less. All weed BMPs discussed under Section 2.5.4.1.9, *Weed Control*, in Chapter 2 would be implemented and would reduce the establishment and spread of noxious weeds, compared to Alternative 2. Weed BMPs would address the treatment and control of noxious weeds on all existing and new disturbed areas.

The reclamation plan for reclaimed areas disturbed by geotechnical investigations in Alternative 3 would require that noxious weeds would have less than 10 percent cover of species listed as Category 1 (established infestations) and 0 percent cover of Categories 2 and 3 (potential invaders and new invaders, as described in the KNF Noxious Weed Handbook, Spring 2008, Edition 5.0). Category 1 noxious weeds would not dominate any location greater than 400 square feet. The goal of Alternative 3 would be to use a native seed mix, if commercially available, approved by the KNF and consistent with the KNF-approved 2018 seed mix (Savage 2018) that would reduce the spread of invasive or noxious species. In Alternative 3, shrubs and trees would be planted by hand in random patterns to prevent the spread or infestation of noxious weeds by limiting disturbance from machinery. MMC would not be required to control other introduced species.

Effectiveness of the KNF's Proposed Mitigation

The KNF's modifications to MMC's weed control program would be effective in minimizing weed infestations on lands disturbed by the facilities.

3.22.4.4.4 Alternative 4

Weed control at the Libby Adit Site would be the same as Alternatives 1 and 2. With 1.5 acres of disturbance, Alternative 4 would have the same potential to result in the establishment and spread of noxious weeds and other introduced species as described for Alternatives 2 and 3. The reclamation and weed management plans for Alternative 4 would be the same as Alternative 3.

3.22.4.4.5 Cumulative Effects

Past actions, particularly timber harvest, road construction, and fire suppression, coupled with human activity have resulted in the establishment of the existing noxious weed and other introduced species populations in the analysis area. All reasonably foreseeable future projects in the area that involve ground disturbances have the potential to spread and increase the number of noxious weeds and other introduced species. Any ground-disturbing activities, activities that involve large equipment, livestock grazing, or activities that increase motor access could increase the spread of noxious weeds or introduce new invaders to the area. Noxious weed and other introduced species infestations could impact sensitive plant species. The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. If the Montanore and Rock Creek projects were approved and implemented, construction of both projects would increase the opportunity for noxious weeds to invade the CMW from the east and west. All reasonably foreseeable actions would be subject to existing Forest Service, state, and county-wide management practices, which have proved effective in slowing the spread of targeted noxious weeds. Native species are also affected by chemical weed control programs. The Forest Service and other land managers and owners are not required to control other introduced species.

3.22.4.4.6 Regulatory/Forest Plan Consistency

Alternative 2 would comply with Executive Order 13112 and the Montana County Weed Control Act. KFP direction does not apply to activities on the Libby Adit Site because it is on private land. In Alternatives 3 and 4, all weed BMPs discussed under Section 2.5.4.1.9, *Weed Control*, in Chapter 2 would be implemented and would reduce the establishment and spread of noxious weeds on all facilities. Alternatives 3 and 4 would improve the trend toward the forestwide and Libby Geographic Area desired conditions (FW-DC-VEG-10 and GA-DC-VEG-LIB-03) and objectives (FW-OBJ-VEG-02).

3.22.4.4.7 Irreversible and Irretrievable Commitments

All alternatives have the potential to increase noxious weed and other introduced species populations, which would displace native species and result in an irreversible loss of plant species. Chemical weed control programs also would limit native species.

3.22.4.4.8 Short-Term Uses and Long-Term Productivity

All alternatives have the potential to increase noxious weed and other introduced species populations, which would displace native species and reduce their long-term productivity. Chemical weed control programs also would limit native species' productivity.

3.22.4.4.9 Unavoidable Adverse Environmental Effects

A potential unavoidable increase in noxious weed and other introduced species populations would occur under all alternatives. Invasion of noxious weeds and other introduced species as well as spraying of noxious weeds with chemicals would result in the loss of some native plant species.

3.23 Wetlands and Other Waters of the U.S.

3.23.1 Regulatory Framework

Discharges of dredged or fill material into waters of the U.S. are regulated under Section 404 of the Clean Water Act by the Corps. Waters of the U.S. are defined broadly in the Corps' regulations to include a wide variety of waters and wetlands. All water bodies in the analysis area are State waters. The Corps defines "wetlands" as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328.3 (b)). Under natural conditions, waters of the U.S. provide food and habitat for fish and wildlife, flood protection, erosion control, water quality improvement, and opportunities for recreation (Adamus et al. 1991). The term "wetlands and other waters of the U.S." includes both deep-water habitats (non-wetland) and special aquatic sites, which include wetlands (Environmental Laboratory 1987). Federal requirements under Section 404 of the Clean Water Act are described in the JFEIS.

A 404 permit from the Corps may be needed for Project activities, such as culvert replacements; such activities may be eligible for a Nationwide Permit. Depending on the extent of the activities, compensatory wetland mitigation may be needed. If needed, compensatory mitigation would need to comply with the Corps and the EPA regulations (33 CFR 332 and 40 CFR 230 Subpart J) regarding compensatory mitigation requirements for losses of aquatic resources. As stated in 33 CFR 320.4(r), "all compensatory mitigation will be for significant resource losses which are specifically identifiable, reasonably likely to occur, and of importance to the human or aquatic environment. Also, all mitigation will be directly related to the impacts of the proposal, appropriate to the scope and degree of those impacts, and reasonably enforceable." Activities subject to the Corps' jurisdiction also must comply with the 404(b)(1) Guidelines for discharge of dredged and fill material into wetlands and other waters of the U.S. (40 CFR 230). The 404(b)(1) Guidelines and their applicability are described in the JFEIS.

Federal agencies, such as the KNF, have responsibilities to avoid, minimize, and mitigate unavoidable impacts on wetlands under Executive Order 11990. Requirements of the Executive Order are described in the JFEIS.

The KFP includes the INFS, which establishes management direction for wetlands. KFP standards and guidelines apply to an area within 150 feet of a wetland greater than 1 acre in size. For a wetland less than 1 acre, KFP standards and guidelines apply to an area within 100 feet of a wetland. Direction for inland native fish and RHCAs is discussed in Section 3.6, *Aquatic Life and Fisheries*. Other applicable KFP direction includes the following:

> **FW-DC-VEG-12.** Peatlands support natural unique plant and animal communities and provide habitat for rare plant and animal species. Peatland waterflows, water quality, water chemistry, soil, organic substrate, and plant communities function under conditions characteristic of how they evolved. Upland areas surrounding peatlands that have the most direct influence on peatland characteristics, and stream segments that flow directly into peatlands, are managed to sustain the natural characteristics and diversity of those peatlands.

FW-GDL-VEG-09. Peatlands/bogs should be buffered by at least 660 feet from management activities that may degrade this habitat.

In Montana, surface water is any water of the State at the surface of the ground, including but not limited to any river, stream, creek, ravine, coulee, undeveloped spring, lake, or other natural surface source of water regardless of its character or manner of occurrence (ARM 36.12.101(74)). Montana requirements pursuant to the Clean Water Act are described in the *Surface Water Hydrology* section.

3.23.2 Analysis Area and Methods

The analysis area is where potential direct, indirect, or cumulative effects on wetlands and other waters of the U.S. from any of the alternatives would occur. The analysis area is the same as the analysis area used for surface water hydrology (discussed in Section 3.11.2, *Analysis Area and Methods*). Except as described below, methods for data collection and impact analysis are the same as described in the JFEIS. A transmission line would not be constructed, and wetlands and waters of the U.S. in the Fisher River watershed would not be affected.

In 2014, MMC completed a wetland delineation along Libby Creek Road from US 2 to its intersection with Bear Creek Road (Respec 2014) and a stream crossing survey of the same area (Kline Environmental Research 2014). The wetland delineation followed Corps methods (Environmental Laboratory 1987; Corps 2010). The stream crossing survey characterized discharge, field water quality parameters, and wetted and bankfull dimensions.

In 2013, MMC inventoried and characterized four areas for GDEs: upper Libby Creek drainage and Libby lakes basin, upper Ramsey Creek drainage and Ramsey Lake, upper East Fork Bull River drainage and Saint Paul Lake, and upper East Fork Rock Creek drainage and Rock Lake. Specific areas inspected on foot were selected based on a review of aerial photography and Light Detection and Ranging (LiDAR) maps, and on previous GDE field inspections (MMC 2014b). The work involved identifying additional GDEs in the four areas, measuring spring and stream flows and installing continuous streamflow monitors at selected locations, and sampling streams and springs for characterization. The results of the inventory were described briefly in the JFEIS. The results are described in more detail in the 2013 GDE inventory report (MMC 2014b).

MMC continues to monitor flow, water quality, and plant composition at four GDE sites (GDE sites 1 through 4) (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). Monitoring at GDE-4 began in 2009 and at GDE-1 through GDE-3 in 2013. MMC conducted a vegetation survey of the GDE sites in 2016 using the Forest Service GDE Level II Protocol (USDA Forest Service 2012b). The wetland indicator status of each identified species was determined, and a prevalence index, which is used by the Corps as an indicator of wetland vegetation (Corps 2010), was calculated. The community is hydrophytic (growing either partly or totally submerged in water) if the prevalence index is 3.0 or less. A lower prevalence index indicates the plant community contains more species that require moist soils.

3.23.3 Affected Environment

3.23.3.1 Wetlands and Streams

Except as described in this section, wetlands and streams in the analysis area that may be affected by Project activities are described in JFEIS Section 3.23.3, *Affected Environment*. Wetlands in the

geotechnical investigation area (Alternatives 3 and 4) are shown on Figure 318. These wetlands are described in JFEIS Section 3.23.3.

3.23.3.1.1 Wetlands and Streams along Libby Creek Road

Five wetlands were identified in the area surveyed along Libby Creek Road. One wetland was found at the Hoodoo Creek crossing, and another small wetland adjacent to the road was fed by spring seeps in the steep hillside above the roadway. The remaining three wetlands were found in roadside ditches (Respec 2014). The stream crossing survey identified 27 locations that had flowing water or evidence of flowing water that was sufficient to form a bed and banks near a culvert (Kline Environmental Research 2014). The Corps has not made a jurisdictional determination of wetlands and streams identified in the area surveyed along Libby Creek Road.

3.23.3.1.2 Groundwater-Dependent Ecosystems overlying the Mine Area

The following descriptions of the GDEs overlying the mine area are based on the 2016 and 2017 GDE monitoring (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). At GDE-1 near lower Libby Lake, wetlands are supported by four separate seeps. Seeps A and D contained the highest amount of moss cover likely due to the close proximity of the lake and prolonged wet conditions. Common hydrophyte species observed in all stations consisted of black alpine sedge, arrow-leaved groundsel, alpine and fringed willowherbs, and Scandinavian sedge. Lady fern was only found in the higher-elevation seeps (B and C) with higher prevalence in seep B. The average prevalence index value of all four sites was 2.63 in 2016 and 2.65 in 2017.

GDE-2 is in an upper East Fork Bull River tributary drainage and is a large seep/pond/wetland complex. In 2013, MMC identified five seeps and six pools throughout the complex. In 2016, MMC chose three representative GDE seeps for surveying; due to snowy conditions and time constraints, one was mapped but was not fully surveyed. In 2017, four representative GDE seeps were inventoried. Black alpine sedge, showy sedge, and Drummond's rush were the dominant species at the seeps inventoried. In 2016, one seep area had a prevalence index of 2.33, and the other seep's prevalence index was 2.21. The average prevalence index of all four sites in 2017 was 2.13.

Located at the headwaters of East Fork Rock Creek above Rock Lake, GDE-3 formed as a seep/spring wetland from multiple small seeps on the adjoining rock wall. Two distinct channels were determined to flow through the GDE area and merge before flowing out of the GDE boundary. Common species found in the GDE include lady fern, arrow-leaved groundsel, black alpine sedge, fringed grass of Parnassus, and western St. John's wort. The prevalence index value was 2.65 in 2016 and 2.58 in 2017.

GDE-4, upstream of the Libby Adit in upper Libby Creek, is the largest of the GDE monitoring sites in the GDE inventory area. GDE-4 has three channels from three originating springs that flow through the GDE area. The three distinct springs are channelized, and hydrophytic species are concentrated adjacent to these channels while upland species are found between channels. The dominant tree species are sitka alder, Engelmann spruce, and subalpine fir. Common understory includes lady fern, bluejoint, Canada violet, and various moss species. The prevalence index was 3.14 in 2016 and 3.09 in 2017, above the value indicating a hydrophytic community. MMC reported the randomized transects tended to overlay upland species more often, which resulted in a higher prevalence index value. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on wetlands and other waters of the U.S. in the analysis area, and to enable the decision

makers to make a reasoned choice among alternatives. Appendix C describes GDE monitoring that would occur. Effects on these resources would be identified through monitoring described in Appendix C. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.23.4 Environmental Consequences

3.23.4.1 Alternative 1

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Any changes of streamflow in Libby Creek above the Libby Adit Site from the partial dewatering of the Libby Adit would continue until groundwater levels recovered after the Libby Adit was plugged. Alternative 1 would not disturb or affect any wetlands or other waters of the U.S.

3.23.4.2 Alternative 2

3.23.4.2.1 Direct Effects

Alternative 2 would have no direct effects on jurisdictional or isolated wetlands. The existing disturbance at the Libby Adit Site is on private land, and no additional disturbance outside of the site's existing disturbance boundary is anticipated. Activities at the Libby Adit Site, including expansion of an existing waste rock storage area, would occur within the existing 11.6-acre disturbance area and would avoid all wetlands and waters of the U.S.

Libby Adit Site Closure

MMC would place two plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two plugs would be near the Libby Adit portal, as discussed in Section 2.4.4.1, *Closure of the Libby Adit and Site Reclamation*. As discussed in Section 3.10.4.2.2, *Libby Adit Site Closure*, the groundwater flow path after adit closure may change because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. Any indirect effects on wetlands, springs, and seeps probably would remain.

3.23.4.2.2 Indirect Effects

NEPA regulations define indirect effects as "effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8). The discussion of indirect effects on wetlands in Alternatives 2, 3, and 4 is consistent with the NEPA definition. Under the 404(b)(1) Guidelines (40 CFR 230.11(h)(1)), "secondary effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Information about secondary effects on aquatic ecosystems shall be considered before the time final section 404 action is taken by permitting authorities." The Corps indicated to the KNF that adit dewatering is not within its scope of analysis. Consequently, the Corps does not require mitigation for indirect effects of dewatering.

Indirect effects on wetlands, springs, and seeps may occur during adit dewatering. The indirect effects on wetlands, spring, and seep habitat overlying the mine area would be the same in all action alternatives and are difficult to predict (see *Groundwater Hydrology* in Section 3.10.4.3.1, *Project Activities*). The reduction in streamflow in the upper watersheds is small, ranging up to 0.02 cfs or 10 gpm. GDEs supported by bedrock-groundwater discharging as seeps and springs would be at the greatest risk. The effect on plant species, functions, and services associated with the affected wetlands, springs, or seeps from a change in water level would be best determined by relating plant species with water abundance and quality for monitoring and evaluation. Continued monitoring, coupled with the GDE Level II Protocol vegetation survey that MMC completed in 2016, would be used in assessing changes in vegetation should flow in seeps and springs identified in the GDEs be reduced. In the upper watershed, wetlands at Rock Creek Meadows would not be indirectly affected by dewatering.

3.23.4.3 Alternative 3

3.23.4.3.1 Direct Effects

Effects on wetlands at the Libby Adit Site would be the same as described for Alternative 2.

Geotechnical Investigations

No jurisdictional wetlands, isolated wetlands, or streams are within the disturbance areas for the Alternatives 3 and 4 geotechnical investigations. MMC would avoid isolated and delineated wetlands and other waters of the U.S. when conducting the geotechnical investigations. Effects on wetlands at the Libby Adit Site would be the same as described for Alternative 2.

Effect of Mitigation Measures

Alternatives 3 and 4 include mitigations related to roads, including snowplowing, road BMPs, and access changes. MMC would plow Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316) year-round during Project activities. Implementing some BMPs listed in Table 311 may require a 404 permit from the Corps. Culverts along all access roads that pose a substantial risk to riparian conditions would be replaced as necessary to comply with KFP standards and guidelines and Forest Service guidance, such as fish passage or conveyance of adequate flows (USDA Forest Service 2008, 2015a). Any work in a RHCA along an access road would be completed in compliance with KFP standards and guidelines. The mitigation may increase sediment delivery to area streams and adjacent wetlands and waters of the U.S. in the short term. Over the long term, the mitigation may increase the function and services of any associated wetlands and would decrease sediment delivery to waters of the U.S.

The Grizzly Bear Mitigation Plan for Alternatives 3 and 4 includes access changes on National Forest System and private roads. Except for a segment of Libby Creek Road from US 2 to Bear Creek Road, wetland delineations along the roads and trails proposed for access changes have not been completed, and work to complete access changes may require a 404 permit from the Corps. MMC would build and maintain gates or barriers on the roads and complete other activities so that the roads would either be removed from service or cause little resource risk if maintenance were not performed on them. In some cases, culverts would be removed; such removals would occur in active stream channels, requiring instream work, structure placement, and fill removal.

MMC would transfer fee title to or place a conservation easement on 742.3 acres of mitigation lands before starting the Project. Habitat enhancement, such as access changes and trail conversions, may be implemented on the mitigation lands. Wetland delineations on mitigation

lands have not been completed, and habitat enhancement work may require a 404 permit from the Corps.

Before implementing these measures, MMC would conduct surveys as necessary in support of a 404 permit, if required for Project activities (see Section 2.5.3.2.3, *Wetlands and Other Waters of the U.S.*). MMC would obtain a 404 permit for any activity that would result in a discharge into a water of the U.S. Mitigation activities may be eligible for authorization under the current Nationwide Permit 44 for Mining Activities (Corps 2017). Other Nationwide Permits may be used to authorize road activities that result in a discharge (such as Nationwide Permit 14 for Linear Transportation Projects) as deemed appropriate by the Corps. DEQ has issued a 401 Certification for Nationwide Permits 14 and 44 (DEQ 2017d).

Libby Adit Site Closure

MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two plugs would be near the Libby Adit portal, as discussed in Section 2.4.4.1, *Closure of the Libby Adit and Site Reclamation*. The effect of Alternative 2 indicated that a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. MMC would update the 3D model within 2 years of completing data collection from underground, assessing if an additional plug was necessary to avoid or minimize permanent effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River. If needed, a plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed (see Section 3.10.4.3.2, *Libby Adit Site Closure*). Although modeling would be used to determine what, if any, effects would be permanent, the KNF anticipates a third plug would ensure that groundwater levels overlying the Libby Adit and drifts, and baseflow in East Fork Rock Creek, the East Fork Bull River, and Libby Creek, would return to existing conditions. Bedrock groundwater-supported wetlands would return to existing conditions.

3.23.4.3.2 Indirect Effects

Indirect effects on wetlands, springs, and seeps may occur during adit dewatering and would be the same in all alternatives. Based on preliminary estimates of hydraulic properties of the bedrock and Rock Lake Fault, underground activities in Alternatives 3 and 4 would be limited to within 300 feet of the Rock Lake Fault and 1,000 feet of Rock Lake to minimize the risk of high water inflow rates and resulting reduction in groundwater levels and surface resources. In Alternative 3, MMC would continue their GDE monitoring in an area overlying the adit and drifts to evaluate indirect wetland effects (see Appendix C). The monitoring would verify the prevalence index values that MMC identified at the GDEs in 2016 and 2017 (Klepfer Mining Services 2017a; MMC and Klepfer Mining Services 2018). The prevalence index would be used to assess changes in vegetation composition and whether a loss of wetland species was occurring. The monitoring would not alter the effect of Alternatives 3 or 4, but would assist in determining whether an impact was occurring and the scale of any impact.

3.23.4.3.3 Effectiveness of the KNF's Proposed Monitoring and Mitigation

Monitoring

The GDE monitoring required for Alternatives 3 and 4 (see Appendix C) would not alter the effect of Alternatives 3 or 4 but would assist in determining whether an impact was occurring and the scale of any impact.

Mitigation

Mitigation of effects on stream baseflow and on Rock Lake, the effectiveness of the mitigations, and the uncertainty associated with each mitigation are discussed in detail in the SEIS in Section 3.10.4.3.3, *Groundwater Model Uncertainty*, and Section 3.10.4.3.4, *Effectiveness of the KNF's Proposed Monitoring and Mitigation*, in the *Groundwater Hydrology* section. Mitigations would include:

- Maintaining buffers around the Rock Lake Fault and Rock Lake where the adit extension and drift development would not occur to reduce the risk of high inflows and excessive impacts on surface flows and the level of Rock Lake. Based on the 3D model results, buffers would be highly effective in minimizing effects on surface water. The benefits would be expected to be similar for wetlands.
- Installing an additional adit plug deep within the Libby Adit to ensure that permanent streamflow effects on East Fork Rock Creek, Rock Lake, and the East Fork Bull River would be eliminated or minimized. The benefits would be expected to be similar for wetlands.

3.23.4.4 Alternative 4

The effects of Alternative 4 would be the same as Alternative 3.

3.23.4.5 Cumulative Effects

Past actions in the analysis area, particularly road construction, have resulted in the placement of culverts and other fill material in streams and adjacent wetlands. Past actions after the passage of the Clean Water Act in 1977 were subject to Section 404 permitting and mitigation requirements.

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Rock Creek's 3D groundwater model predicted that baseflow would not be affected during Phase I Evaluation (Hydrometrics 2014).

Cumulative effects from concurrent development of the Rock Creek Project and the Montanore Project, if they were approved and implemented, are described in the JFEIS. Cumulative direct and indirect effects on waters of the U.S. may result from other reasonably foreseeable actions in the analysis area such as other mineral operations and road construction. All present and reasonably foreseeable future actions requiring a Section 404 permit would be subject to the Corps' permitting and mitigation requirements. Some activities that may result in future effects on waters of the U.S. are exempt from Corps review under Section 404(f), and other activities with minimal effects do not require notification to the Corps for authorization. With appropriate mitigation, cumulative direct wetland effects would be negligible. KNF vegetation management projects would avoid direct effects on waters of the U.S. by maintaining a RHCA buffer around

wetlands and other waters. Typically, proposed activities on National Forest System lands are designed to meet KFP direction. These design features would prohibit timber harvest, including firewood cutting, in RHCAs, thus limiting effects on waters of the U.S. Any activities within the KNF that are not subject to Corps review and that contribute to cumulative effects on waters of the U.S. would be mitigated under Executive Order 11990. Cumulative indirect effects from reasonably foreseeable future actions in the area may include small amounts of increased sedimentation in wetlands from new roads associated with construction and ground-disturbing activities, and projects on private land such as housing development, roads, and logging.

3.23.4.6 Regulatory/Forest Plan Consistency

None of the action alternatives would involve the discharge of fill material or excavation into wetlands or waters of the U.S. If needed for road work or habitat enhancement activities on mitigation lands, MMC would apply for a permit and be required to follow conditions in the Section 404 permit. Such activities may be permitted under a Nationwide Permit. Plans for avoidance, minimization, and mitigation of effects on wetlands would be required before permit issuance.

In compliance with Executive Order 11990, the KNF finds that Alternatives 3 and 4 would include all practicable measures to minimize harm to wetlands. Alternatives 3 and 4 would be in compliance with FW-GDL-VEG-09, and Alternatives 3 and 4 would be neutral in regard to progress toward forestwide KFP desired condition FW-DC-VEG-12.

3.23.4.7 Irreversible and Irretrievable Commitments

After the adit and drifts filled, the total water yield of the region would return to existing conditions. Without mitigation in Alternative 2, the adit and drifts may permanently change the groundwater flow paths from the East Fork Rock Creek watershed toward the East Fork Bull River watershed. Alternative 3 and 4 mitigation would be designed to avoid post-closure changes. The KNF expects that a third adit if required in Alternatives 3 and 4 would avoid a change in the groundwater flow path and an irretrievable commitment of wetlands and streams.

3.23.4.8 Short-Term Uses and Long-Term Productivity

All action alternatives may result in short-term effects on wetlands due to adit dewatering, but effects would be difficult to predict. Over the long term, water availability of this area would not be reduced, and the distribution among the four major drainages would not be altered.

3.23.4.9 Unavoidable Adverse Environmental Effects

The consumptive use of groundwater by the Project would unavoidably reduce the total water yield from this portion of the Cabinet Mountains, potentially affecting wetlands. The anticipated consumptive use would be small relative to the total water yield of the analysis area.

3.24 Wilderness, Roadless Areas, Special Areas, and Wild and Scenic Rivers

3.24.1 Cabinet Mountains Wilderness

3.24.1.1 Regulatory Framework

Federal requirements under the Wilderness Act and Cabinet Mountains Wilderness Management Plan for the 94,272-acre CMW are described in the JFEIS; these requirements are not applicable to state or private lands.

The KFP allocates the CMW to MA1a. MA1a is managed to protect wilderness character as defined in the Wilderness Act and as outlined in the Cabinet Mountains Wilderness Management Plan (USDA Forest Service 2009b). Desired conditions are to allow natural processes to act as the primary forces affecting the composition, structure, and pattern of vegetation; provide nonmotorized and non-mechanized opportunities for exploration, solitude, risk, challenge, and primitive recreation; and provide large, remote areas with little human disturbance to contribute habitats for species with large home ranges such as grizzly bear and mountain goats. The KFP has no specific locatable minerals direction for MA1a, but management direction in the KFP as a whole is subject to valid existing rights and defers to overarching applicable laws and regulations. MMC's mineral rights beneath the CMW are discussed in JFEIS Section 1.3.1, *Mineral Rights*.

3.24.1.2 Analysis Area and Methods

3.24.1.2.1 Analysis Area

The analysis area for direct, indirect, and cumulative effects on wilderness encompasses the CMW south of the ridge separating Big Cherry Creek from Bear Creek (Figure 321). The CMW north of the ridge would not be affected and, consequently, is outside of the analysis area. A transmission line would not be constructed, and no wilderness resources would be affected by a transmission line.

3.24.1.2.2 CMW Baseline Solitude Monitoring

In 2017, the KNF implemented solitude monitoring in the CMW to establish pre-operation baseline information for the Montanore Project and as part of Wilderness Stewardship Performance monitoring (KNF 2017a). The solitude monitoring plan was developed following the protocol in the National Minimum Protocol for Monitoring Outstanding Opportunities for Solitude (USDA Forest Service 2016b).

Locations monitored for solitude in 2017, along with the frequency of monitoring and the Opportunity Class for each location, are shown in Table 344. Six solitude monitoring use areas were monitored in the CMW; three were in the west half of the CMW, and three were in the east half of the CMW. In addition, six special locations were monitored in areas identified for possible increased visibility of Montanore Project disturbances or increased noise from the Evaluation Project and Montanore Project. A total of 74 baseline surveys were completed during 2017. The monitoring surveys used several indicators to measure solitude, including traveling encounters and camp encounters and remoteness from sights and sounds of human activity inside and outside wilderness.

Table 344. Baseline Solitude Monitoring Sites in the CMW.

CMW	Area/Trail Access Number	Opportunity Class	Use Level	Monitoring Completed
West	St. Paul Lake/#646	II	Typical	4 weekdays 6 weekend/holidays
West	Little Ibex Lake Basin/#978	I	Low	5 weekdays 7 weekendsholidays
West	Middle Fork Bull River/#978	II	Low	1 weekend 2 weekdays
West	North Fork Bull River/#972	II	Typical	5 weekdays 5 weekends
West	Chicago Peak/Cliff Lake (no NFS trail)	II/I	Special	1 time
West	Proposed Ventilation Adit for the Rock Creek Project (near Copper Lake)	I	Special	1 time
West	CMW near the Montanore Project's proposed Rock Lake Ventilation Adit site	I	Special	1 time
West	Rock Lake/#935	NA	High	1 weekend
East	Leigh Lake/#132	II	High	9 weekdays 7 weekends
East	Ozette Lake/#302	I	Low	2 weekdays 3 weekend/holidays
East	Sky Lakes Basin/#137 (Flower Creek)	II	Typical	6 weekdays 4 weekends
East	Elephant Peak	I	Special	2 times; sites are close to one another and surveyed as one
East	Bald Eagle Peak	I	Special	
East	Bramlet Lake/#658	I	Special	none

Source: KNF 2018

In Alternatives 3 and 4, CMW Wilderness Stewardship Performance monitoring would be funded, in part, by MMC and conducted every 5 years, or annually as opportunities arise, at the sites used in the 2017 baseline monitoring and listed in Table 344 (see Section 2.5.4.3.2, *Wilderness Stewardship Monitoring*).

3.24.1.2.3 Effects Analysis

Potential direct, indirect, and cumulative effects on the CMW were qualitatively evaluated based on potential effects on wilderness attributes from the proposed activities. Except as described in the following sections, the methods for data collection and impact analysis are the same as described in the JFEIS.

The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on wilderness in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.24.1.3 Affected Environment

Except as described in this section, the existing wilderness character of the CMW and management objectives are described in the JFEIS. The Libby Adit Site is on private land outside of the CMW. The area of geotechnical investigation would be on National Forest System lands outside of the CMW. High levels of road construction to facilitate harvest occurred in the geotechnical investigation area through the 1980s. Most of the roads in the area are gated and may receive some administrative use.

The KNF's 2017 solitude monitoring assessed the number of groups and people encountered by site as a measure of remoteness. The number of people encounters per day varied considerably by use levels. High-use areas averaged 30.4 people encounters per day, typical-use areas averaged 3.5 encounters per day, and low-use areas averaged 0.2 encounters per day. Similar differences were observed for group encounters. The 2017 monitoring validated the opportunity class designations of the survey sites and the information from past visitor registration cards. The solitude monitoring also confirmed that the majority of use in the CMW continues to be day use (KNF 2017a).

As part of the GDE and hydrology monitoring program described in JFEIS Appendix C, MMC has been monitoring 21 sites within the CMW and has installed permanent monitoring equipment at 10 of these sites to mark locations of GDE monitoring and to collect pre-Project hydrologic data (see Figure C-1 in SEIS Appendix C). In 2017, the KNF used the Minimum Requirements Decision Guide (MRDG) to complete a Minimum Requirements Analysis for the permanent installations in the CMW needed for the monitoring (KNF 2017b). The MRDG is a tool to complete a Minimum Requirements Analysis (Arthur Carhart National Wilderness Training Center 2016), which is required under the Wilderness Act (see Appendix C for a description of the MRDG process). Equipment and other man-made objects installed permanently (more than one field season) include the following:

- Transducer data loggers or staff gauges (4- to 6-inch pipes with data logger and staff gage attached) were installed and left on-site at nine locations (EFRC-50, EFRC-100, EFBR-2, EFBR-50, Rock Lake [including a rock bolt], Wanless Lake, Lower Libby Lake, WL-1, and WL-2).
- At a large wetland complex (GDE-4), a piece of metal rebar was installed at one location, and a set of two piezometers (2- to 4-inch pipe) was installed at two locations and left on-site.

3.24.1.4 Environmental Consequences

3.24.1.4.1 Alternative 1

The analysis area would continue to have quiet sound levels characteristic of rural areas and wilderness lands. Existing noise levels would not change. Sounds associated with existing activities at the Libby Adit Site would be audible (at a level below a whisper) within a small portion of the CMW in the upper Libby Creek drainage. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and revised in revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Discharges from the Water Treatment Plant would continue until the adit was plugged. Monitoring wells and other devices installed for monitoring, such as data loggers, would be removed and the area reclaimed. Disturbances at the Libby Adit Site would remain until

reclaimed in accordance with Operating Permit No. 00150. Noise levels in the CMW would return to low, ambient levels when reclamation was completed.

3.24.1.4.2 Alternative 2

None of the action alternatives would physically disturb any lands in the CMW directly, and none of the four wilderness qualities would be directly affected. None of the alternatives would directly affect wilderness character.

The existing disturbance at the Libby Adit Site is on private land, and no additional disturbance outside of the site's existing disturbance boundary is anticipated. Activities at the Libby Adit Site, including expansion of an existing waste rock storage area, would occur within an existing 11.6-acre disturbance.

The experience of wilderness visitors may be affected temporarily by Project activities occurring outside the CMW boundary. Because the wilderness experience is highly personal and individual, the perceived effect would differ among individuals. It is likely that the visual and noise effects of the Project outside the CMW would temporarily reduce the natural quality of the wilderness experience for some individuals in portions of the wilderness. Visitation in the portions of the CMW exposed to sound and visual effects may decrease. Other qualities such as untrammeled, undeveloped, and outstanding opportunities for solitude or a primitive and unconfined type of recreation may also be diminished at some locations in the CMW for visitors while Project activities were occurring. These effects would diminish after reclamation. The following sections describe indirect effects on wilderness character resulting from Alternative 2 Project activities.

Untrammeled

Effects on the untrammeled qualities of the CMW would stem primarily from effects on ecological systems, primarily hydrology, in or adjacent to the wilderness. Groundwater drawdown may indirectly impact aquatic habitat and associated ecological processes in the CMW. The 3D model predicted reductions in baseflow by 0.01 cfs, or 4 to 5 gallons per minute, at the CMW boundary (EFRC-200) at the end of the Project (Table 325). For context, a typical ½-inch, 50-foot household garden hose has a flow rate of 12 gallons per minute. Predicted flow changes are less than what could be measured accurately. Similarly, groundwater flow changes into Rock Lake are predicted to be negligible. Neither a person highly familiar with East Fork Rock Creek nor an average wilderness user would notice reductions in flow or be able to distinguish changes from natural variability. Streamflow changes and effects on Rock Lake would have no impact on bull trout, westslope cutthroat trout, or redband trout. No changes in the flow of the East Fork Bull River in the CMW are predicted. Changes in streamflow in Alternative 2 are discussed in Section 3.10.4.2, *Alternative 2*, in the *Groundwater Hydrology* section and Section 3.11.4.2, *Alternative 2*, in the *Surface Water Hydrology* section. Effects on aquatic life are discussed in Section 3.6.4.2, *Alternative 2*, in the *Aquatic Life and Fisheries* section.

Rock Lake is a popular recreation site in the CMW and is an Opportunity Class 2 area. In all action alternatives, groundwater discharge into Rock Lake would decrease during the Project. The 3D model predicted a small decrease (3 acre-feet per year). The effect on the estimated lake volume of 1,302 acre-feet would be negligible. The effect on lake level and surface area would be very small, less than what can be calculated accurately. The average wilderness user would not perceive predicted reductions in Rock Lake levels or volume.

These direct and indirect impacts on ecological processes inside and adjacent to the wilderness, as described, would not affect the untrammeled quality of the wilderness. The untrammeled quality would continue to appear to have been affected primarily by the forces of nature.

Natural

In Alternative 2, nitrogen deposition rates from the Project would be less than the FLM deposition analysis thresholds at Upper Libby Lake, Lower Libby Lake, and Rock Lake. Sulfur deposition rates are expected to be below the sulfur deposition analysis threshold. Nitrogen and sulfur deposition in Alternative 2 on CMW lakes is discussed in Section 3.4.4.4.3, *Cabinet Mountains Wilderness Impact Assessment*, in the *Air Quality* section and in Section 3.13.4.2, *Alternative 2*, in the *Water Quality* section.

The KNF's analysis concluded that chimney subsidence breaching the surface to form sinkholes is unlikely given the geotechnical setting (thickness of the overlying rock above the underground openings, and the strength of the overlying rock; see Section 3.14.3.1, *Subsidence*).

Existing noise sources at the Libby Adit Site would continue. Increased activity, such as expansion of waste rock storage areas and increased traffic, would slightly increase noise levels in the area surrounding the Libby Adit Site. The predicted noise level on Elephant Peak is expected to be lower than the 25 and 30 dBA predicted for the Montanore Project because of lower activity levels. A typical quiet bedroom at night has a noise level of 30 dBA. The occasional climber of Elephant Peak and other areas along the crest of the Cabinet Mountains may be able to temporarily hear equipment at the Libby Adit Site on a quiet day. Noise levels would return to existing levels in the CMW after reclamation was completed. Natural qualities in the CMW would return to existing conditions. Noise levels are discussed in Section 3.20.4 in the *Sound* section.

Undeveloped

In Alternative 2, Project activities are not proposed in the CMW, and the undeveloped quality of the CMW would not be affected. The CMW would remain essentially without permanent improvements or modern human occupation.

Ongoing monitoring, such as water resources monitoring, required installing some measuring equipment, such as data loggers, in the CMW. Data loggers currently are in lakes (Rock Lake, Wanless Lake, and Lower Libby Lake) and streams (the upper East Fork Bull River and upper East Fork Rock Creek). No resource monitoring in the CMW is proposed in Alternative 2. At closure, monitoring devices, such as data loggers, would be removed and monitoring activity in the CMW would cease. The undeveloped quality of the CMW would return to existing conditions.

Solitude or a Primitive and Unconfined Type of Recreation

Solitude in the CMW may be temporarily affected by the increased noise from activities at the Libby Adit Site. Noise levels are discussed in Section 3.20.4 in the *Sound* section.

The Libby Adit Site is visible from one key viewpoint in the CMW at Elephant Peak. The visual effects of activities at the Libby Adit Site would be temporary, returning to current conditions after activities and diminishing after facility reclamation and closure. Visual impacts are discussed in Section 3.17.4 in the *Scenery* section.

Alternative 2 would not affect opportunities for a primitive and unconfined type of recreation in the CMW. No resource monitoring in the CMW is proposed in Alternative 2. At closure, monitoring activity in the CMW would cease, and opportunities for solitude or a primitive and unconfined type of recreation would return to existing conditions.

3.24.1.4.3 Alternative 3

Impacts on the qualities of wilderness character from activities at the Libby Adit Site would be similar to Alternative 2. New disturbance from the geotechnical investigations (6.4 acres) would be on National Forest System lands outside of the CMW. New disturbances associated with road access changes on lands protected for grizzly bear mitigation also would be outside of the CMW. MMC would transfer fee title to or place a conservation easement on 742.3 acres of private land for grizzly bear mitigation in Alternative 3. The conveyance of title or placement of a conservation easement on private land would restrict future residential and commercial development on these lands.

Effects on visual quality and increased levels of noise from geotechnical investigations would temporarily diminish wilderness qualities related to solitude from some locations in the CMW in Alternative 3. These effects would occur throughout the 12-week geotechnical investigations and would diminish after reclamation.

Untrammeled

Changes in streamflow in Alternative 3 would be similar as described for Alternative 2. Effects on flow of CMW streams would be less in Alternative 3 with design features. In Alternatives 3 and 4, the KNF would require additional mitigation, such as increasing the buffer zones near Rock Lake and the Rock Lake Fault and adding a third adit plug to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to East Fork Rock Creek and the East Fork Bull River would not flow toward the Libby Creek watershed; these mitigations were not modeled. Changes in streamflow in Alternative 3 are discussed in Section 3.10.4.3, *Alternative 3*, in the *Groundwater Hydrology* section and Section 3.11.4.3, *Alternative 3*, in the *Surface Water Hydrology* section. Effects on aquatic life are discussed in Section 3.6.4.3, *Alternative 3*, in the *Aquatic Life and Fisheries* section.

These direct and indirect impacts on ecological processes inside and adjacent to the wilderness, as described, would not affect the untrammeled quality of the wilderness. The untrammeled quality would continue to appear to have been affected primarily by the forces of nature.

Natural

The effects on the natural quality of wilderness would be similar as described for Alternative 2. Potential risk of subsidence would be less than in Alternative 2. The design features of increasing the buffer zones near Rock Lake and the Rock Lake Fault and requiring underground surveys by an independent qualified mine surveyor would minimize the risk of subsidence and associated effects on surface resources in the CMW. Impacts from subsidence, if they were to occur, would not likely affect or be noticed by the average wilderness user recreating in the CMW.

As part of the Alternative 3 grizzly bear mitigation plan, MMC would fund access changes on three roads providing access to the CMW in the Bear Creek, Standard Creek, and East Fork Rock Creek drainages (Figure 312). These roads would be barriered and converted into trails, allowing vegetation to move toward more natural conditions.

Noise levels would be similar to those described for Alternative 2 but would include noise from the 12-week-long geotechnical investigations between Poorman and Little Cherry Creeks. The typical wilderness user would not hear drilling activities.

Undeveloped

Ongoing monitoring, such as water resources monitoring, required installing some measuring equipment, such as data loggers, in the CMW. The KNF's proposed monitoring would continue to use such equipment and would require installing additional similar pieces of equipment. In addition, some surveying would need to occur in the CMW, and monuments would be established. Most equipment and monuments would not be noticeable to the average wilderness user, who stays on trails and camps in identified campsites; some installations may be visible. Before additional monitoring would occur, the Forest Service would use the MRDG process to minimize impacts on wilderness character from actions determined to be necessary. The following equipment currently is used and would continue to be used, or would be used in the CMW:

- Data loggers in area lakes
- Water level datum locations (rock bolts)
- Permanent streamflow recorders (depending on the type of recorder used, these could be slightly visible or not visible) at three stream sites (see Appendix C)
- Survey monuments, such as elevation monuments for LiDAR
- Ground-based reflectors, if needed, for InSAR
- Piezometers in critical GDE locations (need and locations to be determined)

After an alternative is selected in a ROD, the KNF would use the MRDG process to evaluate different methods to accomplish monitoring in the CMW, such as access by stock or foot, overnight camps or day access, or stock use.

At closure, monitoring devices would be removed, and monitoring activity in the CMW would cease. The undeveloped quality of the CMW would return to existing conditions.

Solitude or a Primitive and Unconfined Type of Recreation

The KNF's conceptual monitoring (see Appendix C) would require the following activities in the CMW:

- Completing an existing baseline topographic survey over the ore body and GDE monitoring area (Figure C-2 in SEIS Appendix C) using aerial methods
- Completing a detailed surficial geologic survey of lands overlying the mine area
- Conducting ongoing Level II GDE monitoring
- Monitoring wilderness water resources in wilderness lakes (Rock Lake, Lower Libby Lake, and Wanless Lake) and in the Libby Creek, East Fork Rock Creek, East Fork Bull River, and Swamp Creek drainages

Increased use of the CMW by Project personnel conducting monitoring would decrease opportunities for solitude or a primitive and unconfined type of recreation in Opportunity Class II areas around Rock Lake, Lower Libby Lake, and Wanless Lake and in Opportunity Class I areas in the East Fork Rock Creek, East Fork Bull River, and Swamp Creek drainages. Before any

monitoring would occur, the Forest Service would use the MRDG process to minimize impacts on wilderness character from actions determined to be necessary. Most work in the wilderness would be confined to Mondays through Wednesdays due to the logistics of delivering water quality samples to a laboratory. It is unlikely that much work would occur on Fridays or Saturdays, although an occasional Sunday start may facilitate personnel staging and earlier start times on Mondays (Klepfer Mining Services 2015b). At times, an additional person or guide with a horse may be necessary to minimize the hold time for samples. The frequency, duration, camp locations, and types of surveys are discussed in greater detail below.

Subsidence

Aerial Topographic Survey. The activities associated with the topographic survey would depend on the technology approved by the KNF in the final monitoring plan. If LiDAR (light detection and ranging) was the approved technology, MMC would complete the topographic survey using either a helicopter or a small, fixed-wing airplane. The survey would take 2 or 3 days to complete. Satellite data would be used if InSAR was the approved technology.

Before any aerial survey work could be done, elevation monuments would need to be established in the CMW over the ore body (from Rock Lake north toward the East Fork Bull River) if LiDAR is the approved technology. For InSAR monitoring, ground-based reflectors would be required to increase the number of months per year that InSAR monitoring may be performed, allow coverage in areas with thick vegetation, and increase the accuracy of all surveys. The number, location, and size of the reflectors would be determined during final design should InSAR be the approved technology. For the ground support work needed for aerial surveys, it is assumed that a two-person crew would enter the CMW for a 4-day period one time per year for 3 years. Camp locations for the survey crew would likely be at Rock Lake and somewhere along the East Fork Bull River (not necessarily in an identified campsite) (Klepfer Mining Services 2015b).

Surficial Geologic Surveys. The detailed surficial geologic survey would be completed by ground-based personnel in the area between Rock Lake and the headwaters of the East Fork Bull River, north of St. Paul Lake. The duration of the survey would depend on the complexity of the geology and may be 2 to 3 weeks.

Water Resources

Lakes. As discussed under *Undeveloped*, data loggers are currently installed in Rock Lake, Lower Libby Lake, and Wanless Lake. Currently, Lower Libby Lake is monitored one time per year by a Forest Service crew that typically downloads data from the data logger and collects other monitoring data during a day trip. Future monitoring work may require an overnight trip with a camp at the lake.

Rock Lake is monitored four times per year and in the future would include more extensive monitoring. Specifically, the following activities would occur in the wilderness:

- Continuous lake monitoring: a two-person crew on foot would visit the lake, download data from the data logger, and take water samples twice each summer. A camp would not be required as the work could be completed in a day or combined with other monitoring work (Klepfer Mining Services 2015b).

- Lake profile monitoring: a four-person crew on foot and at least three horses and a guide (to haul equipment) would visit the lake four times per year. The duration of each monitoring trip would be 2 days and would require a camp at Rock Lake (Klepfer Mining Services 2015b). Boats would be used on Rock Lake as part of this work.
- Flow monitoring: a two-person crew would monitor flow four times each summer (monthly). The duration of each trip would be 1 or 2 days with a camp (if needed) at Rock Lake (Klepfer Mining Services 2015b). This monitoring trip would likely be combined with lake profile monitoring.

Wanless Lake is monitored for lake level, profile, and flow and would require a similar-sized crew and frequency as monitoring for Rock Lake. The duration of each trip may be 1 day longer than those for Rock Lake due to the location. Camps would be made at Wanless Lake (Klepfer Mining Services 2015b).

Streamflow. Water resource monitoring locations in the CMW are shown in Appendix C. Twenty-four sites in the Libby Creek, East Fork Rock Creek, East Fork Bull River, and Swamp Creek drainages in the CMW have been identified for monitoring. Streamflow measurements at three sites would require installing a streamflow measuring device to take continuous electronic recordings of stream stage. The following streamflow monitoring activities would occur in the wilderness:

- Libby Creek monitoring: a two-person crew on foot would monitor Libby Creek every 2 weeks from July to October. A camp would not be required as the work could be completed in a day or combined with other monitoring work (Klepfer Mining Services 2015b).
- East Fork Rock Creek monitoring: covered previously under the discussion of the Rock Lake monitoring effort.
- East Fork Bull River monitoring: a two-person crew on foot would monitor the East Fork Bull River five times from mid-July to mid-October. A camp would not be required as the work could be completed in a day or combined with other monitoring work (Klepfer Mining Services 2015b).
- Swamp Creek monitoring (Wanless Lake area): a two-person crew on foot would monitor Swamp Creek five times per summer (monthly). The duration of each trip would be 2 days with a camp along the Swamp Creek trail (Klepfer Mining Services 2015b).

GDE Area. As part of water resources monitoring, MMC would continue its GDE monitoring in the CMW as described in Appendix C. The GDE monitoring area is shown on Figure C-2 in Appendix C and is based on areas of groundwater drawdown predicted by the 3D groundwater model for the Montanore Project. In addition to the surface water monitoring, MMC would continue to monitor the four GDEs monitored in 2016 and 2017.

Effectiveness of the KNF's Proposed Monitoring and Design Features

The design features would be effective in minimizing adverse effects on surface resources in the CMW. Design features such as increasing the buffer zones near Rock Lake and the Rock Lake Fault and the KNF's monitoring would reduce the risk of subsidence and measurable hydrological indirect effects on the surface in the wilderness. In Alternatives 3 and 4, potential air

quality indirect impacts on wilderness lakes and wilderness character would be effectively minimized by design features such as limiting generator use and using Tier 4 engines and ultra-low-sulfur diesel fuel in underground mobile equipment and in generators during the Project, which would reduce emissions in the CMW. The Forest Service would use the MRDG process to ensure that adverse effects on wilderness character during monitoring were minimized. The mitigation and monitoring requirements in Alternatives 3 and 4 would protect the surface resources in accordance with the general purpose of maintaining the wilderness unimpaired for future use and enjoyment as wilderness and preserving the wilderness character consistent with the use of the land for mineral operations in compliance with 36 CFR 228.15 and the Wilderness Act.

3.24.1.4.4 Alternative 4

Impacts on the qualities of wilderness character from activities at the Libby Adit Site and geotechnical investigations would be similar to Alternative 3; for the geotechnical investigations, 1.5 acres of National Forest System lands within MA6-General Forest would be disturbed, and the duration of the investigations would be shorter than in Alternative 3. At closure, monitoring devices such as data loggers would be removed, and monitoring activity in the CMW would cease. The undeveloped quality of the CMW would return to existing conditions.

3.24.2 Roadless Areas

3.24.2.1 Regulatory Framework

The KFP allocated most of the IRAs on the KNF to MA 5 (backcountry). Within IRAs in the Project analysis area, MA 5b direction defers to the requirements of the 2001 Roadless Area Conservation Rule (Roadless Rule). Federal requirements under the Roadless Rule are described in the JFEIS.

The KFP direction considered in the analysis of IRAs is:

> **GOAL-IRA-01.** Inventoried roadless areas will be managed to protect values and benefits of roadless areas.
>
> **FW-STD-IRA-01.** Within inventoried roadless areas, outside of the state of Idaho, the 2001 Roadless Area Conservation Rule (36 CFR 294 Subpart B, published at 66 Fed Reg. 3244-3273) shall apply. IRAs are identified in a set of inventoried roadless area maps, contained in the Forest Service Roadless Area Conservation, Volume 2, dated November 2000, which are held at the national headquarters office of the Forest Service, or any subsequent update or revisions of those maps (36 CFR 294.11). Maps of the IRAs are also found in appendix C of the Forest Plan FEIS.

Roadless Rule and KFP requirements are not applicable to state or private lands.

3.24.2.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on IRAs encompasses the Cabinet Face East IRA east of the CMW and south of the ridge between Big Cherry Creek and Bear Creek, the Rock Creek IRA on the west side of the CMW, and that portion of the McKay Creek IRA adjacent to East Fork Rock Creek (Figure 321).

The methods for data collection and impact analysis are the same as described in the JFEIS. The data available and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects on IRAs in the analysis area and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.24.2.3 Affected Environment

The Cabinet Face East IRA, Rock Creek IRA, and McKay Creek IRA are described in detail in the JFEIS; KNF-identified capabilities for each IRA are also described in the JFEIS and in detail in the KFP EIS (USDA Forest Service 2013). Portions of each IRA are managed as recommended wilderness in the KFP (MA1b). Most of East Fork Rock Creek is outside of both the Rock Creek IRA and the McKay Creek IRA. A 2,300-foot segment divides the two IRAs. The Libby Adit Site is on private land outside of the IRAs. The area of geotechnical investigation is on National Forest System lands and also outside of the IRAs. High levels of road construction to facilitate harvest occurred in the geotechnical investigation area through the 1980s. Most of the roads in the area are gated and may receive some administrative use. About half of the geotechnical investigation area is previously harvested coniferous forest.

3.24.2.4 Environmental Consequences

3.24.2.4.1 Alternative 1

Alternative 1 would not directly affect the Cabinet Face East IRA. Sounds associated with the activities at the Libby Adit Site would be audible in portions of the Cabinet Face East IRA in the Libby Creek drainage. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and revised in revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with DEQ-permitted activities at the Libby Adit Site. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Noise levels in the IRA would be slightly higher during site reclamation and would return to low, ambient levels when closure and reclamation were completed at the site. Noise levels are discussed in Section 3.20.4 in the *Sound* section.

3.24.2.4.2 Alternative 2

No road construction or timber harvest would occur in any IRA. Alternative 2 would not directly affect any IRA.

Cabinet Face East IRA

The existing disturbance at the Libby Adit Site is on private land, and no additional disturbance outside of the site's existing disturbance boundary is anticipated. Activity at the site would increase. Activities at the Libby Adit Site, including expansion of an existing waste rock storage area, would occur within the existing 11.6-acre disturbance area and would not alter the existing visual effects. Views of the Libby Adit Site from high or open locations in the Cabinet Face East IRA may affect some visitors' primitive recreational experience. Activities at the Libby Adit Site would slightly increase noise levels in portions of the Cabinet Face East IRA in the Libby Creek drainage. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Noise levels in the IRA would return to low, ambient levels when closure and reclamation was completed at the site. Visual impacts would diminish after reclamation. Noise levels are discussed in Section 3.20.4 in the *Sound* section, and visual impacts are discussed in Section 3.17.4 in the *Scenery* section.

Rock Creek and McKay IRAs

The indirect streamflow reduction predicted in the 2,300-foot segment that divides the two IRAs described in Section 3.24.1.4.2 and in Section 3.11.4 under *Surface Water Hydrology* would be negligible (reductions of 0.01 to 0.02 cfs) and would not reduce the natural integrity of the Rock Creek and McKay Creek IRAs. At closure, MMC would place two plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. It is unknown if streamflow in East Fork Rock Creek would return to existing conditions. If groundwater flowed from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage, streamflow in East Fork Rock Creek probably would be more than predicted during the Project but less than existing conditions.

3.24.2.4.3 Alternative 3

No road construction or timber harvest would occur in any IRA.

Cabinet Face East IRA

Sounds and visual impacts associated with the activities at the Libby Adit Site would be similar to Alternative 2. Elevated noise levels may last longer because of more activity at the site.

Alternative 3 would include noise and visual impacts from the 12-week-long geotechnical investigations between Poorman and Little Cherry Creeks. The typical IRA user would not hear the activity. Visual impacts of the 6.4 acres of disturbance may be visible from some IRA locations and would diminish after reclamation. Noise levels are discussed in Section 3.20.4 in the *Sound* section, and visual impacts are discussed in Section 3.17.4 in the *Scenery* section.

The KNF's proposed water resources monitoring would require monitoring of water resources in the Bear Creek and Libby Creek drainages (see Appendix C). Although the IRA excludes roads along Libby Creek, increased use by Project personnel conducting the monitoring for 3 to 5 days between July and October would decrease opportunities for solitude or a primitive and unconfined type of recreation in the IRA adjacent to these creeks. At closure, monitoring activity in the IRA would cease. The opportunities for solitude or a primitive and unconfined type of recreation in the IRA would return to existing conditions.

MMC would fund access changes on four roads (Granite-Bear Creek Roads, Upper Bear Creek Road, Cable-Poorman Creek Roads, and Standard Creek Road) leading up to or into the Cabinet Face East IRA in the Poorman, Cable Creek, Bear Creek and Standard Creek drainages (Figure 321). The Granite-Bear Creek Roads and Cable-Poorman Creek Roads are currently restricted yearlong to motor vehicles but open to snow vehicles December 1 through April 30 (Table 309 in Chapter 2). These roads are gated with motorized access restricted to administrative uses, access to private property, and access to mining claims. In the Alternative 3 grizzly bear mitigation plan, no change would be made to the existing public motorized access status; however, the gates would be replaced with barriers to permanently restrict motorized access. Use by over-snow vehicles would be limited further to December 1 to March 31 to minimize disturbance during the grizzly bear early spring use period. Standard Creek Road is currently restricted yearlong to motor vehicles, including over-snow vehicles; access is restricted by a gate. In Alternative 3, no change would be made to the existing public motorized access status of Standard Creek Road; however, the gate would be replaced with a barrier, and the road would be converted to a trail where necessary. Upper Bear Creek Road (NFS road #4784) in the Bear Creek drainage is currently open from July 1 to October 14 to motor vehicles, and gated with motorized access restricted to administrative uses other times of the year. It is currently open to over-snow vehicles

from December 1 through April 30 (Table 309 in Chapter 2). MMC would barrier 2.7 miles of the road if it was not already closed by the Rock Creek Project (Phase I). Regardless of which company closed the road, the KNF would reduce winter use of over-snow vehicles by a month, from December 1 through April 30 to December 1 through March 31. The change would improve the opportunities for solitude and primitive recreation in the Cabinet Face East IRA as long as the access change remained in place. However, existing motorized and over-snow on-road uses on the roads are limited, and effects of the Alternative 3 access changes are unlikely to be experienced by most users of the roads. Effects on recreation are described in Section 3.16.4.3, *Alternative 3*.

Rock Creek and McKay IRAs

The predicted indirect streamflow effects would be negligible, the same as Alternative 2, and would not reduce the natural integrity of the Rock Creek and McKay Creek IRAs. The design features, such as increasing the buffer zones near Rock Lake and the Rock Lake Fault and adding a third adit plug to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains, are designed to minimize effects on East Fork Rock Creek streamflow.

The KNF's proposed monitoring would occur in or adjacent to the IRAs in the East Fork Rock Creek drainage (see Appendix C). Increased use by Project personnel conducting the monitoring would decrease opportunities for solitude or a primitive and unconfined type of recreation in this drainage. At closure, monitoring activity in the IRA would cease. The opportunities for solitude or a primitive and unconfined type of recreation in the IRAs would return to existing conditions.

MMC would transfer fee title to the KNF or place a conservation easement on a 4.5-acre private land parcel at the southern end of the Rock Creek Meadows site and a conservation easement on a 14.5-acre private land parcel at the north end of Rock Lake. Access on East Fork Rock Creek Road (NFS road #150A)/Rock Lake Trail #935, which currently separates the Rock Creek IRA from the McKay IRA, would change from gated to barriered. Access is currently restricted yearlong to motor vehicles, including over-snow vehicles, so this change would not affect existing motorized or over-snow access. The habitat protection and access change would increase the amount of unroaded area in upper East Fork Rock Creek and would improve the IRAs' manageability.

Effectiveness of the KNF's Proposed Mitigation

In the context of the KNF's protection of IRAs in the National Forest System, the design features of increasing the buffer zones near Rock Lake and the Rock Lake Fault and adding a third adit plug, if needed, would be effective in minimizing changes in East Fork Rock Creek streamflow and water quality in the IRAs.

3.24.2.4.4 Alternative 4

No road construction or timber harvest would occur in any IRA. Effects on the Cabinet Face East IRA would be similar to Alternative 3, but noise and visual impacts from the geotechnical investigations between Poorman and Little Cherry Creeks would be shorter in duration. Effects on the Rock Creek and McKay IRAs would be the same as Alternative 3.

3.24.3 Special Areas

3.24.3.1 Regulatory Framework

Special Areas on the KNF are managed with emphasis on public use and enjoyment while protecting or enhancing areas of unusual characteristics. These areas have outstanding natural characteristics or unique recreation or cultural values and are managed to maintain their special values. Special Areas are classified as scenic, geological, botanical, zoological, paleontological, historical, or recreational, depending on their special characteristics or unique values. The objective of designating special areas is to "protect and manage for public use and enjoyment, special recreation areas with scenic, geological, botanical, zoological, paleontological, archaeological, or other special characteristics or unique values" (FSM 2370.02).

3.24.3.2 Affected Environment

The KNF manages two botanical special areas in the analysis area on the west side of the CMW. The 109-acre East Fork Bull River botanical area parallels the East Fork Bull River, beginning below the confluence of the North Fork East Fork Bull River and extending 2 miles downstream. The site contains the southernmost known location of northern beech fern, a Forest Service sensitive species, on the KNF. The site contains rich old- growth streamside riparian environment for sensitive plant species along the East Fork Bull River bottom and terrace remnant. The 185-acre Rock Creek Meadows botanical area is a significant meadow and wetland area in the head of East Fork Rock Creek. Private land owned by MMI is at the southern end of Rock Creek Meadows.

3.24.3.3 Environmental Consequences

3.24.3.3.1 Alternative 1

The two botanical areas would not be affected by Project activities.

3.24.3.3.2 Alternative 2

Existing streamflow in the East Fork Bull River where it enters the East Fork Bull River botanical site was not estimated. Based on estimated streamflow at EFBR-500, 1.2 miles upstream, a predicted reduction of 0.02 cfs from an estimated low flow of 3.7 cfs in the East Fork Bull River at the East Fork Bull River botanical site would result in a less than 1 percent flow reduction. Streamflow in East Fork Rock Creek where it enters Rock Creek Meadows was estimated at 2 cfs. A predicted reduction of 0.01 cfs from an estimated streamflow of 2 cfs in the East Fork Rock Creek at the Meadows would result in a less than 1 percent flow reduction. These flow changes would have no effect on alluvial groundwater levels, and hydrology support for the botanical resources at the East Fork Bull River and Rock Creek Meadows botanical sites would not be affected.

3.24.3.3.3 Alternative 3

Flow changes in Alternative 3 would be the same as Alternative 2. The hydrology support for the botanical resources at the East Fork Bull River and Rock Creek Meadows botanical sites would not be affected. MMC would transfer fee title to the KNF or place a conservation easement on the 4.5-acre private land parcel at the southern end of the Rock Creek Meadows site for grizzly bear habitat protection. The risk of development in the site would be eliminated, and the botanical area's manageability would be improved.

3.24.3.3.4 Alternative 4

The effect of Alternative 4 would be the same as Alternative 3.

3.24.4 Wild and Scenic Rivers

3.24.4.1 Regulatory Framework

Federal requirements under Section 7 of the 1968 Wild and Scenic Rivers Act are described in the JFEIS. KFP direction regarding eligible wild, scenic, or recreational rivers and their adjacent areas are also described in the JFEIS.

3.24.4.2 Analysis Area and Methods

The eligible segments of the East Fork Bull River and the Bull River below the confluence with the East Fork Bull River are part of the analysis area for wild and scenic rivers (Figure 321). Other eligible segments of the Bull River system would not be affected. The analysis of effects on wild and scenic rivers was qualitatively based on direct effects on the free-flowing characteristics, water quantity, water quality, and outstandingly remarkable values of the eligible wild and scenic segments.

Data on the outstandingly remarkable values of the eligible wild and scenic segments were taken from the KNF's 2014 process to identify and classify potentially eligible wild and scenic rivers (USDA Forest Service 2015a, Appendix E). The data available and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects on wild and scenic rivers in the analysis area and to enable the decision makers to make a reasoned choice among alternatives. The KNF did not identify any incomplete or unavailable information, as described in Section 3.1.3, *Incomplete or Unavailable Information*.

3.24.4.3 Affected Environment

Three river segments of the Bull River were determined eligible for inclusion as part of the Wild and Scenic River System. A 3-mile segment of the East Fork Bull River in the CMW was preliminarily classified as a Wild River. A 4.5-mile segment of the East Fork Bull River outside the CMW and a 9.1-mile eligible segment of the Bull River in the analysis area were preliminarily classified as Recreational Rivers (Figure 321). The Outstandingly Remarkable Value of the three segments is scenery.

A wild river is a river or section of rivers free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America. A recreation river is a river or section of rivers readily accessible by roads or railroad, which may have some development along their shoreline and which may have undergone some impoundments or diversions in the past. The qualities that contribute to each of the three segments' eligibility are scenic values.

3.24.4.4 Environmental Consequences

3.24.4.4.1 Alternative 1

The three eligible river segments would not be affected by Project activities.

3.24.4.4.2 Alternative 2

Free-Flowing Characteristics

Alternative 2 would not alter the free-flowing character of the East Fork Bull River or Bull River. Flow would remain in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the stream.

Water Quantity

Changes in streamflow in Alternative 2 are discussed in Section 3.11.4.2, *Alternative 2*, in the *Surface Water Hydrology* section. Baseflow changes predicted by the 3D model due to adit and drift dewatering would reduce streamflow by 0.02 cfs at the mouth of the East Fork Bull River, a change of less than 1 percent in the $7Q_{10}$ flow. The 3D model predicted streamflow would not be affected in the East Fork Bull River at and above the CMW boundary (EFBR-500).

At closure, a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. The change would be less than the 0.02 cfs predicted during adit and drift dewatering.

Water Quality

Changes in water quality in Alternative 2 are discussed in Section 3.13.4.2, *Alternative 2*, in the *Water Quality* section. The effects of adit inflows and waste rock management while the Libby Adit remained open would be similar to Alternatives 3 and 4. At closure, a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. Any changes in water quality in East Fork Rock Creek, Rock Lake, and the East Fork Bull River would be more likely to be permanent than in Alternatives 3 and 4. A range of likely adit inflows was evaluated to estimate how long it would take to flood the adit and drifts and begin recovery of groundwater levels. Within the range of likely inflow rates, the time required for the adit and drifts to flood completely ranged from 4 months to 3 years. The adit and drifts would fill in 6 months or less if the inflow rate was as high as the modeled inflow rate of 260 gpm. Groundwater levels would reach steady-state conditions 2 to 3 years after the adit and drifts flooded.

Outstandingly Remarkable Values

Reductions in streamflow or changes in water quality would have no effect on the scenic values of the East Fork Bull River or Bull River. Historic resources in the three segments, such as trails or the Bull River Guard Station, would not be affected. The scenic quality of the three segments would not be affected by a reduction in baseflow.

3.24.4.4.3 Alternative 3 and Alternative 4

Free-Flowing Characteristics

Alternatives 3 and 4 would not alter the free-flowing character of the East Fork Bull River or Bull River. Flow would remain in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the stream.

Water Quantity

Changes in streamflow in Alternatives 3 and 4 are discussed in Section 3.11.4.3, *Alternative 3*, and Section 3.11.4.4, *Alternative 4*, in the Surface Water Hydrology section. Predicted baseflow changes would be the same as described for Alternative 2.

At closure, MMC would place two or three plugs in the Libby Adit after the KNF and DEQ allowed MMC to proceed with adit plugging. The two easternmost plugs would be near the Libby Adit portal, the same as Alternative 2. The effect of Alternative 2 indicated that a change in groundwater flow path may occur because the inclined drift would connect groundwater beneath the watersheds of East Fork Rock Creek and the East Fork Bull River with groundwater beneath the Libby Creek watershed, possibly resulting in the diversion of groundwater from the East Fork Rock Creek and East Fork Bull River drainages toward the Libby Creek drainage. MMC would update the 3D model within 2 years of completing data collection from underground, assessing if an additional plug was necessary to avoid or minimize permanent effects on the East Fork Bull River. If needed, a plug would be installed by Year 5 to isolate the adit and drifts beneath the west side of the Cabinet Mountains hydraulically from the adit beneath the east side of the Cabinet Mountains and to ensure any groundwater tributary to the East Fork Bull River would not flow toward the Libby Creek watershed. The KNF estimates the westernmost plug, if needed, would be 1,850 feet from the start of the inclined drift to above the ore body. A third plug, if needed, would ensure that streamflow in East Fork Rock Creek, the East Fork Bull River, and Libby Creek would return to existing conditions. A third plug also would ensure that groundwater discharge into Rock Lake would return to existing conditions.

The design features of increasing the buffer zones near Rock Lake and the Rock Lake Fault, which was not modeled, and adding a third adit plug are designed to minimize effects on East Fork Bull River streamflow and water quality.

Water Quality

Changes in water quality in Alternatives 3 and 4 are discussed in Section 3.13.4.3, *Alternative 3*, and Section 3.13.4.4, *Alternative 4*, in the *Water Quality* section. The effects on the three eligible segments would be the same as Alternative 2. With the design features of a third adit plug if required in Alternatives 3 and 4, post-closure changes in streamflow in the three eligible river segments would be minimized, and the water quality of the three segments would not be affected.

Outstandingly Remarkable Values

Reductions in streamflow or changes in water quality would have no effect on the scenic values of the East Fork Bull River or Bull River. The historic resources in the three eligible river segments, such as trails or the Bull River Guard Station, would not be affected. The scenic quality of the three segments would not be affected by a reduction in baseflow.

Effectiveness of the KNF's Proposed Mitigation

The mitigation in Alternative 3 and Alternative 4 would minimize effects on East Fork Bull River streamflow and water quality.

3.24.5 Other Disclosures

3.24.5.1 Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Past actions have not substantially altered the attributes of the CMW since the passage of the Wilderness Act or the establishment of the Cabinet Face East IRA. The existing Libby Adit is visible from some locations in the CMW and the Cabinet Face East IRA.

Reasonably foreseeable projects used for the cumulative effects analysis are described in Section 3.3. Of the projects reasonably foreseeable, the proposed Rock Creek Project is the only one with the potential to contribute cumulative effects on wilderness. The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

3.24.5.2 Regulatory/Forest Plan Consistency

3.24.5.2.1 Wilderness

Valid existing rights were established, and patents were issued to lode mining claims HR 133 and HR 134 in the CMW in 2001. None of the alternatives would directly physically disturb any lands in the CMW, and none of the four wilderness qualities would be directly affected. None of the alternatives would directly affect wilderness character. Under all alternatives, the undeveloped quality would not be affected because the wilderness would remain essentially without permanent improvements or modern human occupation.

The Wilderness Act does not regulate activities outside the wilderness that may affect wilderness character. None of the alternatives would indirectly affect the wilderness quality of undeveloped. The undeveloped quality would not be affected because the wilderness would remain essentially without permanent improvements or modern human occupation.

All alternatives would indirectly affect wilderness qualities of untrammeled, natural, and solitude or a primitive and unconfined type of recreation. Monitoring required for Alternatives 3 and 4 (Appendix C), including a Minimum Requirements Analysis (as described in Appendix C) and wilderness stewardship performance monitoring, would be implemented to monitor potential changes in wilderness character. Mitigation measures such as increasing the buffer zones near Rock Lake and the Rock Lake Fault and installing a third plug in the Libby Adit (if needed) would reduce the risk of subsidence and measurable hydrological indirect effects on the surface in the wilderness. In Alternatives 3 and 4, potential air quality indirect impacts on wilderness lakes and wilderness character would be minimized by mitigation measures such as limiting generator use and using Tier 4 engines and ultra-low-sulfur diesel fuel in underground mobile equipment and generator engines, which would reduce emissions compared to Alternative 2.

Mitigation measures and monitoring requirements in Alternatives 3 and 4 are reasonable stipulations for protection of the wilderness character and are consistent with the use of the land for mineral development. Alternatives 3 and 4 would be conducted to protect the surface resources in accordance with the general purpose of maintaining the wilderness unimpaired for future use and enjoyment as wilderness and preserving the wilderness character consistent with the use of the land for mineral operations in compliance with 36 CFR 228.15 and the Wilderness

Act. All alternatives would comply with the Wilderness Act; meet the KFP MA1b-Wilderness desired conditions, standards, and guidelines; and comply with the 2009 Cabinet Mountains Wilderness Management Plan. Alternatives 3 and 4 would further minimize adverse environmental impacts on surface resources in the wilderness and thereby comply with the regulations (36 CFR 228 Subpart A) for locatable mineral operations on National Forest System lands.

The KNF 2015-2025 Wilderness Stewardship Performance (2015) includes the element "Other Special Provisions." In addition to requiring monitoring for many resources (Appendix C), the KNF would develop a special provisions plan, covering both management and monitoring in the CMW (see Appendix C).

3.24.5.2.2 Inventoried Roadless Areas

Alternative 2 would not directly physically disturb or impact any IRA, and the roadless area capability would not be directly affected. In Alternatives 3 and 4, fee title transfer of mitigation lands (if it occurs) may improve manageability of IRAs. Alternative 2 would not affect any IRA and would comply with KFP IRA direction. Alternatives 3 and 4 would comply with the KFP regarding management of affected IRAs. Although Alternatives 3 and 4 would decrease the opportunities for solitude or a primitive and unconfined type of recreation in the affected IRAs, these alternatives would maintain progress toward GOAL-IRA-01. IRAs would be managed to protect values and benefits of roadless areas. No road construction or road reconstruction and no timber cutting, sale, or removal would occur in an IRA in Alternatives 3 and 4. These alternatives would comply with the standard FW-STD-IRA-01. Alternatives 3 and 4 would minimize adverse environmental impacts on surface resources in the IRAs and thereby comply with the regulations (36 CFR 228 Subpart A) for locatable mineral operations on National Forest System lands.

3.24.5.2.3 Special Areas

None of the alternatives would affect the botanical resources in the two designated botanical areas in the analysis area.

3.24.5.2.4 Eligible Wild and Scenic River Segments

None of alternatives would affect the free-flowing characteristics of the eligible portions of the Wild and Scenic River segments. Flow in the three eligible segments would remain in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the stream. Mitigation measures identified in Chapter 2 for Alternatives 3 and 4 and monitoring required for Alternatives 3 and 4 (Appendix C) would be implemented to minimize changes in the water quality of the three eligible segments. Reductions in streamflow or changes in water quality would have no effect on the scenic values of the East Fork Bull River or Bull River, and the free-flowing status of the rivers would remain. All alternatives would comply with the Wild and Scenic Rivers Act, Forest Service policy, and the KFP regarding eligible Wild and Scenic River segments.

3.24.5.3 Irreversible and Irretrievable Commitments

Any changes to streamflow in East Fork Rock Creek and the East Fork Bull River in the CMW would be an irreversible commitment of resources. Wilderness experiences for some visitors may be irretrievably affected from specific viewpoints in the CMW under any of the alternatives. All action alternatives would irreversibly reduce streamflow in the eligible East Fork Bull River and Bull River Wild and Scenic River segments. Although modeling would be used in Alternatives 3

and 4 to determine what, if any, streamflow effects would be permanent, the KNF anticipates that installing a third plug in the Libby Adit at closure would ensure that groundwater levels overlying the Libby Adit and drifts, and baseflow in East Fork Rock Creek, the East Fork Bull River, and Libby Creek, would return to existing conditions.

3.24.5.4 Short-Term Uses and Long-Term Productivity

No changes in short-term uses or long-term productivity of wilderness, IRA, or wild and scenic river resources are expected.

3.24.5.5 Unavoidable Adverse Environmental Effects

All action alternatives would indirectly reduce the opportunities for solitude in the CMW and in the Cabinet Mountains East, Rock Creek, and McKay Creek IRAs. The three wilderness qualities of untrammeled, natural, and solitude or a primitive and unconfined type of recreation in certain areas also would be indirectly affected in all action alternatives.

3.25 Wildlife

3.25.1 Introduction

This section updates information about the affected environment for potentially affected wildlife and describes effects on wildlife and their habitat that may occur from Project activities. This section comprises six subsections: (1) key habitats (snags and down wood); (2) elk security, big game (elk and deer) habitat, and mountain goat; (3) Forest Service sensitive species; (4) federal threatened and endangered species; (5) migratory birds; and (6) other species of interest, namely moose. Specific effects on pileated woodpecker were not evaluated in the SEIS because it is not considered a management indicator species in the current KFP. The evaluation of wildlife effects in the analysis area is concurrent and interdependent with the ESA Section 7 consultation process.

The analysis area for sensitive species was determined based on viability analysis and concepts described by Ruggiero et al. (1994), which considers biological populations and ecological scale. Evaluation of species viability is based on concepts and direction provided in the KFP FEIS wildlife specialist report (Anderson 2014) and the Wildlife Habitat Assessment for the Kootenai and Idaho Panhandle Plan Revision Zone (Ecosystem Research Group 2012). The analysis area used for an individual species may vary from other resource sections, or between different species of wildlife, based on biological needs or direction provided for T&E species under the ESA. The analysis area for direct, indirect, and cumulative effects on key habitats, elk security, big game (elk, deer, and goat) habitat, moose, and appropriate Forest Service sensitive species is the Crazy PSU where evaluation activities would occur. The analysis area for elk security also includes the Silverfish PSU, where protection of grizzly bear mitigation lands and associated road access changes potentially affect habitat quality. For these species, the size of a PSU is sufficient to cover home ranges and to determine the effects of the alternatives.

Analysis areas for threatened and endangered species are based on management areas defined in recovery plans or other areas, such as those defined in the KFP. To provide information about the relative magnitude of anticipated effects of the Project alternatives, effects on wildlife habitat were estimated to the nearest acre; uncertainties in the habitat mapping and effect analysis models are beyond this level of precision.

3.25.2 Key Habitats (Snags and Woody Debris)

This section describes the characteristics and importance of cavity habitat provided by snags and down woody debris and analysis of effects based on the proposed alternatives. Old-growth forests, riparian areas, and wetlands, which are also key habitats for some species, are discussed in Sections 3.22, *Vegetation*; 3.6, *Aquatic Life and Fisheries*; and 3.23, *Wetlands and Other Waters of the U.S.* Species-specific effects related to the availability of cavity habitat and down woody debris are evaluated for species associated with these key habitats such as flammulated owl, fisher, and western toad and are discussed in Section 3.25.4, *Forest Service Sensitive Species*.

3.25.2.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS. The vegetation management approach in the KFP promotes ecosystem diversity by focusing on providing the ecological components, patterns, and processes at multiple scales on the landscape that support the full spectrum of habitats and conditions

needed for all of the biological organisms associated with the various ecosystems (USDA Forest Service 2013). This includes the goal that "the KNF manages wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, invasive species treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species" (GOAL-WL-01).

In Alternatives 3 and 4, MMC would clear forested lands for mineral operations. Vegetation goals, desired conditions, and objectives in the KFP would apply to Project activities. Applicable KFP direction for vegetation and conformance with that direction is described in Section 3.22, *Vegetation*. The following KFP desired conditions related to habitat provided by snags and down woody debris apply to the Project.

> **FW-DC-VEG-07.** Snags occur throughout the forest in an uneven pattern, provide a diversity of habitats for wildlife species, and contribute to the sustainability of snag dependent species. Snag numbers, sizes, and species vary by biophysical setting and dominance group. Table 1 in the 2015 KFP displays the desired range of snag densities. Over time, the number of large-diameter snags (20 inches in DBH or greater) increases in all biophysical settings.
>
> **FW-DC-VEG-08.** Down wood occurs throughout the forest in various amounts, sizes, species, and stages of decay. The larger down wood (i.e., coarse woody debris) provides habitat for wildlife species and other organisms, as well as serving important functions for soil productivity.
>
> **FW-DC-WL-12.** Trees and snags greater than 20-inch DBH are available throughout the Forest. Wildlife species associated with the warm dry biophysical setting find large-diameter ponderosa pine, Douglas-fir, and other species of snags for nesting (see also FW-DC-VEG-07, FW-GDL-VEG-04, and FW-GDL-VEG-05).
>
> **FW-DC-WL-13.** Down wood, especially down logs, are available throughout the Forest for terrestrial mollusks, reptiles, amphibians, small mammals, and other species whose habitat requirements include this component (refers to FW-GDL-VEG-03, FW-GDL-VEG-06, FW-DC-WTR-03, FW-DC-SOIL-01, FW-DC-SOIL-02, FW-DC-SOIL-03, FW-DC-RIP-05, FW-DC-AQH-05, FW-GDL-SOIL-02, FW-GDL-SOIL-03).

3.25.2.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on snags and down woody debris is the Crazy PSU, where the Project activities would occur. The PSU was determined to be the appropriate scale for the cavity and down wood habitat cumulative effects analysis because it is of sufficient size to include home ranges of species associated with cavity and down wood habitat while allowing the evaluation of the cumulative effects of proposed activities. The methods for data collection and effect analysis are the same as described in the JFEIS, except that effects on the potential population level were not quantified because the extent of habitat disturbed would be less than 7 acres for all alternatives.

3.25.2.3 Affected Environment

Two wildfires occurred in the Crazy PSU in 2015: the 177-acre Smearl fire in the Smearl Creek drainage and the 7-acre Midas fire in the Midas Creek drainage. Estimating snag densities in

these (burned) areas is difficult as the fire severity would not be the same throughout the fire perimeter. Some trees have fallen, others remain, new snags have been created from remaining trees, and newly established seedlings could reach 10 inches dbh by 60 years (USDA Forest Service 1993). These wildfires likely improved habitat conditions for some cavity-nesting species, such as the black-backed woodpecker (se Section 3.25.4.2). Other than these recent fires, snag and down woody debris conditions have not changed substantially in the analysis area since the JFEIS (Towery, pers. comm. 2018). The affected environment for snags and down woody debris is described in JFEIS Section 3.25.2.2.2, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on snags and down woody debris in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.2.4 Environmental Consequences

3.25.2.4.1 Alternative 1

Alternative 1 would maintain the existing vegetative condition on the landscape, and wildlife use of snags and down woody debris would continue at current levels. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Although past timber harvests and other vegetation management treatments resulted in site-specific decreases in the number of snags and amount of down woody debris available, especially in some existing regeneration harvest units, overall the KNF has an abundance of snag habitat (USDA Forest Service 2013). Current down wood levels are generally considered to exceed historical levels due to longer fire return intervals within stands (Graham et al. 1994; Brown et al. 2003).

3.25.2.4.2 Alternative 2

No additional ground disturbance would occur in Alternative 2, and no snags or down woody debris would be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1.

3.25.2.4.3 Alternative 3

Ground disturbance at the Libby Adit Site would be limited to existing revegetated areas and an existing soil stockpile within the 11.6-acre, privately owned disturbance area (Figure 310). Alternative 3 geotechnical investigations would disturb 6.4 acres of general forest habitat, consisting of 3.4 acres of previously harvested coniferous forest and 3 acres of mature coniferous forest. Alternative 3 would have a negligible effect on the availability of snags and down wood debris because the amount of habitat affected would be small relative to habitat available in the analysis area, and because most of the habitat affected was previously harvested. MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons. This mitigation would be incorporated into the Vegetation Removal and Disposition Plan and would reduce any effects on wildlife associated with snags and down woody debris.

3.25.2.4.4 Alternative 4

Direct and indirect effects from Alternative 4 on snags and down woody debris would be similar to Alternative 3, except that less habitat would be disturbed at the geotechnical investigation area. In Alternative 4, geotechnical investigations would disturb 1.1 acres of coniferous forest and 0.4 acre of previously harvested coniferous forest. Alternative 4 would have a negligible effect on the availability of snags and down woody debris because the amount of habitat affected would be

small relative to habitat available in the analysis area, some of the habitat affected was previously harvested, and MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons.

3.25.2.4.5 Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. Because their effects on snags and down wood would be negligible, none of the alternatives would contribute to cumulative effects on these habitats when combined with the effects of other past, present, and reasonably foreseeable activities. The cumulative effects of the Montanore Project, if approved and implemented, are described in the JFEIS.

3.25.2.5 Regulatory/Forest Plan Consistency

3.25.2.5.1 Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. Alternative 2 would have no effect on snags and down woody debris. Alternatives 3 and 4 would comply with 36 CFR 228.8 because they would incorporate additional feasible and practicable measures to minimize adverse environmental effects on wildlife habitat that benefit key habitats, including leaving snags in disturbance and clearing areas unless required to be felled for safety reasons, leaving down wood on National Forest System and state lands, minimizing effects on riparian areas and complying with KFP riparian direction, and having a wetland mitigation plan more likely to replace lost wetland functions.

3.25.2.5.2 National Forest Management Act/Kootenai Forest Plan

All action alternatives would be consistent with desired conditions for snags and down wood. In all alternatives, a wide range of successional habitats and associated amounts of down wood would be available.

FW-DC-VEG-07 (snags) and FW-DC-WL-12. Alternatives 1 and 2 would not affect snags. Alternatives 3 and 4 would have a negligible effect on the availability of snags in the analysis area because the amount of habitat affected would be small relative to habitat available, the habitat affected was mostly previously harvested, and MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons. The Vegetation Removal and Disposition Plan included in Alternatives 3 and 4 would include measures to retain snags. Therefore, none of the alternatives would reduce the availability of snags across the landscape.

FW-DC-VEG-08 and FW-DC-WL-13. Alternatives 1 and 2 would not affect down woody debris. Alternatives 3 and 4 would have a negligible effect on the availability of down woody debris because the amount of habitat affected would be small relative to habitat available in the analysis area, the habitat affected was previously harvested, and MMC would leave down wood, including any snags cut for safety reasons, that would later become woody debris in the geotechnical investigation area. Therefore, none of the alternatives would reduce the availability of down woody debris across the landscape.

3.25.2.5.3 Statement of Findings for Snags and Down Woody Debris

Habitat for cavity-dependent species in the Crazy PSU would be maintained in all alternatives. Alternatives 1 and 2 would not affect snags or down woody debris. Alternatives 3 and 4 would have a negligible effect on the availability of snags and down woody in the analysis area because the amount of habitat affected would be small relative to habitat available, the habitat affected was mostly previously harvested, and MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons. In all alternatives, sufficient quality and quantity of snags and replacement snags for viable populations of cavity-dependent wildlife species would continue to be provided in the Crazy PSU. Proposed activities and implementation of design features would maintain the availability and distribution of down wood materials within the impacted PSUs at levels beneficial to wildlife. The availability and distribution of down wood materials in the Crazy PSU would continue to be at levels beneficial to wildlife in all alternatives.

3.25.3 Elk Security, Big Game Habitat (Elk and Deer), and Mountain Goat

This section describes the affected environment and potential effects on elk security, elk and deer winter range, and mountain goats.

3.25.3.1 Elk Security

3.25.3.1.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS. The KFP direction considered in the analysis of elk security is:

> **FW-GDL-WL-10. Elk.** Management activities in planning subunits should maintain existing levels of elk security (see Glossary). Where possible, management activities in high and medium emphasis planning subunits (determined in cooperation with Montana Fish, Wildlife, and Parks; see FW-DC-WL-16) should improve elk security.
>
> **FW-OBJ-WL-02. Elk.** Over the life of the Plan, increase by 1 the number of planning subunits that provide at least 30 percent elk security (see Glossary) and increase by 1 the number of high emphasis planning subunits (determined in cooperation with FWP; see FW-DC-WL-16) that provide at least 50 percent elk security.

The elk is among the Management Indicator Species (MIS) for the KFP. The KFP MIS were chosen to estimate the effects of the KFP alternatives on fish and wildlife populations and to establish KFP objectives for the maintenance and improvement of their associated habitats or habitat components. These MIS are included in the forest-level monitoring program to monitor the outcome of KFP implementation. None were chosen due to viability concerns. The elk was chosen as an MIS because forest access management during the hunting season influences elk security, which was identified in the plan revision analysis as a key indicator for terrestrial wildlife habitat. There are no project-specific analysis requirements for MIS other than those related to project consistency with specific plan components (e.g., elk security guideline FW-GDL-WL-10).

3.25.3.1.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on elk security on National Forest System lands is the Crazy and Silverfish PSUs, where Project activities would occur. Effects were evaluated based on the percentage of National Forest System lands in the Crazy and Silverfish PSUs that provide security habitat for elk. The methods for data collection and effect analysis are described in the JFEIS. The effects of mitigation, such as road access changes associated with grizzly bear mitigation, were included in the analysis of effects on elk security. Although Alternatives 3 and 4 include road access changes in the East Fork Rock Creek drainage (Rock PSU), these changes would not affect elk security; therefore, the Rock PSU is outside of the analysis area.

3.25.3.1.3 Affected Environment

The affected environment for elk security is described in JFEIS Section 3.25.3.1.3, *Affected Environment*. Elk security habitat in the Crazy and Silverfish PSUs is shown on Figure 322. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on elk security in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.3.1.4 Environmental Consequences

Alternative 1

No effects on elk security would occur under this alternative. No motorized access changes during hunting season would occur.

Alternative 2

No new roads would be created, and no motorized access changes during hunting season would occur in Alternative 2. Alternative 2 would not affect elk security.

Alternative 3

New access roads associated with Alternative 3 geotechnical surveys would not reduce elk security habitat. Road access changes, specifically installation of barriers, included in Alternative 3 would increase elk security habitat by 807 acres.

Alternative 4

Effects of Alternative 4 would be the same as Alternative 3.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past, present, and reasonably foreseeable activities on elk security are described in the JFEIS. Increases in elk security habitat resulting from Alternatives 3 and 4, in combination with Rock Creek Project Phase I and Miller-West Fisher access changes, would cumulatively reduce effects on elk security. Alternatives 1 and 2 would not affect elk security or contribute to cumulative effects. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

3.25.3.1.5 Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. None of the alternatives would affect elk security, and all alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

FW-GDL-WL-10. All alternatives were designed in accordance with guideline FW-GDL-WL-10 and would maintain elk security habitat in the Crazy PSU and either maintain (Alternatives 1 and 2) or improve (Alternatives 3 and 4) elk security habitat in the Silverfish PSU.

FW-OBJ-WL-02. Elk. As described in Section 3.25.3 of the JFEIS, percent elk security in analysis area PSUs exceeds 30 percent. None of the alternatives would increase elk security habitat in analysis area PSUs to greater than 50 percent. Therefore, all alternatives would be neutral toward achieving this objective.

3.25.3.2 Big Game (Elk/Deer) Habitat

3.25.3.2.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS.

The vegetation management approach in the KFP promotes ecosystem diversity by focusing on providing the ecological components, patterns, and processes at multiple scales on the landscape that support the full spectrum of habitats and conditions needed for all of the biological organisms associated with the various ecosystems (USDA Forest Service 2013). Cover and forage habitat for native ungulates, including deer and elk, is managed through the desired conditions for vegetation and fire in the KFP. Additional KFP direction considered in the analysis of effects on big game habitat is:

> **FW-DC-WL-08.** Habitat for native ungulates is available and well-distributed across the landscape to provide prey for carnivores.
>
> **FW-DC-WL-16.** Habitat for native ungulates (elk, deer, moose, bighorn sheep, and mountain goat) is managed in coordination with state agencies. Cover and forage are managed according to FW-DC-VEG-01, FW-DC-VEG-02, FW-DC-VEG-04, FW-DC-VEG-05, and FW-DC-VEG-11.
>
> **FW-DC-WL-17.** Forest management contributes to wildlife movement within and between national forest parcels. Movement between those parcels separated by other ownerships is facilitated by management of the NFS portions of linkage areas identified through interagency coordination. Federal ownership is consolidated at these approach areas to highway and road crossings to facilitate wildlife movement.
>
> **FW-DC-WL-19.** By trending toward the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.

FW-GDL-WL-08. Big Game. Management activities should avoid or minimize disturbance to native ungulates on winter range between December 1 and April 30, with exception of routes identified on the KNF's Motor Vehicle Use Map as open to motor vehicle use. Management activities that occur on winter range during the winter period should concentrate activities to reduce effects on native ungulates.

FW-GDL-WL-09. Big Game. Management activities should be avoided or minimized on native ungulate winter range areas during the critical mid-winter period (January and February) when snow depths most likely influence movement and availability of forage.

FW-GDL-WL-11. Big Game. Management activities should avoid or minimize disturbance to native ungulates during the birthing/parturition period.

FW-GDL-WL-12. Connectivity. During construction or reconstruction of highways that cross national forest lands, or high use forest roads, wildlife crossing features should be included in the design where necessary to contribute to connectivity of wildlife populations.

FW-GDL-WL-13. Connectivity. Management activities within one quarter mile of existing crossing features, and future crossing features developed through interagency coordination, should not prevent wildlife from using the crossing features. The vegetative and structural components of connectivity, including snags and downed wood, should be managed according to the desired conditions for vegetation.

FW-GDL-WL-14. Connectivity. In wildlife linkage areas identified through interagency coordination, federal ownership should be maintained.

GA-DC-WL-LIB-04. Wildlife move between the Cabinet Mountains and the Fisher River, as well as north-south through the Cabinet Mountains.

KFP direction for elk security habitat is addressed in Section 3.25.3.1, *Elk Security*.

3.25.3.2.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on elk and deer habitat on National Forest System lands is the Crazy PSU, where Project activities would occur. The Silverfish and Rock PSUs are not included in the analysis area. Although elk and deer habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, other than improving elk security, elk and deer would not be measurably affected by this design feature. Effects of road access changes associated with grizzly bear mitigation lands on elk security are described in Section 3.25.3.1. Effects were evaluated based on the effects indicators shown in Table 345. The methods for data collection and effect analysis are described in the JFEIS.

Table 345. Resource Indicators and Measures for Assessing Effects on Big Game Habitat.

Resource Element	Resource Indicator	Measure	Source
Cover/forage	Indicator 1—Amount of cover relative to forage	Cover/forage percentages	FW-DC-WL-16 FW-DC-WL-19
Winter range	Indicator 2—Management activities on winter range that may affect big game	Overlap of activities and winter range	FW-GDL-WL-08 FW-GDL-WL-09
Special habitats	Indicator 3—Management activities in special habitats such as birth/parturition areas and wallows	Acres of activities in birthing/parturition areas and wallows	FW-GDL-WL-11
Connectivity	Indicator 4—Management activities in connectivity areas	Overlap of activities and connectivity areas	FW-DC-WL-17 FW-GDL-WL-12 FW-GDL-WL-13 FW-GDL-WL-14 GA-DC-WL-FSH-01 GA-DC-WL-LIB-04

3.25.3.2.3 Affected Environment

The affected environment for elk and deer habitat resource indicators is described in JFEIS Section 3.25.3.2.4, *Affected Environment*. Elk and white-tailed deer winter range in the Crazy PSU is shown on Figure 322. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on elk and deer habitat in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.3.2.4 Environmental Consequences

Alternative 1

Resource Indicator 1

Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Forage would be provided at the Libby Adit Site after reclamation was complete. Within the Crazy PSU, cover would remain at 82 to 96 percent and forage at 4 to 18 percent.

Resource Indicator 2

Traffic on Libby Creek Road would increase slightly relative to existing use during Libby Adit Site closure and reclamation. Big game habitat use and occurrence would return to existing conditions after site reclamation was completed. Effects of Alternative 1 on elk and deer winter range would be negligible because the disturbance from increased vehicle use of Libby Creek Road relative to existing use would be small and short-term.

Resource Indicator 3

Alternative 1 would not affect wallows, wetlands, or birthing/parturition areas.

Resource Indicator 4

No additional ground disturbance would occur in Alternative 1. Activities at the Libby Adit Site would increase when the site was reclaimed. The effect would be similar to Alternative 2.

Alternative 2

Resource Indicator 1

Ground disturbance would be limited to existing revegetated areas and an existing soil stockpile within the existing 11.6-acre, privately owned disturbance area (Figure 310), and forage and cover would not be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1. Forage would be provided at the Libby Adit Site after reclamation was completed.

Resource Indicator 2

Alternative 2 facilities would be greater than 6 miles from the nearest area of deer or elk winter range. Libby Creek Road, which is open to motorized use on the Motor Vehicle Use Map, passes through deer winter range and is adjacent to elk winter range. Snowplowing and year-round road use would occur throughout the Project. Traffic on Libby Creek Road and Upper Libby Creek Road would increase by a maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development (see Section 3.21.4). Increased road use by MMC and recreational users may affect wintering elk and deer and cause them to decrease use near the road. During heavy snow years, snowplowing berms may restrict ungulate movement across the road. After the Libby Adit Site was reclaimed and the site closed, effects on deer and elk winter range along Libby Creek Road would cease, and ungulate use along the road would return to existing conditions. Snowplowing and year-round use of Libby Creek Road, including during the critical mid-winter period, could increase displacement of deer and elk from habitat and increase mortality risk in the road corridor; however, increased vehicle use of Libby Creek Road relative to existing use would be small (a maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development) and short-term and would occur in an existing open road corridor.

Resource Indicator 3

As discussed in Section 3.23, *Wetlands and Other* Waters *of the U.S.*, Alternative 2 would have no direct effects on wetlands providing potential wallows. Activities at the Libby Adit Site would occur within the existing 11.6-acre disturbance area and would avoid all wetlands and waters of the U.S.

No known concentrated fawning or calving sites occur within the analysis area, and no additional ground disturbance potentially affecting fawning or calving would occur in Alternative 2. Increased human activity at the Libby Adit Site would slightly increase noise in the surrounding area (see Section 3.20, *Sound*), which may displace deer and elk from nearby suitable fawning or calving habitat. Given the availability of habitat in the surrounding area, effects would be negligible.

Resource Indicator 4

No additional ground disturbance would occur in Alternative 2. Increased human activity at the Libby Adit Site would slightly increase noise in the surrounding area (see Section 3.20, *Sound*), which may disrupt deer and elk movements. Activity at the Libby Adit Site would continue until

the adit was plugged. Deer and elk habitat use and occurrence would return to existing conditions after site reclamation was completed. Individual animals may adjust their localized movement patterns, but no connectivity barriers would be created by Alternative 2. Increased traffic on Libby Creek Road and Upper Libby Creek Road would not likely create a barrier to deer and elk movement.

Alternative 3

Resource Indicator 1

Like Alternative 2, activities at the Libby Adit Site in Alternative 3 would occur within the existing 11.6-acre disturbance area. Alternative 3 geotechnical investigations would disturb 6.4 acres of general forest habitat, consisting of 3.4 acres of previously harvested coniferous forest and 3 acres of mature coniferous forest, which would slightly reduce cover. Alternative 3 would contribute to forage after revegetation of the geotechnical investigation area was complete and the area was revegetated. Effects on the amount of cover relative to forage would be negligible, resulting in a change in the proportion of cover in the Crazy PSU of less than 1 percent.

Resource Indicator 2

The effects of Alternative 3 on winter range would be similar to Alternative 2. In Alternative 3, geotechnical activities would occur more than 1 mile from the nearest elk or deer winter range area. Geotechnical activities would occur between June 16 and October 14 to reduce impacts on grizzly bears and on ungulate winter range and would cease after 12 weeks. Alternative 3 traffic would be less than Alternative 2, due to implementation of the Transportation Plan, which would include transporting employees to the Libby Adit Site, requiring managers to carpool to the extent practicable, and establishing a supply staging area in Libby to consolidate shipments to the site (Section 2.5.3.1.1). Traffic would increase slightly above existing conditions by up to 10 trips per day during Project activities at the Libby Adit. Four to six vehicle trips per day would be made during the 12-week geotechnical investigations. Snowplowing and year-round use of Libby Creek Road, including during the critical midwinter period, could increase displacement of deer and elk from winter range and increase mortality risk in the road corridor. Alternative 3 effects on deer and elk would be minimized because increased vehicle use of Libby Creek Road relative to existing use would be small (up to 10 trips per day) and short-term and located in an existing open road corridor, disturbance from geotechnical activities would be short-term and would not occur in the winter period, and timing restrictions and the Transportation Management Plan would be implemented to minimize effects on winter range.

Resource Indicator 3

As discussed in Section 3.23, *Wetlands and Other* Waters *of the U.S.*, Alternative 3 would have no direct effects on wetlands providing potential wallows. Activities at the Libby Adit Site would occur within the existing 11.6-acre disturbance area and would avoid all wetlands and waters of the U.S. No wetlands providing potential wallows are within the Alternative 3 geotechnical investigation disturbance boundary. MMC would avoid isolated and delineated wetlands and other waters of the U.S. when conducting the geotechnical investigations.

Potential effects on fawning and calving would be similar to Alternative 2, except that human disturbance potentially affecting calving and fawning also would increase temporarily in the geotechnical investigation area. Implementation of the noise mitigation would minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. Given

the availability of habitat in the surrounding area, the temporary nature of the disturbance, and that noise would be reduced through mitigation, any effects on deer and elk fawning and calving would be negligible.

Resource Indicator 4

Effects on big game habitat connectivity would be similar to Alternative 2, except that disturbance from geotechnical activities may temporarily affect big game movements between Little Cherry Creek and Poorman Creek. Implementation of the noise mitigation would minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. The geotechnical investigation disturbance area would be reclaimed and revegetated after activities were complete. Alternative 3 geotechnical activities would not occur on ridgetops and would not directly interfere with big game connectivity in these areas. Individual animals may adjust their localized movement patterns, but no connectivity barriers would be created by Alternative 3.

Alternative 4

Resource Indicator 1

Alternative 4 effects on cover and forage would be similar to Alternative 3, except that less habitat would be disturbed at the geotechnical investigation area. In Alternative 4, geotechnical investigations would disturb 1.1 acres of coniferous forest and 0.4 acre of previously harvested coniferous forest. Effects on the amount of cover relative to forage would be negligible, resulting in a change in the proportion of cover in the Crazy PSU of less than 1 percent.

Resource Indicator 2

The effects on winter range would be similar to Alternative 3, except that the duration of geotechnical activities would be shorter.

Resource Indicator 3

The effects of Alternative 4 on potential wallows would be the same as Alternative 3. Effects of Alternative 4 on fawning and calving would be similar to Alternative 3, except that human disturbance from geotechnical investigations would be shorter in duration. Because the increase in disturbance relative to existing disturbance would be small and short-term, and because effects on fawning and calving would be reduced through implementing design features, Alternative 4 would have a negligible effect.

Resource Indicator 4

Effects on big game connectivity from Alternative 4 would be similar to Alternative 3, except that human disturbance from geotechnical investigations would be shorter in duration. Individual animals may adjust their localized movement patterns, but no connectivity barriers would be created by Alternative 4.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past, present, and reasonably foreseeable activities on deer and elk habitat are described in the JFEIS. It is expected that vegetation management on National Forest System lands that creates more forage and moves vegetative conditions nearer to the desired

conditions would provide the amounts of cover and forage and the pattern similar to historic conditions. All action alternatives would contribute toward increasing forage, although effects on the amount of cover relative to forage would be negligible. In all action alternatives, snowplowing and year-round use of Libby Creek Road could increase displacement of deer and elk from winter range and increase mortality risk in the road corridor, but effects would be small and short-term and would not substantially contribute to cumulative effects on ungulates. None of the alternatives would affect wetlands providing potential wallows; therefore, they would not contribute to cumulative effects on wallows. Because their effects on fawning and calving would be negligible, none of the alternatives would contribute to cumulative effects on fawning and calving when combined with the effects of other past, present, and reasonably foreseeable activities. None of the alternatives would create barriers to deer and elk movement across their habitat; therefore, they would not contribute to cumulative effects on habitat connectivity. Cumulative effects of the Montanore Project, if it were approved and implemented, on the four deer and elk habitat effects indicators are described in the JFEIS.

3.25.3.2.5 Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Mineral Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. Effects of all alternatives on cover and forage, big game winter range, special habitats, and habitat connectivity would be negligible. In addition, Alternatives 3 and 4 include timing restrictions for geotechnical activities to reduce effects on big game winter range. All alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

Consistency with KFP direction is described below.

FW-DC-WL-08. The Project would not manage vegetation for ungulate habitat. Alternative 2 would not affect deer or elk habitat, and Alternatives 3 and 4 would make negligible contributions to forage after reclamation of the geotechnical investigation area was complete and the area was revegetated. Alternatives 3 and 4 would contribute slightly to progressing toward this desired condition.

FW-DC-WL-16. The Project would not manage vegetation for ungulate habitat. Analysis of all alternatives used information provided by the State (e.g., winter range GIS layers). None of the alternatives would affect overall forestwide trends toward achieving this desired condition.

FW-DC-WL-17. None of the alternatives would create barriers to movement. All alternatives would be neutral with regard to achieving this desired condition.

FW-DC-WL-19. The alternatives would be neutral with regard to this desired condition or would contribute to early seral habitats in the long term after reclamation and revegetation was completed. Alternatives 3 and 4 would create small openings and early seral habitats, which would contribute to progress toward this desired condition.

FW-GDL-WL-08. In all action alternatives, Libby Creek Road and Upper Libby Creek Road, which are identified as open to motor vehicle use, would be snowplowed and used during the winter. Other than increased use of these two roads, none of the alternatives would affect deer or

elk winter range. In Alternatives 3 and 4, geotechnical work would be restricted to the period between June 16 and October 14 to reduce impacts on grizzly bears and on ungulate (including moose) winter range. Implementation of the Transportation Plan in Alternatives 3 and 4 would minimize Project-related increases in traffic on Libby Creek Road and Upper Libby Creek Road. In Alternatives 3 and 4, traffic would increase slightly above existing conditions by up to 10 trips per day during Project activities at the Libby Adit Site. All alternatives were designed in accordance with this guideline.

FW-GDL-WL-09. Other than increased use of Libby Creek Road and Upper Libby Creek Road, none of the alternatives would affect deer or elk during the winter period. In all action alternatives, Libby Creek Road and Upper Libby Creek Road would be snowplowed and used during the winter. Although activities would be concentrated on existing roads and disturbed areas, disturbance from increased vehicle use of these two roads could result in increased displacement of deer, elk, and moose from winter range and increased mortality risk in the road corridor. Libby Creek Road passes through moose and deer winter range and near elk winter range; Upper Libby Creek Road passes through moose winter range. Snowplowing and year-round use of these two roads would occur during the critical midwinter period (January and February) when snow depths most likely influence ungulate movement and availability of forage. Both Libby Creek Road and Upper Libby Creek Road provide access to private land and are year-round open roads identified on Motor Vehicle Use Maps (MVUM) as open to motor vehicle use. Evaluation Project management activities that would occur during winter are concentrated in the existing open road corridor, which minimizes disturbance to the surrounding winter range during the critical midwinter period. Although snowplowing would increase wheeled motorized vehicle traffic on the plowed roads, a reduction in snowmobile traffic would be expected on these roads. In Alternatives 3 and 4, geotechnical work would be restricted to the period between June 16 and October 14 to reduce impacts on grizzly bears and on ungulate winter range. Implementation of the Transportation Plan in Alternatives 3 and 4 would minimize Project-related increases in traffic on Libby Creek Road. Therefore, all alternatives would meet the intent of this guideline.

FW-GDL-WL-11. No areas of concentrated use for deer and elk birthing or parturition are known in the analysis area. Therefore, all alternatives were designed in accordance with this guideline.

FW-GDL-WL-12. There are no sites along routes used for these alternatives where Project activities are expected to create a connectivity or movement barrier. No crossing features are warranted for inclusion in the project design. Therefore, all alternatives were designed in accordance with this guideline.

FW-GDL-WL-13. There are no existing crossing features or any crossing features under development. Therefore, all alternatives were designed in accordance with this guideline.

FW-GDL-WL-14. None of the alternatives would affect federal ownership of habitat in big game linkage areas. Therefore, all alternatives were designed in accordance with this guideline.

GA-DC-WL-LIB-04. None of the alternatives would create barriers to deer and elk movement through the Cabinet Mountains and between the Cabinet Mountains and other key habitat areas.

3.25.3.3 Mountain Goat

3.25.3.3.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS. Cover and forage habitat for mountain goat is managed through the desired conditions for vegetation and fire in the KFP. Additional wildlife-specific KFP direction considered in the analysis of big game habitat, including mountain goat, is described under Section 3.25.3.2, Big Game (Elk/Deer) Habitat.

3.25.3.3.2 Analysis Area and Methods

The analysis area for direct and indirect project effects on individuals and their habitat is all mountain goat habitat in the Crazy PSU (Figure 323). The Silverfish and Rock PSUs are not included in the analysis area. Although mountain goat habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, mountain goats would not be measurably affected by this design feature. The methods for data collection and effect analysis are the same as described in the JFEIS.

In the JFEIS, influence zones based on the Cumulative Effects Model (USDA Forest Service et al. 1988; IGBC 1990) were used to evaluate effects of human activity on mountain goats. A transmission line would not be constructed, and mountain goats would not be affected by helicopter use. The influence zone for the high-intensity motorized point activity or motorized linear high use activity that would occur is 0.5 mile and 0.25 mile, respectively. Except for increased activities at the existing Libby Adit Site, no Project activities would occur in influence zones where mountain goat summer or winter range occurs (Figure 323).

The effects analysis includes an evaluation of the potential benefits to mountain goats from implementation of noise mitigations described in Section 2.5.4.3.3, *Noise Mitigation*, and the MRDG process in the CMW described in Section 3.24.1.

3.25.3.3.3 Affected Environment

Updated information about mountain goat habitat use and occurrence in the analysis area is presented in this section. Except as described in this section, the affected environment for mountain goats or their habitat is described in JFEIS Section 3.25.3.3.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on mountain goats in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

Mountain goats may be disturbed by continued maintenance and care of the Libby Adit Site. Habitat potentially affected by disturbance at the Libby Adit Site is shown on Figure 323. As part of a cooperative agreement with FWP, MMC prepared a report presenting data acquired from mountain goat surveys of the drainages between and including the Bear Creek and West Fisher drainages conducted from late spring 2013 to late fall 2015 (Klepfer Mining Services 2017b). Survey results indicated that most mountain goats were observed on the north-facing slopes and headwalls of Poorman, Ramsey, Libby, and West Fisher creek drainages. Few goats were observed in the winter range areas defined by Brown (2006) or in the influence zones defined in the JFEIS during any season. Two goats were observed in the influence zone around the Libby Adit Site during both fall flights. Survey results suggest that females preferred areas other than the previously identified kidding area near Shaw Mountain, where one female was observed.

3.25.3.3.4 Environmental Consequences

Alternative 1

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with the permitted activities at the Libby Adit Site. Goats would likely continue to use the headwalls of Poorman, Ramsey, Libby, and West Fisher Creek drainages. Increased activity at the Libby Adit Site and increased traffic during site closure would slightly increase noise in the surrounding area, temporarily intensifying disturbance in the existing influence zones for these activities. Mountain goat habitat use and occurrence would return to existing conditions after site reclamation was completed.

Alternative 2

No mountain goat habitat would be physically lost or degraded in Alternative 2. Ground disturbance would be limited to existing revegetated areas and an existing soil stockpile in the existing 11.6-acre, privately owned disturbance area (Figure 310). As described in Section 3.20, *Sound*, increased activity at the Libby Adit Site and increased traffic would slightly increase noise in the surrounding area, temporarily intensifying disturbance in the existing influence zones for these activities. Activity at the Libby Adit Site would continue until the adit was plugged and return to existing conditions after the site was reclaimed. Based on recent surveys conducted by FWP (Klepfer Mining Services 2017b), goat use in the influence zones defined in the JFEIS is rare. Because the increase in disturbance relative to existing disturbance would be small and short-term, and because goat use of habitat adjacent to the Libby Adit Site and Upper Libby Creek Road appears to be infrequent, Alternative 2 would have a negligible effect on mountain goats.

Alternative 3

The effects of Alternative 3 on mountain goats would be similar to Alternative 2, except that human disturbance also would increase temporarily in the geotechnical investigation area. Neither summer range nor winter range habitat occurs within the geotechnical investigation area influence zone (Figure 323). In Alternative 3, MMC would conduct additional water resources and subsidence monitoring in the CMW (see Appendix C). Installation of monitoring equipment and survey monuments, as well as disturbance from airplanes or helicopters used for topographic surveys, may result in increased human disturbance of mountain goats in the CMW, but effects would be short-term. Before any monitoring would occur, the Forest Service would conduct a Minimum Requirements Analysis according to the MRDG to ensure that adverse effects on wilderness character are minimized (see Section 3.24, *Wilderness, Roadless Areas, Special Areas, and Wild and Scenic Rivers*), which also would minimize effects on mountain goats. Implementation of the noise mitigation in the geotechnical investigation area and at the Libby Adit Site would minimize noise. Noise in the geotechnical investigation area would return to existing levels at the end of the 12-week geotechnical investigation. Because the increase in disturbance relative to existing disturbance would be small and short-term, and because goat use of habitat adjacent to the Libby Adit Site, Upper Libby Creek Road, and geotechnical investigation area influence zones appears to be infrequent, Alternative 3 would have a negligible effect on mountain goats. In addition, any effects on goats would be minimized through implementation of the noise mitigation measures and, in the CMW, the MRDG process.

Alternative 4

The effects of Alternative 4 on mountain goats would be similar to Alternative 3, except that human disturbance from geotechnical investigations would be shorter in duration. Because the increase in disturbance relative to existing disturbance would be small and short-term, and because goat use of habitat adjacent to the Libby Adit Site, Upper Libby Creek Road, and geotechnical investigation area influence zones appears to be infrequent, Alternative 4 would have a negligible effect on mountain goats. In addition, any effects on goats would be minimized through implementation of the noise mitigation measures and, in the CMW, the MRDG process.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. Climate change also would contribute to degradation or loss of mountain goat habitat quality by changing seasonal precipitation and temperature patterns influencing vegetation and snow cover. The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Project activities would not have cumulative effects when combined with Rock Creek's Phase I. Other reasonably foreseeable actions would not affect mountain goat habitat, and none of the alternatives would cumulatively affect mountain goats. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

3.25.3.3.5 Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. The effects of Alternative 2 on mountain goats would be negligible. Alternatives 3 and 4 would incorporate feasible and practicable measures to minimize adverse environmental effects on mountain goat habitat. These measures would include implementing access changes and land protection described in Section 2.5, *Alternative 3*, and noise mitigations described in Section 2.5.4.3.3, *Noise Mitigation*. All alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

FW-DC-WL-08. The Project would not manage vegetation for ungulate habitat. Alternatives 2, 3, and 4 would not directly remove mountain goat summer or winter range. Although Alternatives 2, 3, and 4 would slightly increase noise disturbance, effects on mountain goats would be negligible. Forestwide, adequate amounts of mountain goat habitat would remain available and well-distributed across the landscape to provide prey for carnivores. None of the alternatives would affect overall forestwide trends toward achieving this desired condition.

FW-DC-WL-16. The Project would not manage vegetation for ungulate habitat. Analysis of all alternatives used information provided by the state (e.g., winter range information). All alternatives would not affect overall forestwide trends toward achieving this desired condition.

FW-DC-WL-17. The alternatives would not create barriers to movement. None of the alternatives would affect overall forestwide trends toward achieving this desired condition.

FW-GDL-WL-08 and FW-GDL-WL-09. Alternatives 2, 3, and 4 would not include any new surface disturbance of mountain goat winter range. All alternatives would meet the intent of these guidelines for mountain goats.

FW-GDL-WL-11. Alternatives 2, 3, and 4 would not disturb native ungulates in birthing/parturition areas. All alternatives were designed in accordance with this guideline.

FW-GDL-WL-12. There are no sites along routes used for these alternatives where Project activities are expected to create a connectivity or movement barrier. No crossing features are warranted for inclusion in the project design. All alternatives were designed in accordance with this guideline.

FW-GDL-WL-13. There are no existing crossing features or any crossing features under development. All alternatives were designed in accordance with this guideline.

FW-GDL-WL-14. No wildlife linkage areas have been identified for mountain goats in the analysis area, and connectivity would not be affected. All alternatives were designed in accordance with this guideline.

GA-DC-WL-LIB-04. The alternatives are not expected to affect mountain goat north-south movement through the Cabinet Mountains. All alternatives would be neutral to progress toward achieving this desired condition.

Mountain Goat Statement of Findings

All of the action alternatives would have negligible short-term effects on mountain goats. Mosaics of habitat types, forage opportunities, and secure habitat away from open roads and project facilities are available in alpine habitats in the analysis area. Therefore, sufficient quality and quantity of the diverse age classes of vegetation currently found in the analysis area would remain to provide habitat for mountain goats in the Crazy PSU, consistent with KFP direction for native ungulate habitat.

3.25.4 Forest Service Sensitive Species

3.25.4.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS. Sensitive species are administratively designated by the Regional Forester (Forest Service Manual [FSM] 2670.5) and are those species for which population viability is a concern. Conservation Assessments have been completed for some sensitive species to assist land managers with planning efforts. The KFP includes direction for the protection, enhancement, and restoration of sensitive species and their habitats (Anderson 2014; Ecosystem Research Group 2012; Kootenai and Idaho Panhandle National Forests 2014).

Sensitive species are designated by the Regional Forester (FSM 2670.5). FSM 2672.42 directs the Forest Service to conduct a biological evaluation (BE) to analyze effects on sensitive species. The sensitive species analysis in this document meets the requirements for a BE as outlined in FSM 2672.42. FSM 2670.22 requires that the Forest Service develop and implement management practices to ensure that sensitive species do not become threatened or endangered because of Forest Service actions and maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on

National Forest System lands. Any decision on the Project cannot result in loss of sensitive species viability or create significant trends toward federal listing (FSM 2670.32). Sensitive wildlife species on the KNF and their status in the analysis area are listed in Table 346.

In addition to general habitat managed through the desired conditions for vegetation and fire in the KFP, the following KFP direction was considered in the analysis of all sensitive wildlife species discussed in this section. FW-GDL-WL-21 applies to sensitive, threatened, or endangered species not covered under other forestwide guidelines. This direction is not repeated for each individual species.

> **GOAL-WL-01.** The KNF manages wildlife habitat through a variety of methods (*e.g.*, vegetation alteration, prescribed burning, invasive species treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species.
>
> **GOAL-WL-02.** The KNF manages and schedules activities to avoid or minimize disturbance to sensitive species and manages habitat to promote their perpetuation into the future.
>
> **FW-GDL-WL-21.** Management activities on NFS lands should avoid/minimize disturbance at known active nesting or denning sites for other sensitive, threatened, or endangered species not covered under other forestwide guidelines. Use the best available information to set a timeframe and a distance buffer around active nests or dens. Individual animals that establish nests and den sites near areas of pre-existing human use, inconsistent with the timeframes and distances in the other forestwide wildlife guidelines or in the best available information, are assumed to be accepting of that existing higher level of human use at the time the animals established occupancy. In those instances, as long as the individual animals continue to use the site, the higher intensity, duration, and extent of disturbance may continue but would not be increased beyond the level existing at the time the animals established occupancy.

3.25.4.2 Black-Backed Woodpecker

3.25.4.2.1 Regulatory Framework

General KFP direction considered in the analysis of sensitive species is described in Section 3.25.4.1, *Regulatory Framework*. In addition, the KFP direction considered in the analysis of the black-backed woodpecker is:

> **FW-GDL-WL-05. Wildfire Areas.** Maintain unlogged conditions in some portions of areas burned by wildfires for 5 years post-fire. A well distributed diversity of patch sizes and burned conditions, based on fire characteristics and pre-fire forest conditions, should be left to provide habitat for species whose habitat requirements include recently burned forests (black-backed woodpecker, etc.).

Table 346. Sensitive Wildlife Species on the KNF and Status in the Analysis Area.

Sensitive Species	Status[1]	Determi-nation[2]	Comments
American peregrine falcon (*Falco peregrinus anatum*)	S	No impact	May occur in the analysis area, but no suitable habitat would be impacted by project alternatives. Species dropped from further analysis.
Bald eagle (*Haliaeetus leucocephalus*)	K	May impact	Species and suitable habitat observed in analysis area, but impacts would be negligible (see JFEIS Section 3.25.4.2, *Bald Eagle*). Species dropped from further analysis.
Bighorn sheep (*Ovis canadensis*)	NS	No impact	No suitable habitat available in analysis area.
Black-backed woodpecker (*Picoides arcticus*)	S	May impact	Observed outside but in vicinity of analysis area, and suitable habitat available.
Coeur d'Alene salamander (*Plethodon vandykei idahoensis*)	NS	No impact	No suitable habitat available in analysis area (see JFEIS Section 3.25.4.4, *Coeur D'Alene Salamander*).
Common loon (*Gavia immer*)	NS	No impact	No suitable habitat available in analysis area.
Fisher (*Martes pennanti*)	K	May impact	Species and suitable habitat observed in analysis area.
Flammulated owl (*Otus flammeolus*)	K	May impact	Species and suitable habitat observed in analysis area.
Gray wolf (*Canis lupus*)	K	May impact	Species and suitable habitat observed in analysis area.
Harlequin duck (*Histrionicus histrionicus*)	NS	No impact	No suitable habitat available in analysis area.
Northern bog lemming (*Synaptomys borealis*)	NS	No impact	Analysis area not within species range.
Northern leopard frog (*Rana pipiens*)	NS	No impact	No suitable habitat available in analysis area.
Townsend's big-eared bat (*Corynorhinus townsendii*)	K	May impact	Species and suitable habitat observed in analysis area.
Western toad (*Bufo boreas*)	K	May impact	Species and suitable habitat observed in analysis area.

[1] Status Key:

K = Species is known to occur in the analysis area.
S = Species is suspected to occur in analysis area.
NS = Species is not suspected to occur in the analysis area and is dropped from further evaluation.

[2] Determination Key:

No impact = Species is not suspected to occur in the analysis area.
May impact = May impact individuals or their habitat but will not likely contribute to a trend toward federal listing.

Source: USDA Forest Service 2011b; Westech 2005; MNHP and FWP 2014; and KNF data for District observation and historical records (NRIS Wildlife).

3.25.4.2.2 Analysis Area and Methods

The analysis area for direct and indirect project effects on individual black-backed woodpeckers and their habitat is the Crazy PSU. The Silverfish and Rock PSUs are not included in the analysis area because protection of grizzly bear mitigation lands in these PSUs in Alternatives 3 and 4

would not affect black-backed woodpecker habitat. The methods for data collection and effect analysis are the same as described in the JFEIS. Indicators for comparing alternative effects on black-backed woodpecker are changes in high-quality and general forest habitat. The effects analysis includes an evaluation of the benefits to black-backed woodpeckers from mitigation measures proposed by the KNF.

3.25.4.2.3 Affected Environment

Two wildfires occurred in the Crazy PSU in 2015: the 177-acre Smearl fire in the Smearl Creek drainage and the 7-acre Midas fire in the Midas Creek drainage. These burned areas provide habitat for beetles, larvae, and other black-backed woodpecker food sources, improving habitat for this species. Other than these recent fires, habitat conditions for the black-backed woodpecker are as described in JFEIS Section 3.25.4.3.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on black-backed woodpeckers in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.4.2.4 Environmental Consequences

Alternative 1

In Alternative 1, no direct, indirect, or cumulative effects on black-backed woodpeckers or their habitat would occur. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Over time, with continued fire suppression and lack of active forest management, indirect effects of this alternative would include a continued trend toward later successional habitats.

Alternative 2

Ground disturbance would be limited to existing revegetated areas and an existing soil stockpile in the existing 11.6-acre, privately owned disturbance area (Figure 310). No black-backed woodpecker habitat would be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1.

Alternative 3

Alternative 3 would not affect high-quality black-backed woodpecker habitat in the Crazy PSU. Geotechnical investigations would disturb 6.4 acres of general forest habitat, consisting of 3.4 acres of previously harvested coniferous forest and 3 acres of mature coniferous forest. Alternative 3 would have a negligible effect on black-backed woodpeckers because no high-quality (post-fire) habitat would be affected, no black-backed woodpeckers have been observed in the Crazy PSU, and the amount of low-quality habitat affected would be small relative to habitat available in the analysis area. MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons. This mitigation would be incorporated into the Vegetation Removal and Disposition Plan and would reduce any effects on black-backed woodpeckers.

Alternative 4

Direct and indirect effects from Alternative 4 on black-backed woodpecker would be similar to Alternative 3, except that less habitat would be removed at the geotechnical investigation area. In Alternative 4, geotechnical investigations would disturb 1.1 acres of coniferous forest and 0.4 acre of previously harvested coniferous forest. Other effects would be the same as described for Alternative 3.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past, present, and reasonably foreseeable activities on black-backed woodpecker are described in the JFEIS. Because their effects on black-backed woodpeckers would be negligible, none of the alternatives would contribute to cumulative effects on the species when combined with the effects of other past, present, and reasonably foreseeable activities. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. Alternative 2 would have no effect on black-backed woodpecker habitat. Alternatives 3 and 4 would comply with 36 CFR 228.8. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental effects on wildlife habitat that benefit black-backed woodpecker, including implementing a Vegetation Removal and Disposition Plan.

National Forest Management Act/Kootenai Forest Plan

As described in Section 3.25.2, *Key Habitats (Snags and* Woody Debris*)*, all action alternatives would be consistent with desired conditions for snags and down wood. In all alternatives, a wide range of successional habitats and associated amounts of down wood would be available.

Forest Service Sensitive Species Statement of Findings

Neither Alternative 1 nor Alternative 2 would affect individual black-backed woodpeckers or their habitat in the analysis area, and neither would contribute to a trend toward federal listing or cause a loss of viability to the population or species. ***Alternatives 3 and 4 may impact individual black-backed woodpeckers or their habitat but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.*** This determination is based on the following: (1) no effect on high-quality (post-fire) habitat would occur; (2) no black-backed woodpeckers have been observed in the Crazy PSU, despite several recent surveys; (3) the amount of low-quality habitat affected would be small relative to habitat available in the analysis area; and (4) implementation of the Vegetation Removal and Disposition Plan would minimize any effects.

3.25.4.3 Fisher

3.25.4.3.1 Regulatory Framework

In 2011, the USFWS concluded that the fisher in the U.S. Northern Rocky Mountains of western Montana and north-central to northern Idaho constituted a distinct population segment but determined that listing the fisher as threatened or endangered was not warranted at the time. In response to another petition, the USFWS determined in 2017 that listing the Northern Rocky Mountain population of the fisher was not warranted at the time (USFWS 2017). General KFP direction considered in the analysis of sensitive species is described in Section 3.25.4.1, *Regulatory Framework*.

3.25.4.3.2 Analysis Area and Methods

The analysis area for direct and indirect project effects on individual fishers and their habitat is the Crazy PSU. The Silverfish and Rock PSUs are not included in the analysis area. Although fisher habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, fishers would not be measurably affected by this design feature. The methods for data collection and effect analysis are the same as described in the JFEIS. The effects analysis includes an evaluation of the benefits to fisher from mitigation measures proposed by the KNF.

3.25.4.3.3 Affected Environment

The affected environment for fishers and their habitat is described in JFEIS Section 3.25.4.5.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on fishers in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.4.3.4 Environmental Consequences

Alternative 1

Alternative 1 would not disturb the fisher or its habitat and would have no effect on this species. Over time, with continued fire suppression and lack of active forest management, indirect effects of this alternative would include a continued trend toward later successional habitats, which would favor fisher habitat. Large-scale fires could occur in the analysis area. Ecosystem Research Group (2012) reported that over the next 5 decades, the driving force behind habitat change on the KNF will be due to natural disturbance processes, especially wildfire. Similarly, in its listing decision, the USFWS notes that fisher populations have increased in numbers and distribution despite the effects of anthropogenic activities.

Traffic during site closure would slightly increase but would return to existing conditions after site reclamation was completed. Effects of Alternative 1 traffic on fishers would be negligible because the increased vehicle use of Libby Creek Road relative to existing use would be small and short-term.

Alternative 2

No modeled fisher habitat in the Crazy PSU would be disturbed as a result of Alternative 2. Snowplowing and year-round road use would occur throughout the Project. Traffic on Libby Creek Road and Upper Libby Creek Road would increase by a maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development (see Section 3.21.4), but effects on fisher would be negligible because of the relatively low speeds (less than 30 mph) and traffic volumes anticipated on access roads. Increased human activity at the Libby Adit Site would slightly increase noise in the surrounding area (see Section 3.20, *Sound*), which may displace fishers from nearby suitable habitat. Activity at the Libby Adit Site would continue until the adit was plugged. Fisher habitat use and occurrence would return to existing conditions after site reclamation was completed. Because the increase in disturbance relative to existing conditions would be small and short-term, Alternative 2 would have negligible disturbance effects on fishers.

Alternative 3

The types of effects on fisher from Alternative 3 would be the same as Alternative 2, except that traffic would be slightly less (up to 10 trips per day) with implementation of the Transportation Plan, and human disturbance would increase temporarily in the geotechnical investigation area. Implementation of the noise mitigation would minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. MMC also would implement measures described in Section 3.6.4.3.1 to minimize effects on riparian habitat potentially supporting fishers. Road access changes would reduce trappers' winter access to fisher habitat in old-growth and riparian areas. Because the increase in disturbance relative to existing disturbance would be small and short-term, and because effects on fishers would be reduced through implementing design features, Alternative 3 would have a negligible effect on fishers.

Alternative 4

The effects of Alternative 4 on fisher would be similar to Alternative 3, except that human disturbance from geotechnical investigations would be shorter in duration. Other effects would be the same as described for Alternative 3.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. Climate change also would contribute to degradation or loss of fisher habitat by changing seasonal precipitation and temperature patterns influencing vegetation and snow cover. The effects of past, present, and reasonably foreseeable activities on fishers are described in the JFEIS. Because their effects on fishers would be negligible, none of the action alternatives would contribute to cumulative effects on the species when combined with the effects of other past, present, and reasonably foreseeable activities. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. The effects of Alternative 2 on fisher would be negligible. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental effects on wildlife habitat that benefit fisher. These measures would include implementing access changes and land protection described in Section 2.5, *Alternative 3*; noise mitigations described in Section 2.5.4.3.3, *Noise Mitigation*; and BMPs to reduce effects on RHCAs described in Section 2.5.3.1.2, *Road Management Plan Development and Implementation*, and Section 2.5.3.2.4, *Vegetation Removal and Disposition Plan*. All alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

Fisher habitat occurs in the analysis area. Effects of all alternatives on fishers would be negligible. In addition, Alternatives 3 and 4 would include measures to minimize effects on riparian forests that provide habitat for fisher. Section 3.6, *Aquatic Life and Fisheries*, describes forest plan consistency with KFP direction regarding riparian habitat components that benefit fisher.

Forest Service Sensitive Species Statement of Findings

Alternative 1 would not affect individual fisher or their habitat in the analysis area and would not contribute to a trend toward federal listing or cause a loss of viability to the population or species. ***All action alternatives may impact individual fishers or their habitat but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.*** This determination is based on the following: (1) none of the action alternatives would remove modeled fisher habitat, (2) the increase in disturbance relative to existing conditions would be small and short-term, and (3) mitigation measures included in Alternatives 3 and 4 would reduce disturbance to fishers. While some individual fishers may be affected, for all action alternatives, effects would be negligible and would not limit fisher viability on the KNF or affect fisher populations in the Crazy PSU.

3.25.4.4 Flammulated Owl

3.25.4.4.1 Regulatory Framework

General KFP direction considered in the analysis of sensitive species is described in Section 3.25.4.1, *Regulatory Framework*. In addition, the KFP direction considered in the analysis of the flammulated owl is:

> **FW-GDL-WL-16. Raptors.** Management activities on NFS lands should avoid/minimize disturbance at known active raptor nests, including owls. Timing restrictions and distance buffers should be based on the best available information, as well as site-specific factors (e.g., topography, available habitat, etc.). Birds that establish nests near pre-existing human activities are assumed to be tolerant of that level of activity.

3.25.4.4.2 Analysis Area and Methods

The analysis area for direct and indirect project effects on individual flammulated owls and their habitat is the Crazy PSU. The Silverfish and Rock PSUs are not included in the analysis area. Although flammulated owl habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, flammulated owls would not be measurably affected by this design feature. The methods for data collection and effect analysis are the same as described in the JFEIS. The effects analysis includes an evaluation of the benefits to flammulated owl from mitigation measures proposed by the KNF.

3.25.4.4.3 Affected Environment

The affected environment for flammulated owls and their habitat is described in JFEIS Section 3.25.4.6.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on flammulated owls in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.4.4.4 Environmental Consequences

Alternative 1

Alternative 1 would not disturb the flammulated owl's habitat. Increased activity at the Libby Adit Site and increased traffic during site closure would slightly increase noise in the surrounding area, temporarily intensifying disturbance in the existing influence zones for these activities.

Flammulated owl habitat use and occurrence would return to existing conditions after site reclamation was completed.

Alternative 2

No mapped flammulated owl habitat in the Crazy PSU would be disturbed as a result of Alternative 2. Increased human activity at the Libby Adit Site would slightly increase noise in the surrounding area (see Section 3.20, Sound), which may displace flammulated owls from nearby suitable habitat. Activity at the Libby Adit Site would continue until the adit was plugged. Flammulated owl habitat use and occurrence would return to existing conditions after site reclamation was completed. Because the increase in disturbance relative to existing conditions would be small and short-term, Alternative 2 would have a negligible disturbance effect on flammulated owls.

Alternative 3

The types of effects on flammulated owl from Alternative 3 would be the same as Alternative 2, except that human disturbance also would increase temporarily in the geotechnical investigation area. Implementation of the noise mitigation would minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. MMC also would implement a Vegetation Removal and Disposition Plan, which would reduce effects on flammulated owl habitat. Because the increase in disturbance relative to existing disturbance would be small and short-term, and because effects on flammulated owls would be reduced through implementing design features, Alternative 3 would have a negligible effect on flammulated owls.

Alternative 4

The effects of Alternative 4 on flammulated owls would be similar to Alternative 3, except that human disturbance from geotechnical investigations would be shorter in duration. Other effects would be the same as described for Alternative 3.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. Climate change also would contribute to degradation or loss of flammulated owl habitat by changing seasonal precipitation and temperature patterns influencing vegetation. The effects of past, present, and reasonably foreseeable activities on flammulated owls are described in the JFEIS. Because their effects on flammulated owls would be negligible, none of the action alternatives would contribute to cumulative effects on the species when combined with the effects of other past, present, and reasonably foreseeable activities. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. The effects of Alternative 2 on flammulated owls would be negligible. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental effects on wildlife habitat that benefit flammulated owls, including implementing a Vegetation Removal and

Disposition Plan and noise mitigations described in Section 2.5.4.3.3, *Noise Mitigation*. All alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

As described in Section 3.25.2, *Key Habitats (Snags and* Woody Debris*)*, all action alternatives would be consistent with KFP desired conditions for snags and down wood. In all alternatives, a wide range of successional habitats and associated amounts of down wood would be available. All alternatives were designed in accordance with guideline FW-GDL-WL-16 to avoid or minimize disturbance at known active raptor nests, including those of owls.

Forest Service Management Sensitive Species Statement of Findings

Alternative 1 would not affect individual flammulated owls or their habitat in the analysis area and would not contribute to a trend toward federal listing or cause a loss of viability to the population or species. ***All action alternatives may impact individual flammulated owls or their habitat but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species for flammulated owls.*** This determination is based on the following: (1) none of the action alternatives would remove mapped flammulated owl habitat, (2) no flammulated owls were identified in the analysis area during surveys conducted in 2005 (Westech 2005), (3) the increase in disturbance from human activities relative to existing conditions would be small and short-term, (4) mitigation measures included in Alternatives 3 and 4 would reduce disturbance to flammulated owls, and (5) sufficient habitat would remain in the Crazy PSU and across the KNF to support existing populations, and habitat would continue to increase over the next 5 decades (Ecosystem Research Group 2012). While some individual flammulated owls may be affected, for all action alternatives, effects would be negligible and would not limit flammulated owl viability on the KNF or affect flammulated owl populations in the Crazy PSU.

3.25.4.5 Gray Wolf

3.25.4.5.1 Regulatory Framework

The gray wolf was removed from the federal list of T&E species and is listed as a sensitive species in Forest Service Region 1. The final rule delisting gray wolf populations in the Northern Rocky Mountains (USFWS 2011) authorized the State of Montana (FWP) to manage wolves under the state's approved Gray Wolf Conservation and Management Plan. The FWP currently manages active harvest of wolves in northwest Montana including within the analysis area.

General KFP direction considered in the analysis of sensitive species is described in Section 3.25.4.1, *Regulatory Framework*. In addition, the KFP direction considered in the analysis of the gray wolf is:

> **FW-DC-WL-01.** Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites. Individual animals that establish nests and den sites near areas of pre-existing human use are assumed to be accepting of that existing level of human use at the time the animals establish occupancy.
>
> **FW-DC-WL-08.** Habitat for native ungulates is available and well-distributed across the landscape to provide prey for carnivores.

FW-DC-WL-18. Secure denning and rendezvous sites are available for wolf packs and avoided by management activities during critical biological periods (e.g., whelping, rearing).

FW-GDL-WL-18. Wolf. Management activities would avoid or minimize disturbance to wolves near den and rendezvous sites during the times those sites are in use based on the best available information.

3.25.4.5.2 Analysis Area and Methods

The analysis area for direct and indirect project effects on individual wolves and their habitat is the Crazy PSU. The Silverfish and Rock PSUs are not included in the analysis area. Although wolf habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, other than improving security for prey (elk), wolves would not be measurably affected by this design feature. The methods for data collection and effect analysis are the same as described in the JFEIS. The effects analysis includes an evaluation of the benefits to wolves from mitigation measures proposed by the KNF. Measurement indicators for evaluating effects of the alternatives on the gray wolf are based on the following key habitat components described in the Wolf Recovery Plan (USFWS 1987): year-round prey base, suitable denning and rendezvous sites, and sufficient space with minimal exposure to humans. The rationale for basing the effects evaluation on these components and the indicators of effects are described in the JFEIS.

3.25.4.5.3 Affected Environment

The affected environment for gray wolves and their habitat is described in JFEIS Section 3.25.4.7.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on gray wolves in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

At the end of 2017, at least 124 wolf packs and 63 breeding pairs were in Montana (FWP 2018). Based on Patch Occupancy modeling, an estimated 851 wolves occupied Montana (FWP 2018). In 2017, 233 wolves were legally harvested across Montana (FWP 2018). The Cabinet Pack continues to be active in the Libby Creek area, but it has not yet been confirmed if they produced pups in 2018, or if the geotechnical investigation area is still being used as a pup rearing or rendezvous site (Boyd, pers. comm. 2018).

3.25.4.5.4 Environmental Consequences

Alternative 1

Alternative 1 would not affect the gray wolf and would not change existing conditions for prey base, denning and rendezvous sites, or space with minimal exposure to humans.

Alternative 2

Prey Base

In Alternative 2, current populations of white-tailed deer, elk, and moose would be maintained and continue to provide a good year-round prey base for wolves. Alternative 2 effects on habitat conditions for big game species are described in Section 3.25.3, *Elk Security, Big Game Habitat (Elk and Deer), and Mountain Goat*, and Section 3.25.7, *Other Species of Interest*.

Den and Rendezvous Sites

No known den or rendezvous sites occur near Alternative 2 facilities. Alternative 2 is unlikely to affect wolf denning or congregating. Based on general habitat availability; location of roads and other areas of human activity (Figure 303); and the presence of features typical of den or rendezvous sites, such as streams and other areas of open water (Figure 313), it appears that other potentially suitable, secluded denning or rendezvous sites are available in the analysis area.

Sufficient Space with Minimal Exposure to Humans

As described in Section 3.25.3, *Elk Security, Big Game Habitat (Elk and Deer), and Mountain Goat*, Alternative 2 would not affect elk security. Snowplowing and year-round road use would occur throughout the Project. Traffic on Libby Creek Road and Upper Libby Creek Road would increase by a maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development (see Section 3.21.4.1.2), but effects on wolves would be negligible because of the relatively low speeds (less than 30 mph) and traffic volumes anticipated on access roads. Increased human activity at the Libby Adit Site would slightly increase noise in the surrounding area (see Section 3.20, *Sound*), which may displace wolves from nearby suitable habitat. Activity at the Libby Adit Site would continue until the adit was plugged. Wolf habitat use and occurrence would return to existing conditions after site reclamation was completed. Because the increase in disturbance relative to existing conditions would be small and short-term, Alternative 2 would have a negligible disturbance effect on wolves.

Alternative 3

Prey Base

In Alternative 3, current populations of white-tailed deer, elk, and moose would likely be maintained and continue to provide a good year-round prey base for wolves. Overall, road densities would likely decrease through protection of grizzly bear mitigation lands and road access changes on NSF lands and on mitigation lands (non-NFS lands). Road access changes, specifically installation of gates and barriers, would increase elk security habitat by 807 acres. Alternative 3 effects on habitat conditions for big game species are described in Section 3.25.3, *Elk Security, Big Game Habitat (Elk and Deer), and Mountain Goat*, and Section 3.25.7, *Other Species of Interest*.

Den and Rendezvous Sites

Alternative 3 geotechnical studies would occur near the possible pup rearing/rendezvous site identified in the area between Little Cherry Creek and Poorman Creek and another possible rendezvous site in the same area, although it is unknown if these areas are still active (Boyd, pers. comm. 2018). Geotechnical activities would occur between June 16 and October 14 when pups would likely be old enough for adults to move them to another area, should they be disturbed by the activity (Boyd, pers. comm. 2018). If a denning or rendezvous site was confirmed in the geotechnical investigation area, FWP may implement adverse conditioning techniques before geotechnical studies began to deter wolves from denning in or near the area of activity, if appropriate. Implementation of adverse conditioning techniques to deter wolves from denning in or near the analysis area would give wolves time to excavate an alternate den site at a safer, more secluded location. Based on general habitat availability; location of roads and other areas of human activity (Figure 303); and the presence of features typical of den or rendezvous sites, such as streams and other areas of open water (Figure 313), it appears that other potentially suitable, secluded denning or rendezvous sites are available in the analysis area.

Sufficient Space with Minimal Exposure to Humans

Alternative 3 effects on secluded wolf habitat would be similar to Alternative 2, except that traffic would be slightly less (up to 10 trips per day) with implementation of the Transportation Plan and human disturbance would increase temporarily in the geotechnical investigation area. Implementation of the noise mitigation would minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. Because the increase in disturbance relative to existing conditions would be small and short-term, Alternative 3 would have a negligible disturbance effect on wolves. Alternative 3 road access changes, specifically installation of gates and barriers, would benefit wolves by reducing human access to wolf habitat.

Alternative 4

Effects of Alternative 4 on the wolf would be the same as Alternative 3, except that the duration of geotechnical studies, and any associated effects on wolves, would be shorter.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past, present, and reasonably foreseeable activities on gray wolves are described in the JFEIS.

Cumulative effects of the alternatives in combination with past, present, and reasonably foreseeable actions on big game prey species are described in Section 3.25.3, *Elk Security, Big Game Habitat (Elk and Deer), and Mountain Goat*, and Section 3.25.7, *Other Species of Interest*. All alternatives would maintain prey populations and increase areas with minimal exposure to humans by maintaining elk security and increasing grizzly bear core habitat, and therefore would not contribute to cumulative effects on big game prey species.

Effects on wolves would be somewhat reduced in Alternatives 3 and 4 through road access changes, which would create security habitat for prey species and reduce motorized access to wolf habitat. Current populations of white-tailed deer and elk would be maintained and would continue to provide a good year-round prey base for wolves. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Mineral Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. The effects of Alternative 2 on gray wolves would be negligible. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental effects on wildlife habitat that would benefit the gray wolf. These measures would include minimizing disturbance in big game winter range and increasing areas with minimal exposure to humans through yearlong access changes. If a denning or rendezvous site were confirmed in the Alternative 3 or 4 geotechnical investigation area, FWP may implement adverse conditioning techniques before geotechnical studies began to deter wolves from denning in or near the area of activity, if appropriate. All alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

FW-DC-WL-01. Alternative 2 would not affect any known wolf den or rendezvous sites. While the Alternative 3 and 4 geotechnical investigation area occurs near a possible pup-rearing/rendezvous site, geotechnical activities would occur between June 16 and October 14 when pups would likely be old enough for adults to move them to another area. If a denning or rendezvous site were confirmed in the Alternative 3 or 4 geotechnical investigation area, FWP may implement adverse conditioning techniques before geotechnical studies began to deter wolves from denning in or near the area of activity, if appropriate. All alternatives would be neutral with regard to progress toward achieving this desired condition.

FW-DC-WL-08. The Project would not manage vegetation for ungulate habitat. Alternative 2 would not affect big game habitat, and Alternatives 3 and 4 would make negligible contributions to forage after reclamation of the geotechnical investigation area was complete and the area was revegetated. Alternatives 3 and 4 would contribute slightly to progressing toward this desired condition.

FW-DC-WL-18. Potentially suitable, secluded denning or rendezvous sites are available in the analysis area. Alternative 2 would not affect any known wolf den or rendezvous sites. While the Alternative 3 and 4 geotechnical investigation area occurs near a possible pup-rearing/rendezvous site, geotechnical activities would occur between June 16 and October 14 when pups would likely be old enough for adults to move them to another area. If a denning or rendezvous site were confirmed in the Alternative 3 or 4 geotechnical investigation area, FWP may implement adverse conditioning techniques before geotechnical studies began to deter wolves from denning in or near the area of activity, if appropriate. All alternatives would be neutral with regard to progress toward achieving this desired condition.

FW-GDL-WL-18. Wolf. Alternative 2 would not affect any wolf den or rendezvous sites. If a denning or rendezvous site were confirmed in the Alternative 3 or 4 geotechnical investigation area, FWP may implement adverse conditioning techniques before geotechnical studies began to deter wolves from denning in or near the area of activity, if appropriate. All alternatives were designed in accordance with this guideline.

Forest Service Sensitive Species Statement of Findings

Alternative 1 would not affect individual gray wolves or their habitat in the analysis area and would not contribute to a trend toward federal listing or cause a loss of viability to the population or species. ***All action alternatives may impact individual wolves and their habitat in the analysis area but would not contribute to a trend toward federal listing or cause a loss of viability to the population or species.*** This determination is based on the following:

1) No known den or rendezvous sites occur near Alternative 2 facilities;

2) Alternatives 3 and 4 would minimize or avoid disturbance in big game winter range;

3) While the Alternative 3 and 4 geotechnical investigation area occurs near a possible pup-rearing/rendezvous site, geotechnical activities would occur between June 16 and October 14 when pups would likely be old enough for adults to move them to another area. If a denning or rendezvous site were confirmed in the Alternative 3 or 4 geotechnical investigation area, FWP may implement adverse conditioning techniques

before geotechnical studies began to deter wolves from denning in or near the area of activity, if appropriate;

4) In all alternatives, sufficient populations of elk, deer, and other prey species would continue to be maintained and would continue to provide a good year-round prey base for wolves;

5) In Alternatives 3 and 4, effects on the wolf would be somewhat reduced through road access changes, which would create security habitat for prey species and reduce motorized access to wolf habitat;

6) In all action alternatives, employees would be prohibited from carrying firearms and MMC would remove road-killed big game animals, which may reduce vehicle collisions with wolves;

7) Alternatives 3 and 4 include funding of a Grizzly Bear Specialist and one Law Enforcement Officer, which may indirectly benefit wolves through improved enforcement of access changes and increased public awareness of issues related to threatened and endangered species as well as other species; and

8) Alternatives 3 and 4 include implementation of a Transportation Plan that would include busing and carpooling employees and staged shipments of supplies in a general location before delivery to the Libby Adit Site to reduce traffic and mortality risk.

Overall, effects on wolves from the action alternatives would be negligible and would not affect wolf viability on the KNF.

3.25.4.6 Townsend's Big-Eared Bat

3.25.4.6.1 Regulatory Framework

General KFP direction considered in the analysis of sensitive species is described in Section 3.25.4.1, *Regulatory Framework*. The additional KFP direction considered in the analysis of Townsend's big-eared bat is:

> **FW-DC-WL-15.** Caves, mines, and snags with loose bark provide areas for roosting, hibernation, or maternity sites for various species of bats (refer to FW-DC-VEG-07, FW-GDL-VEG-04, and FW-GDL-VEG-05).
>
> **FW-GDL-WL-17. Townsend's Big-eared Bat.** Avoid or minimize disturbance at known active roosts and hibernacula in caves, abandoned mines, or rock outcrops using the best available information.

3.25.4.6.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on Townsend's big-eared bat is the Crazy PSU. The Silverfish and Rock PSUs are not included in the analysis area. Although Townsend's big-eared bat habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, Townsend's big-eared bats would not be measurably affected by this design feature. The methods for data collection and effect analysis are the same as described in the JFEIS. The effects analysis includes an evaluation of the benefits to Townsend's big-eared bat from mitigation measures proposed by the KNF.

3.25.4.6.3 Affected Environment

The affected environment for Townsend's big-eared bat and their habitat is described in JFEIS Section 3.25.4.10.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on Townsend's big-eared bat in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.4.6.4 Environmental Consequences

Alternative 1

Alternative 1 would not affect Townsend's big-eared habitat in the Crazy PSU. Increased activity at the Libby Adit Site and increased traffic during site closure would slightly increase noise in the surrounding area, temporarily intensifying disturbance in the existing influence zones for these activities. Townsend's big-eared bat habitat use and occurrence would return to existing conditions after site reclamation was completed.

Alternative 2

Ground disturbance would be limited to existing revegetated areas and an existing soil stockpile in the existing 11.6-acre, privately owned disturbance area (Figure 310), and no Townsend's big-eared bat habitat would be affected. Increased human activity at the Libby Adit Site would slightly increase noise in the surrounding area (see Section 3.20, *Sound*), which may displace Townsend's big-eared bats from nearby suitable habitat. Activity at the Libby Adit Site would continue until the adit was plugged. Townsend's big-eared bat habitat use and occurrence would return to existing conditions after site reclamation was completed. Because the increase in disturbance relative to existing conditions would be small and short-term, Alternative 2 would have negligible disturbance effects effect on Townsend's big-eared bats.

Alternative 3

Alternative 3 would affect less than 0.1 acre of old growth providing Townsend's big-eared bat habitat where a new access road for the geotechnical investigations would be constructed. The new access road would bisect a patch of old-growth habitat for 165 feet, increasing habitat fragmentation. MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons. This mitigation would be incorporated into the Vegetation Removal and Disposition Plan and would reduce any effects on Townsend's big-eared bats. As described in Section 3.25.2, *Key Habitats (Snags and Woody Debris)*, snag levels would continue to be greater than KFP guidelines, and sufficient cavity habitat would remain in the Crazy PSU and the KNF to provide roosting habitat for Townsend's big-eared bat populations.

Disturbance effects from Alternative 3 would be similar to Alternative 2, except that human disturbance also would increase temporarily in the geotechnical investigation area. Implementation of the noise mitigation would minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. The overall effect of Alternative 3 on Townsend's big-eared bat habitat would be negligible because a small amount of Townsend's big-eared bat habitat would be affected relative to surrounding habitat, the increase in disturbance relative to existing disturbance would be small and short-term, and effects on Townsend's big-eared bats would be reduced through implementing the KNF's mitigation measures.

Alternative 4

The effects of Alternative 4 on Townsend's big-eared bat would be similar to Alternative 3, except that human disturbance from geotechnical investigations would be shorter in duration, and less habitat would be disturbed at the geotechnical investigation area. In Alternative 4, no old-growth habitat would be affected. The overall effect of Alternative 4 on Townsend's big-eared bat habitat would be negligible because no old-growth habitat would be affected, the increase in disturbance relative to existing disturbance would be small and short-term, and effects on Townsend's big-eared bats would be reduced through implementing design features.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past, present, and reasonably foreseeable activities on Townsend's big-eared bat are described in the JFEIS. Effects of the Project alternatives on Townsend's big-eared bat would be negligible and would not contribute to cumulative effects on the species. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. Alternative 2 would not affect Townsend's big-eared bat habitat. Alternatives 3 and 4 would include several mitigation measures to reduce effects on Townsend's big-eared bat, including noise reduction measures and snag retention at the geotechnical investigation area. All alternatives would comply with 36 CFR 228.8 because effects on Townsend's big-eared bat would be negligible.

National Forest Management Act/Kootenai Forest Plan

FW-DC-WL-15. None of the alternatives would affect key roosting habitat or potential hibernacula such as caves, mines, or rock outcrops. Alternative 2 would not affect Townsend's big-eared bat habitat and would be neutral with respect to achieving this desired condition. Although timber harvest activities associated with Alternatives 3 and 4 would reduce potential summer roosting sites for the Townsend's big-eared bat, effects would be negligible. In Alternatives 3 and 4, MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons. Implementation of the noise mitigation would reduce noise from Alternative 3 and 4 geotechnical investigations. Alternatives 3 and 4 would slightly improve forestwide trends toward achieving this desired condition.

FW-GDL-WL-17. None of the alternatives would affect key roosting habitat or potential hibernacula such as caves, mines, or rock outcrops. Although timber harvest activities associated with Alternatives 3 and 4 would reduce potential summer roosting sites for the Townsend's big-eared bat, effects would be negligible. All alternatives were designed in accordance with guideline FW-GDL-WL-17.

Forest Service Sensitive Species Statement of Findings

Alternative 1 would not affect individual Townsend's big-eared bats or their habitat in the analysis area and would not contribute to a trend toward federal listing or cause a loss of viability to the population or species. ***Implementation of the action alternatives may impact individuals or their habitat but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species for Townsend's big-eared bats.*** This determination is based on the following: (1) none of the alternatives would affect key roosting habitat or potential hibernacula such as caves, mines, or rock outcrops; (2) Alternatives 3 and 4 would clear less than 0.1 acre of old-growth habitat, resulting in negligible effects on Townsend's big-eared bat habitat; (3) snag levels would continue to be greater than KFP guidelines, and sufficient cavity habitat would remain in the Crazy PSU and the KNF to provide roosting habitat for Townsend's big-eared bat populations; and (4) a forested environment suitable for foraging would remain well distributed across the Crazy PSU and the KNF.

3.25.4.7 Western Toad

3.25.4.7.1 Regulatory Framework

General KFP direction considered in the analysis of sensitive species is described in Section 3.25.4.1, *Regulatory Framework*.

3.25.4.7.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on the western toad is the Crazy PSU. The Silverfish and Rock PSUs are not included in the analysis area. Although western toad habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, western toads would not be measurably affected by this design feature. The methods for data collection and effect analysis are the same as described in the JFEIS. Criteria used to compare the alternative effects on the western toad and its habitat includes effects on known or suitable breeding/rearing habitat and suitable upland foraging habitat. In the analysis area, suitable breeding habitat is represented by wetlands and aquatic habitat, as described in Sections 3.6, *Aquatic Life and Fisheries*, and 3.23, *Wetlands and Other Waters of the U.S.*

3.25.4.7.3 Affected Environment

The affected environment for western toads and their habitat is described in JFEIS Section 3.25.4.10.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on western toads in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.4.7.4 Environmental Consequences

Alternative 1

Alternative 1 would not disturb the western toad or their habitat and would have no effect on this species. Natural successional processes would continue to occur in the upland habitat being used by western toads for foraging and overwintering habitat. No effects on riparian areas or breeding/rearing habitat would occur. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Upland foraging habitat would be provided in the Libby Adit Site footprint after reclamation was complete.

Traffic during site closure would slightly increase but would return to existing conditions after site reclamation was completed. Effects of Alternative 1 traffic on western toad would be negligible because the increased vehicle use of Libby Creek Road relative to existing use would be small and short-term.

Alternative 2

As discussed in Section 3.23, *Wetlands and Other* Waters *of the U.S.*, Alternative 2 would have no direct effects on wetlands providing high-quality western toad breeding habitat. Construction at the Libby Adit Site would occur within the existing 11.6-acre disturbance area and would avoid all wetlands and waters of the U.S. No western toad upland foraging habitat would be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1. Traffic on Libby Creek Road and Upper Libby Creek Road would increase by a maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development (see Section 3.21.4). Activity at the Libby Adit Site would continue until the adit was plugged. Western toad habitat use and occurrence would return to existing conditions after site reclamation was completed. Some incidental mortality may occur due to increased traffic, but these effects would be negligible because the increase in vehicle use of Libby Creek Road relative to existing use would be small and short-term.

Alternative 3

Effects of Alternative 3 on western toad would be similar to Alternative 2, except that traffic would be slightly less (up to 10 trips per day) with implementation of the Transportation Plan, and Alternative 3 geotechnical investigations would disturb 6.2 acres of upland foraging habitat. Like Alternative 2, Alternative 3 would have no direct effects on wetlands providing high-quality western toad breeding habitat. Alternative 3 geotechnical investigations would affect a suitable western toad breeding habitat where a 185-foot section of an access road west of Little Cherry Loop Road overlapped with an RHCA. Section 3.6, *Aquatic Life and Fisheries*, describes effects on RHCAs in detail. Potential effects would occur on less than 1 percent of the available high-quality or upland foraging habitat. Alternative 3 would include implementation of access and design changes that minimize sedimentation in RHCAs and would include compliance with KFP standards and guidelines for any work in a RHCA along an access road. Four to six vehicle trips per day would be made during the 12-week geotechnical investigations.

Similar to Alternative 2, some incidental mortality may occur due to forest clearing and increased traffic associated with Alternative 3. Overall, effects of Alternative 3 on western toad would be minor because although some individual toads may be killed or injured, no wetlands would be affected, the amount of RHCAs and upland foraging habitat affected would be small relative to habitat available in the analysis area, access and design changes and compliance with KFP standards and guidelines would minimize effects on RHCAs, the transportation plan would minimize vehicle traffic on access roads, and increases in vehicle use of Libby Creek Road and access roads associated with the geotechnical investigations relative to existing use would be small and short-term.

Alternative 4

Direct and indirect effects from Alternative 4 on western toad would be similar to Alternative 3, except that less habitat would be disturbed at the geotechnical investigation area. In Alternative 4, geotechnical investigations would disturb 1.5 acres of forest providing suitable western toad upland foraging habitat.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past, present, and reasonably foreseeable activities on western toad are described in the JFEIS. Alternative 2 would not contribute to cumulative effects on western toad because effects would be negligible. Effects of Alternative 3 and 4 on western toad habitat would be negligible, but these alternatives may result in mortality of individual toads. The contribution of Alternatives 3 and 4 to western toad mortality at the population level would be negligible when considered in combination with past, present, and reasonably foreseeable activities where individual toads may be affected. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. Alternative 2 would not affect western toad habitat, and the increased risk of toad mortality would be negligible. Alternatives 3 and 4 would incorporate additional feasible and practicable measures to minimize adverse environmental effects on wildlife habitat that benefit the toad, including implementation of access and design changes that minimize sedimentation in RHCAs, and compliance with KFP standards and guidelines for any work in a RHCA along an access road. All alternatives would be in compliance with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

Less than 1 percent of the high-quality or upland foraging habitat available would be affected by the alternatives, and minimal other potential habitat would be affected. Alternatives 3 and 4 would include implementation of access and design changes that minimize sedimentation in RHCAs and would include compliance with KFP standards and guidelines for any work in a RHCA along an access road.

Forest Service Sensitive Species Statement of Findings

Alternative 1 would not affect individual western toads or their habitat and would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species. ***All action alternatives may impact individuals or their habitat but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species for western toad.*** This determination is based on the following: (1) Alternative 2 would not affect western toad habitat, (2) areas disturbed in Alternatives 3 and 4 would be 1 percent or less of available high-quality or upland foraging habitat, (3) some incidental mortality may occur due to forest clearing and increased traffic associated with the alternatives, and (4) Alternatives 3 and 4 would include implementation of access and design changes that minimize sedimentation in RHCAs and would include compliance with KFP standards and guidelines for any work in a RHCA along an access road.

3.25.5 Threatened, Endangered, and Proposed Species

3.25.5.1 Regulatory Framework

Section 3.6, *Aquatic Life and Fisheries*, discusses the regulatory framework for aquatic and terrestrial federally listed threatened, endangered, proposed, and candidate species. In 2014, the USFWS determined that listing the North American wolverine as threatened was not warranted and withdrew a listing proposal. In 2016, a U.S. District Court for the District of Montana vacated the August 13, 2014, withdrawal of the proposed rule to list the distinct population segment of the North American wolverine as threatened under the ESA, which effectively returned the process to the stage of the proposed listing rule USFWS published in 2013. USFWS has initiated a new status review of the North American wolverine to determine whether this distinct population segment meets the definition of an endangered or threatened species under the ESA.

In 2014, the Forest Service submitted a programmatic BA for the North American wolverine evaluating the effects of activities commonly conducted on National Forest System lands in Region 1, including mineral exploration and extraction (USDA Forest Service 2014). Shortly thereafter, the USFWS issued written concurrence with the Forest Service's determination that the potential activities would not jeopardize the continued existence of the North American wolverine distinct population segment (Bush and Conard 2014).

The KNF will prepare a BA that evaluates the potential effect of Alternative 3 on terrestrial threatened, endangered, and proposed species and designated critical habitat, including measures the KNF identified as needed to minimize or compensate for effects. Potential Alternative 3 effects on the wolverine will also be addressed in the BA, and a Summary Sheet for Wolverine Programmatic Assessment (KNF 2019b) is available in the Project Record.

The Organic Administration Act authorizes the Forest Service to regulate the occupancy and use of National Forest System lands. The Forest Service's mineral regulations are promulgated at 36 CFR 228 Subpart A. The regulations apply to operations conducted under the U.S. mining laws as they affect surface resources on National Forest System lands under the jurisdiction of the Secretary of Agriculture. One of these regulations (36 CFR 228.8) requires that mineral operations be conducted, where feasible, to minimize adverse environmental effects on National Forest System surface resources. 36 CFR 228.8 also requires that mineral operations take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations.

The species list for terrestrial threatened and endangered species known or suspected to occur on the KNF is supplied by the USFWS Montana Ecological Field Services Field Office, current as of July 2018 (USFWS 2018). The status of federally listed threatened, endangered, and proposed wildlife species in the analysis area and the KNF's effect determination are shown in Table 347. No designated critical habitat for lynx occurs in the analysis area.

Table 347. Federally Listed Threatened, Endangered, and Candidate Species Potentially Affected by the Project.

Species	ESA Status	Determination[1]	Status in Analysis Area and Comments
Grizzly Bear (*Ursus arctos*)	Threatened	May affect, not likely to adversely affect	Species documented to occur
Canada Lynx (*Lynx canadensis*)	Threatened	May affect, not likely to adversely affect	Species documented to occur
Critical Habitat for Canada Lynx	NA	No effect	No designated critical habitat in analysis area
North American Wolverine (*Gulo gulo luscus*)	Proposed Threatened	Not likely to jeopardize	Species documented to occur

[1]Determinations are for all action alternatives.
Source for ESA status: USFWS 2018.

The KFP provides overall guidance for the management of the lands on the KNF. It describes the goals, desired conditions, and objectives toward which the management of the land should be directed. It establishes standards and guidelines to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, and to meet applicable legal requirements. KFP components that provide direction applicable to threatened and endangered terrestrial wildlife species are:

> **GOAL-WL-01.** The KNF manages wildlife habitat through a variety of methods (e.g., vegetation alteration, prescribed burning, invasive species treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species.
>
> **FW-DC-WL-01.** Nests and den sites and other birthing and rearing areas for terrestrial threatened, endangered, proposed, or sensitive species are relatively free of human disturbance during the period they are active at these sites. Individual animals that establish nests and den sites near areas of pre-existing human use are assumed to be accepting of that existing level of human use at the time the animals establish occupancy.
>
> **FW-DC-WL-02.** A forest-wide system of large remote areas is available to accommodate species requiring large home ranges and low disturbances, such as some wide-ranging carnivores (e.g., grizzly bear).
>
> **FW-DC-WL-03.** Recovery of the terrestrial threatened and endangered species is the long-term desired condition. Foraging, denning, rearing, and security habitat is available for occupation. Populations trend toward recovery through cooperation and coordination with USFWS, state agencies, other federal agencies, tribes, and interested groups.

The KFP incorporated direction established in the 2011 Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones (Access Amendment) (USDA Forest Service 2015a). The Access Amendment, as incorporated into the KFP, sets standards for wheeled motor vehicle use (excluding over-snow vehicle use) in the Cabinet-Yaak and Selkirk Recovery Zone BMUs along with administrative use levels and timelines, and linear miles of open and total road for areas outside the recovery zones that are experiencing recurring use by grizzly bears,

known as Bears Outside of Recovery Zones or BORZ. This decision is retained in the KFP through standard FW-STD-WL-02.

The KFP components that provide specific grizzly bear resource direction relevant to the Evaluation Project are:

> **FW-DC-WL-04.** All grizzly BMUs have low levels of disturbance to facilitate denning activities, spring use, limit displacement, and reduce human/bear conflicts and potential bear mortality. Spring, summer, and fall forage is available for the grizzly bear.
>
> **FW-DC-WL-05.** Recovery of the grizzly bear is promoted by motorized access management within the KNF portion of the Northern Continental Divide Ecosystem (NCDE) and Cabinet-Yaak recovery zones.
>
> **FW-STD-WL-02.** The Motorized Access Management within the Selkirk and Cabinet Yaak Grizzly Bear Recovery Zone Management Direction shall be applied.
>
> **FW-STD-WL-04.** Permits and operating plans (e.g., special use, grazing, and mining) shall specify sanitation measures and adhere to the forest-wide food/attractant storage order in order to reduce human/wildlife conflicts and mortality by making wildlife attractants (e.g., garbage, food, livestock carcasses) inaccessible through proper storage or disposal.
>
> **FW-STD-WL-05.** No grooming of snowmobile routes in grizzly bear core habitat in the spring after April 1 of each year.
>
> **FW-GDL-WL-01. Grizzly Bear.** Management activities should avoid or minimize disturbance in areas of predicted denning habitat during spring emergence (April 1 through May 1).
>
> **FW-GDL-WL-15. Grizzly Bear.** Elements contained in the most recent "Interagency Grizzly Bear Guidelines," or a conservation strategy once a grizzly bear population is delisted, will be applied to management activities.

The KFP also incorporated direction established in the Northern Rockies Lynx Management Direction (USDA Forest Service 2007) and ROD (USDA Forest Service 2015a, Appendix B). The plan components that provide specific Canada lynx resource direction relevant to this project include:

> **FW-STD-WL-01.** The Northern Rockies Lynx Management Direction (USDA Forest Service, 2007) shall be applied. Since that direction is largely focused on vegetation management actions, many of the directives do not apply to the Project. Specific goals, objectives, standards, and guidelines that do apply to the Project include:
>
> **Objective ALL O1.** Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
>
> **Standard ALL S1.** New or expanded permanent development and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.

Objective HU O1. Maintain the lynx's natural competitive advantage over other predators in deep snow, by discouraging the expansion of snow-compacting activities in lynx habitat.

Objective HU O2. Manage recreational activities to maintain lynx habitat and connectivity.

Objective HU O3. Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.

Objective HU O5. Manage human activities, such as special uses, mineral and oil and gas exploration and development, and placement of utility transmission corridors, to reduce impacts on lynx and lynx habitat.

Objective HU O6. Reduce adverse highway effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity, and to reduce the potential of lynx mortality.

Guideline HU G4. For mineral and energy development sites and facilities, remote monitoring should be encouraged to reduce snow compaction.

Guideline HU G5. For mineral and energy development sites and facilities that are closed, a reclamation plan that restores lynx habitat should be developed.

Guideline HU G6. Methods to avoid or reduce effects on lynx should be used in lynx habitat when upgrading unpaved roads to maintenance levels 4 or 5, if the result will be increased traffic speeds and volumes, or a foreseeable contribution to increases in human activity or development.

Guideline HU G8. Cutting brush along low-speed, low-traffic-volume roads should be done to the minimum level necessary to provide for public safety.

Guideline HU G9. On new roads built for projects, public motorized use should be restricted. Effective closures should be provided in road designs. When the Selected Alternative is over, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

Guideline HU G12. Winter access for non-recreation special uses and mineral and energy exploration and development, should be limited to designated routes or designated over-the-snow routes.

Objective LINK O1. In areas of intermingled land ownership, work with landowners to pursue conservation easements, habitat conservation plans, land exchanges, or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat.

3.25.5.2 Grizzly Bear

3.25.5.2.1 Analysis Area and Methods

The Evaluation Project is in the southern half of the Cabinet-Yaak Recovery Zone (CYRZ) on the east side of the Cabinet Mountains. Some Alternative 3 and 4 access changes would be east of the CYRZ in the Cabinet Face BORZ. The analysis area for direct, indirect, and cumulative effects

on grizzly bears comprises BMUs 2, 5, and 6 in the CYRZ and the Cabinet Face BORZ outside of the CYRZ (Figure 324).

The following analysis addresses potential key stressors (risks and threats) and their effects on grizzly bears. Key stressors are activities that might impact grizzly bears if not managed or mitigated. Some stressors, such as activities that occur on adjacent private lands, are outside of Forest Service control. Among the key stressors under Forest Service control (Anderson 2014), those applicable to the Project include attractants, road impacts, and ground-disturbing activities associated with the geotechnical investigations. Also addressed in this analysis are KFP desired conditions, objectives, standards, and guidelines applicable to grizzly bears that would be used to achieve the goal to "manage(s) wildlife habitat through a variety of methods…to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species" (GOAL-WL-01). The focus of the grizzly bear analysis is based on access management direction for core habitat, open motorized route density (OMRD), and total motorized route density (TMRD) included in the KFP (FW-WL-STD-02).

Interagency grizzly bear management guidelines (IGBC 1986) were incorporated into the KFP (FW-GDL-WL-15) and are discussed under *Application of Interagency Grizzly Bear Guidelines*. All of the lands in the Cabinet portion of the CYRZ were delineated into one of two management situations: MS-1 or MS-3. MS-1 lands are areas managed for grizzly bear habitat maintenance, habitat improvement, and minimization of grizzly/human conflict. Management decisions will favor the needs of the grizzly bear when grizzly habitat and other land use values compete. MS-3 lands include private lands, campgrounds, or other lands where grizzly bear presence and factors contributing to their presence will be actively discouraged. Guidelines regarding maintenance and improvement of habitat, minimization of grizzly/human conflict potential, and resolution of human/grizzly conflict are provided for each management situation. The effects analysis for the Project considers the potential key stressors, compliance with management direction, and best science available.

The intention of grizzly bear management on the KNF is to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery. As mentioned above, an integral part of fostering grizzly bear recovery is the implementation of measures within the authority of the Forest Service to minimize human-caused grizzly bear mortalities. Reducing grizzly bear mortality is accomplished by addressing and mitigating the key stressors described above and achieving goals, desired conditions, objectives, standards, and guidelines identified by the KFP and applicable to grizzly bear recovery.

Resource indicators and acreages were calculated with the ArcGIS geographic information system applications using KNF data for analysis area vegetation, BMU and BORZ boundaries, linkage areas and movement corridors, proposed federal activities, and road data. Acres or miles reported in various stages of the following analyses may differ slightly from the Evaluation Project description due to rounding.

Methods used to estimate alternative displacement effects in the analysis area are described in detail in ERO (2018b). In summary, habitat displacement effects were evaluated based on estimates of the extent of the displacement, or zone of influence, of the Project, and the degree to which suitable grizzly bear habitat would be used in these zones of influence (disturbance coefficients). The extent of a zone of influence was determined based on the type of activity, as recommended in the Cumulative Effects Analysis Process (Christensen and Madel 1982; USDA

Forest Service et al. 1988; IGBC 1990). The degree of habitat use was estimated based on disturbance coefficients and compensation levels assigned to different human activities (Christensen and Madel 1982; USDA Forest Service et al. 1988; IGBC 1990).

For the grizzly bear analysis, the following resource indicators were used to evaluate Project effects (Table 348).

Table 348. Resource Indicators and Measures for Assessing Effects on Grizzly Bears.

Resource Element	Resource Indicator	Measure	Source
Core habitat OMRD/TMRD	Changes in the acres and percentage of core, OMRD, and TMRD by BMU	Acres and percentage by BMU	KFP FW-STD-WL-02 App. B, Table 25, p. 147
Minimum width at constricted locations in north-south movement corridor; decreased risk for future human development in north-south movement corridor	Changes in the minimum width at three constricted locations: north, middle, south; changes in MS-1 or MS-3 land classification; changes in federal ownership or conservation easements	Width in 0.1-mile increments; mitigation land in acres and MS-1 and MS-3 acres	KFP FW-GDL-WL-12 FW-GDL-WL-14 FW-GDL-WL-15 GA-DC-WL-CLK-03 GA-DC-WL-FSH-01 GA-DC-WL-LIB-04
Seasonal bear habitat	Changes in the availability of seasonal habitat by BMU	Acres and percentage by BMU	KFP FW-DC-WL-03, FW-DC-WL-04
Displacement (acres) resulting from disturbance	Changes in habitat in the zone of influence of human activities	Acres	KFP FW-DC-WL-04
Bears Outside Recovery Area (BORZ)	Changes in open and total road miles	Miles	KFP Appendix B, Table 26, p. 150

Road- and Trail-Related Indicators

Three road- or trail-related indicators used in the analysis are core, OMRD, and TMRD. These indicators are defined in the KFP. Core is "an area of secure habitat within a BMU that contains no motorized travel routes or high use non-motorized trails during the non-denning season and is more than 0.31 miles (500 meters) from a drivable road. Core areas do not include any gated roads but may contain roads that are impassible due to vegetation or constructed barriers. Core areas strive to contain the full range of seasonal habitats that are available in the BMU." OMRD is a "calculation made with the moving windows technique that includes open roads, other roads not meeting all restricted or obliterated criteria, and open motorized trails. The percent of the analysis area in relevant route density classes are calculated." TMRD is a "calculation made with the moving windows technique that includes open roads, restricted roads, roads not meeting all reclaimed criteria, and open motorized trails. The percent of the analysis area in relevant route density classes is calculated."

Minimum Width of Core Habitat at Constricted Areas

The Cabinet-Yaak Recovery Zone (CYRZ) is small and narrow. Because design features of Alternatives 3 and 4 would be in the same BMU as activities associated with the Rock Creek Project, the minimum width of core habitat at three points in the north-south movement corridor, referred to as north, middle, and south constricted areas, was quantified and evaluated to

determine potential effects on the distribution of grizzly bears in the CYRZ. Decreased risk for future human development within the north-south movement corridor was evaluated and discussed relative to changes in acres of MS-1 and MS-3 lands and total acres of mitigation land. Mitigation land could potentially increase federal ownership in the north-south corridor if fee title transfer occurred. Lands may also be protected by conservation easement as specified in the mitigation plan.

Seasonal Habitats

Each affected BMU contains a mix of seasonal habitats (denning, avalanche chutes, and spring range). The degree to which these seasonal habitats are protected in core habitat is used to compare changes in availability of seasonal foods and denning habitat between the baseline condition and the Project. Using the indicator of seasonal habitat within core (as opposed to considering it across OMRD and TMRD) assures that seasonal habitats are fully available to bears and thus provides a conservative assessment of effects on seasonal habitat distribution by BMU.

Displacement Resulting from Human Disturbance

The term "displacement" refers to the long-term avoidance of habitat due to the effects of motorized use and human activity along roads. Impacts from human disturbance, such as activities related to a timber sale, are often temporary and do not result in long-term habitat displacement. Point source disturbance pertains to a disturbance originating from a single point, rather than a linear feature such as a road. Examples include a drill rig, or a campground. Long-term disturbance or displacement from human activity such as mining activities or high-use roads may result in underuse of the available habitat by grizzly bears due to avoidance behavior. The term "displacement" does not necessarily mean that grizzly bears would totally avoid an area or be excluded in some way from ever using an area. The duration of displacement also depends on the nature of the disturbance and consequences experienced by grizzly bears (USFWS 2006).

Because the Project-related human disturbance considered in this analysis may occur for several years or more, it may result in underuse of suitable habitat or long-term displacement of grizzly bears from suitable habitat to other areas with less disturbance. Displacement from suitable habitat may change normal behavior or disrupt normal movement patterns and can increase stress, energy expenditure, or conflicts with other bears or competition for food sources. The analysis of habitat displacement estimates the extent of the displacement, or zone of influence, and the degree to which suitable grizzly bear habitat is used. The methods used to evaluate displacement effects from the Evaluation Project are described in a displacement analysis memo (ERO Resources Corp. 2018b).

Miles of Total Open Roads outside the Recovery Zone

Within the designated Cabinet Face BORZ, miles of total and open roads are used to identify any increased risk to grizzly bears.

Mortality Risks

The availability of attractants and increased human occupancy of and access to grizzly bear habitat increase the opportunities for human/bear interactions and potential for mortality. Effects on mortality risks associated with the Project design features were qualitatively evaluated. Grizzly bear management on the KNF involves implementing measures within the authority of the Forest Service to minimize human-caused grizzly bear mortalities (see KFP FW-STD-WL-

04). This includes limiting sources of attractants associated with Forest Service–permitted activities and management of motorized access.

Resource indicators and acreages were calculated with the ArcGIS geographic information system applications using vegetation information from the analysis area, BMUs, proposed federal activities, and road data. There may be slight differences in acres or miles presented in the following analyses than elsewhere in the document due to rounding. Methods used to estimate Alternative 3 displacement effects in the analysis area are described in detail in ERO (2018b). In summary, habitat displacement effects were evaluated based on estimates of the extent of the displacement, or zone of influence, of the Project, and the degree to which suitable grizzly bear habitat would be used in these zones of influence (disturbance coefficients). The extent of a zone of influence was determined based on the type of activity, as recommended in the Cumulative Effects Analysis Process (Christensen and Madel 1982; USDA Forest Service et al. 1988; IGBC 1990). The degree of habitat use was estimated based on disturbance coefficients and compensation levels assigned to different human activities.

3.25.5.2.2 Affected Environment

Status and Distribution

The grizzly bear was listed as threatened in the conterminous U.S. in 1975, when the species occupied less than 2 percent of its former range south of Canada and was distributed in five small populations totaling an estimated 800 to 1,000 bears (USFWS 1975). A Grizzly Bear Recovery Plan was approved in 1982, and a revised plan was completed in 1993 (USFWS 1993a). Recovery needs for the grizzly bear are described in the Recovery Plan, which outlines a series of goals and objectives necessary to provide for conservation and recovery of the grizzly bear in identified recovery zones, including the CYRZ.

The Cabinet-Yaak Ecosystem (CYE) Grizzly Bear Recovery Zone is in extreme northwest Montana and northeast Idaho, directly south of Canada, and encompasses 2,600 square miles (USFWS 1993a, 1993b). The Kootenai River bisects the area with the Cabinet Mountains portion to the south and the Yaak River portion to the north. Bear movement between the two portions is minimal (Kasworm et al. 2018; Kendall et al. 2015). The southern portion lies south of the Kootenai River and makes up about 58 percent of the ecosystem. The CYE is large and diverse, meaning that grizzly bear habitat and use in one part of the ecosystem may not be reflected throughout the whole ecosystem. To facilitate population monitoring and habitat evaluation in each ecosystem, the recovery zones are divided into areas designated as BMUs. These BMUs, designed to approximate the average home range of a female grizzly (about 100 square miles), assist in characterizing grizzly bear numbers and distribution within each ecosystem and in tracking cumulative effects (Christensen and Madel 1982). Breaking the ecosystem down into smaller units (i.e., by BMU) allows for analysis to consider effects associated with the activity's area of influence so that potential effects will not be minimized by considering too large an area (IGBC 2016). The BMUs are biologically meaningful to grizzly bears in that they (1) are based on the average size of a female bear's home range, (2) provide seasonal and elevational movement in response to needs (e.g., food and denning habitat), and (3) provide contiguous, unobstructed habitat allowing for displacement (i.e., core) (Christensen and Madel 1982; IGBC 2016). Delineating BMU boundaries using topographical features establishes a recognizable unit for management consistency, allowing for identification of management needs or concerns, activity planning, scheduling, coordination, and monitoring (Christensen and Madel 1982; IGBC 2016) within and among adjacent ranger districts and forests.

The Grizzly Bear Recovery Plan (USFWS 1993a) outlines the process for considering cumulative effects and correlates that to the cumulative effects model (Christensen and Madel 1982). The cumulative effects model expressly provides for use of BMUs as the appropriate scale to consider cumulative impacts. Christensen and Madel (1982), in "Cumulative Effects Analysis Process," chose a 515,000-acre cumulative effects analysis area, which represented 56 percent of the CYRZ and was the focal point of mineral exploration and development on the KNF.

Life History and Habitat

A complete discussion of the biology and ecology of grizzly bears may be found in the Grizzly Bear Recovery Plan (USFWS 1993a). In general, grizzly bears are habitat generalists who use a wide variety of habitats with their locations generally dictated by the availability of food and security from human-related disturbances. Most areas currently inhabited by the species are contiguous and relatively undisturbed mountainous terrain with high topographic and vegetative diversity.

Grizzly bears are sensitive to the amount and quality of vegetative cover for security, and food sources may be inaccessible if adequate cover is not present, especially in areas where threatening encounters with people are possible (Zager 1980). Descriptions of grizzly bear habitat use and population dynamics consistently emphasize the grizzly bear's need for isolation from humans and human-associated activities (Archibald et al. 1987; Mattson et al. 1987; McLellan and Shackleton 1988, 1989a, 1989b; Kasworm and Manley 1990; Mace et al. 1996, 1999). Grizzly bears generally try to avoid people, even if this prevents them from accessing valuable food sources (Parametrix 2010).

Population Density and Recovery Efforts in the Northern Rockies

In the areas in the northern Rockies that are occupied by grizzly bears, grizzly bear populations have increased substantially since they were first listed as an endangered species in 1975. Considered on this large scale, population increases across the northern Rockies are likely the result of a variety of management actions undertaken during the last 4 decades. These actions include regulations on food storage, minimum standards for core habitat defined by BMU, the employment of a cadre of bear management specialists who work with and educate landowners, compensation for livestock depredation, and a variety of other project-specific measures.

Grizzly bear populations in the NCDE were estimated at 300 in 1993 (USFWS 1993a) and increased by 2.5 times by 2009 (Kendall et al. 2009). FWP bear management specialists were added to the Northern Continental Divide Recovery Zone (NCDRZ) starting in the early 1980s with the last position filled in 1996 (Jonkel 2017). Core standards were implemented on the Flathead National Forest in 1996 via a forest plan amendment, and a food storage order was implemented across the NCDRZ in 2000. These actions, in addition to efforts by bear management specialists to monitor mortality, populations, and population distribution, have been considered essential elements by the IGBC for grizzly bear recovery.

Within the Greater Yellowstone Ecosystem (GYE), Gunther and Wyman (2017) estimated a population increase from 136 in 1975 to more than 700 in 2017 and a doubling of the grizzly bear range since the mid-1970s to more than 22,500 square miles of the GYE. It is estimated that the population has increased at annual rates ranging from 4.2 to 7.6 percent between 1983 and 2002 (Schwartz et al. 2006), although these rates slowed to between 0.3 to 2.2 percent per year from 2002 to 2011 (IGBC 2016). The IGBC GYE Subcommittee Draft Conservation Plan (IGBC 2016) concluded that "these two studies indicate that the growth rate of the grizzly bear

population…slowed as bear densities have approached carrying capacity." Management actions in the GYE are similar to those in the CYRZ, and DeBolt et al. (2013) concluded that, to minimize mortality, "conflict prevention measures such as attractant storage, deterrence, and education are the highest priority for the WYGF."

Population Density in the Cabinet-Yaak Recovery Zone

Populations in the CYRZ have not rebounded at the same rate they have in the NCDE and GYE. Nineteen bears have been added to the Cabinet Mountains population since 1990 (13 females and 6 males) (Kasworm et al. 2018). The augmentation effort appears to be the primary reason that grizzly bears remain in the Cabinet Mountains (Kasworm et al. 2011). When population augmentation efforts are not included, the CYRZ population size has been, until recently, relatively constant (since data were first collected in the 1980s). In 2012, the CYRZ grizzly bear population was estimated at a minimum of 42 grizzly bears with a 64 percent probability of a downward population trend (Kasworm et al. 2012). The latest estimates for the CYRZ are between 55 and 60 individuals, with an annual growth rate of 2.1 percent and an estimated probability that the population is stable or increasing of 73 percent (Kasworm et al. 2018). Kendall et al. (2015) had similar findings and concluded that "estimated grizzly bear abundance (all sex and age classes) in the CYE in 2012 was 48 to 50 bears, approximately half the population recovery goal." The number of females with cubs in the CYRZ varied from 2 to 3 per year and averaged 2.7 per year from 2012 to 2017 (Kasworm et al. 2018). Sightings of females with young were documented in 11 of the 22 BMUs in the CYRZ (ibid.).

The Cabinet Mountains portion of the population was estimated to be 5 to 10 bears in 1988 (Kasworm et al. 2017). Kendall et al. (2015) estimated the size of the Cabinet portion of the CYRZ was 22–24 individuals. Kasworm et al. (2018) attribute the twofold to fourfold increase in population to the augmentation effort. Kendall et al. (2015) concluded that "the Cabinet population was essentially rescued from extirpation through the successful augmentation program that began in the early 1990s" and that the CYRZ population density was among the lowest of interior North American populations. Populations with sizes of fewer than 50 to 100 adults have a higher likelihood of extinction due to demographic, genetic, and environmental stochastic effects (Berger 1990; Reed et al. 2003; Romain-Bondi et al. 2004).

Connectivity, Linkage, and Fragmentation

The KFP's Geographic Area Direction identified movement areas associated with the Project BMUs, including wildlife movement between the Cabinet Mountains and the Fisher River (GA-DC-WL-FSH-01) as well as north-south through the Cabinet Mountains (GA-DC-WL-LIB-04 and GA-DC-WL-CLK-03). Additional direction for retaining habitat connectivity is provided in the KFP guidelines FW-GDL-WL-12 (high-use roads and wildlife crossings) and FW-GDL-WL-14 (retain federal ownership in identified linkages areas). Proctor et al. (2012, 2015) identified potential linkage areas in similar locations along US 2 to those identified in the KFP.

The CMW lies within the CYRZ and forms the central section of the north-south movement corridor, connecting the southern Cabinet Mountain BMUs (6, 7, 8, and 22) to the north Cabinet Mountain BMUs (1, 2, 3, 4, and 9) and overall linking the Cabinet Mountains to the Yaak River basin to the north. Along the narrow northwest-trending corridor, the wilderness area is unroaded; however, it is impacted in places by open roads near or adjacent to its borders due to human development on the east and west sides. The influence of nearby roads is especially detrimental where the wilderness narrows as the roads constrict the width of effective grizzly bear habitat or

where habitat in the wilderness is not conducive to grizzly bear movement, such as open areas devoid of cover (USFWS 2006). Kasworm et al. (2018) identified two potential linkage areas between the Yaak and the Cabinet portions of the CYRZ: one between Libby and Troy and one between Troy and the Idaho border.

The CYRZ provides habitat for a larger grizzly bear population that extends into British Columbia, Canada, and that has been fragmented into smaller populations across the trans-border area due to human development (Proctor et al. 2004). Proctor (2013) compiled data from previous and existing projects, including a genetic analysis of 3,134 bears supplemented with radio-telemetry from 792 bears (including Cabinet Mountain bears), and concluded that several small populations in the trans-border area, including the Cabinet Mountains, have immediate conservation concerns.

The USFWS (2017) concluded that "maintaining and increasing movements by females (i.e., demographic rescue) from larger populations (e.g., Canada or the Northern Continental Divide Ecosystem) into the smaller populations (North Cascades Ecosystem, Selkirk Ecosystem, and CYE) is critical to the long-term conservation of these populations. Recovery could be accomplished via natural movements or translocating animals." Kendall et al. (2015) concluded that grizzly bear populations in the Yaak Valley and Cabinet Mountains were demographically and reproductively isolated from each other, and the Cabinet population was highly inbred. Based on DNA analysis, they demonstrated that there was some in-migration from the Selkirk and Northern Continental Divide populations and concluded that "the expansion of neighboring (NCD and Selkirk) populations may eventually help sustain the CYE populations."

Seasonal Habitats

High-value grizzly bear foraging components are generally non-forested. Most non-forested sites in the Cabinet Mountains are the result of natural disturbances including wildfires, insects, disease, and avalanches, and are somewhat temporary and dynamic occurrences. Avalanche chutes are an exception and may persist for centuries due to the continual disturbance associated with sliding snow. In the Cabinet Mountains, radio-collared bears made greatest use of mixed shrub snowchutes, alder shrubfields, huckleberry shrubfields, and beargrass sidehill parks (Kasworm et al. 2011).

Kasworm et al. (2011) noted the importance of huckleberries as a major source of late summer food, along with serviceberries and mountain ash depending on the year. All three species respond favorably to natural disturbances. Monitoring in the Cabinet Mountains shows large interannual variation in berry production over the last 22 years (Kasworm et al. 2009, 2011).

Landownership in the Analysis Area

Between 85 and 97 percent of the impacted BMUs and the Cabinet Face BORZ is managed by the KNF (Table 349). Smaller areas of private and state-owned land also occur in the analysis area.

Table 349. Current Landownership in the Grizzly Bear Analysis Area.

BMU/BORZ	Total Acres	Acres[1](% of BMU)					
		Public Land		Private Land			
		NFS	State	Weyer-haeuser	Stimson	MMC[2]	Other Private
2-Snowshoe	65,241	61,265 (94%)	1,277 (2%)	731 (1%)	1,583 (2%)	0 (0%)	387 (<1%)
5-St. Paul	70,212	67,972 (97%)	0 (0%)	0 (0%)	81 (<1%)	485 (1%)	1,672 (2%)
6-Wanless	64,147	54,478 (85%)	733 (1%)	0 (0%)	2,045 (3%)	3,231 (5%)	3,662 (6%)
Cabinet Face BORZ	28,052	27,093 (97%)	0 (0%)	311 (1%)	0 (0%)	0 (0%)	655 (2%)

[1]Acres do not include waterbodies.
[2]Owner is MMC or related entity.

Inside the Recovery Zone

Existing conditions for core, TMRD, and OMRD in the analysis area and KFP standards for the applicable BMUs are shown in Table 350. Maps showing existing conditions for core, TMRD, and OMRD are available in the project record.

Table 350. Baseline Core, OMRD, and TMRD and Standards by BMU.

Habitat Parameter	Habitat Parameter KFP Standard (%)	Existing Baseline Condition (%)
BMU 2		
Core %	75	77
OMRD %	20	18
TMRD %	18	15
BMU 5		
Core %	60	**58**
OMRD %	30	28
TMRD %	23	23
BMU 6		
Core %	55	**53**
OMRD %	34	29
TMRD %	32	**34**

Source: KNF 2019a.
Note: **Bolded** values indicate where BMUs are not in compliance with the standard.

Core Habitat. Percent core is better than the BMU-specific standard in BMU 2. Core in each of BMUs 5 and 6 is 2 percentage points less (worse) than the BMU-specific standard. In BMU 6, core is 2 percentage points less (worse) than the research benchmark minimum of 55 percent described in the KFP (USDA Forest Service 2015a).

Blocks of core habitat function as displacement areas for grizzly bears. Core block sizes for each BMU are presented in Table 351. They range from 1 to 49,646 acres, with most blocks covering at least several hundred acres. The largest blocks overlap the CMW, providing secure habitat for connectivity between BMUs. For the CYE, no scientifically based minimum effective size

polygon for core has been determined (Wakkinen and Kasworm 1997), although minimum blocks of 2 to 8 square miles (1,280 acres to 5,120 acres) were suggested.

Table 351. Baseline Core Block Sizes in Each BMU.

Core Block	BMU 2 (acres)	BMU 5 (acres)	BMU 6 (acres)
1	0	1	0
2	3	8	1
3	29	11	2
4	96	24	3
5	327	30	8
6	49,646	33	15
7		56	65
8		77	787
9		241	959
10		372	1,036
11		407	1,354
12		845	1,468
13		1,121	1,636
14		37,793	26,983
Total	**50,104 (77% of BMU)**	**41,019 (58% of BMU)**	**34,318 (53% of BMU)**

OMRD. For all BMUs in the analysis area, OMRD is less (better) than the recommended maximum of 34 percent (USDA Forest Service 2015a). OMRD in each BMU is also better than or equal to the BMU-specific standard established in KFP standard FW-WL-STD-02.

TMRD. TMRD is better than the BMU-specific standard in BMU 2 and the same as the BMU-specific standard in BMU 5. TMRD in BMU 6 is greater (worse) than the BMU-specific standard by 2 percentage points.

Minimum Width of Core Habitat at Constricted Areas. The CYRZ is long and narrow, and a relatively narrow north-south corridor of undisturbed grizzly bear habitat connects the southern Cabinet Mountain BMUs to BMUs to the north. At the local scale, this north-south corridor of core habitat bisects BMUs 5 and 6. The topography of this narrow mountain range and road use and private land activities on the east and west slopes constrict the width of effective habitat in the ecosystem, potentially impacting the north-south movement corridor for grizzly bears in BMUs 5 and 6 (USFWS 2003). The portions of the corridor in BMUs 5 and 6 are critical to linking grizzly bear habitat in the southern Cabinet Mountains, specifically BMUs 7, 8, and 22, with habitat in the northern Cabinet Mountain BMUs, consisting of BMUs 1, 2, 3, 4, and 9 (USFWS 2003). The north-south movement corridor and the three narrowest areas of core habitat in the north-south movement corridor, referred to as north, middle, and south constricted areas, are shown on (Figure 325). Project mitigation lands would total 742.3 acres within the north-south movement corridor, and locations are shown in Figure 312. The existing grizzly bear management situation land classifications are discussed under *Application of Interagency Grizzly Bear Guidelines*.

Distribution of Seasonal Habitats. During spring, collared grizzly bears in the Cabinet Mountains used mixed shrub snowchutes, alder, and graminoid parks most (Kasworm et al. 2011). In April and May, sites were often in low elevations below 1,600 meters (Kasworm et al.

2010). Bears increased their use of riparian areas in May and June as these sites began to produce succulent vegetation (Kasworm and Manley 1988). Several wildfires occurred in the analysis area in 2015, creating short-term disturbance but potentially providing grizzly bear forage habitat in the longer term. Locations of these fires are provided in the Project Record. The 5,500-acre Klatawa Fire and the 43-acre Vimy fires burned in the northern part of BMU 2, while the Smearl and Chippewa fires burned 177 acres and 19 acres, respectively, in the southern part of BMU 2. The 728-acre Poplar Point fire occurred in northwestern BMU 5. Other smaller areas of BMU 5 were affected by the Dad (70 acres), Berray Mountain (56 acres), and Midas (7 acres) fires. None of the 2015 fires occurred in BMU 6, and no large fires were recorded in the analysis area in 2016 or 2017. Because of the potentially beneficial impacts of fire on forage production, the current trend of more frequent wildfires will likely improve the productivity of spring/fall range.

Suitable denning habitat in the Cabinet Mountains is provided by remote areas above 5,000 feet and is widely available along the crest of the Cabinet Mountains. Known denning sites are generally dominated by closed timber, timber shrubfields, graminoid parks, and beargrass hillsides, where well-developed soils for excavation and adequate wintertime snow accumulations are present.

Kasworm and Manley (1990) analyzed radio locations from three bears in the Cabinet Mountains to determine the effects of roads on seasonal habitat use patterns and found that grizzly bear habitat use within 0.57 mile of open roads was significantly less than expected based on availability during spring and fall. Based on those findings, seasonal habitats are considered fully useable to grizzly bears only within core habitat. The distribution of seasonal habitats within core by BMU is shown in Table 352 and on Figure 324. Spring habitat is well distributed throughout all directly affected BMUs and is well represented in core areas (secure habitat). Avalanche chutes and denning habitat are also largely protected by core.

Table 352. Seasonal Habitat Components in Core by BMU.

BMU	Size	Core in BMU	Spring Habitat			Denning Habitat			Avalanche Chutes		
			Within BMU	Within Core		Within BMU	Within Core		Within BMU	Within Core	
	(acres)	(acres)	(acres)	(acres)	%	(acres)	(acres)	%	(acres)	(acres)	%
2	65,242	50,105	13,293	12,498	94	17,492	17,050	98	4,389	4,216	96
5	70,212	42,044	17,626	11,953	68	14,410	11,725	81	3,179	2,431	77
6	64,151	34,432	14,092	10,981	78	12,149	10,355	85	571	134	24

Disturbance and Displacement. Road use can result in the long-term avoidance by grizzly bears of adjacent habitat, potentially displacing them from higher-quality habitat to lower-quality habitat. Displacement effects from existing roads are quantified and shown in ERO's (2018b) displacement effects memo. Reducing motorized access provides core habitat and habitat security, reduces human access to grizzly bear habitat, and minimizes "point source" disturbances such as timber harvest and mining, which typically require motorized access (USFWS 2011). Long-term disturbance from mining activities may also result in the underuse of suitable habitat or long-term displacement of grizzly bears from suitable habitat to other areas with less disturbance.

Application of Interagency Grizzly Bear Guidelines. On NFS lands, the objectives of land management in grizzly bear habitat "are to maintain and enhance habitat and to minimize

potential for grizzly-human conflicts" (IGBC 1986, p. 2). Nearly all of BMUs 2, 5, and 6, approximately 173,941 acres (about 87 percent), has been classified as MS-1 lands. The remaining 25,664 acres are found around private property or Forest Service campgrounds and are classified as MS-3 due to human occupation or regular recreational use. Identifying and managing key stressors and trending toward desired vegetative conditions similar to what grizzly bears evolved with would meet the intent of the Interagency Grizzly Bear Guidelines (IGBC 1986) and 2015 Forest Plan direction. In summary, the following existing conditions of BMUs 2, 5, and 6 promote the recovery of grizzly bears in the CYE:

1) The restrictions identified in the Forest's Food Storage Order (USDA Forest Service 2011c), including the proper storage and transportation of food and other attractants, are applied to all permitted activities on NFS lands on the KNF to reduce risk of human/bear interactions.

2) Habitat parameters in BMU 2 meet or are better than standards; BMU 5 is better than the standards for OMRD and TMRD but does not meet the standard for core; and BMU 6 meets the standard for OMRD, is higher than the standard for TMRD, and is less than the standard for core.

3) Although standards are not met in all BMUs, large blocks of core habitat facilitate movement through and between the three BMUs and into adjacent BMUs to the north and south.

4) Past timber harvest, fire management, and natural events have provided a variety of age classes and successional stages in the BMUs, including the creation of habitat conditions favorable for huckleberries and other forage species as well as cover for movement.

Existing management situation classifications for the proposed Alternative 3 and 4 mitigation lands (Table 312) are either MS-1 (Parcels #11, 21, and 26) or MS-3 (Parcel #34). Because activities on MS-3 lands may displace bears from surrounding habitat, the KNF assigns a 0.25-mile influence zone or "buffer" around MS-3 lands. Parcel #34 has an existing cabin that was previously used for commercial outfitting, resulting in the MS-3 classification. Parcel #34 encompasses 83 acres plus an additional 360 acres in the disturbance buffer, resulting in a total of 443 acres of MS-3 in BMU 6. Parcel #34's disturbance buffer also includes 86 acres in BMU 7.

Mortality. The main source of human-caused mortality in the CYRZ is shooting (mistaken identity, illegal, or self-defense), followed by natural mortality, mortality from unknown causes, and mortality from management removals of problem bears. Subadult and adult female survival is found to have the largest influence on overall population trend (Wakkinen and Kasworm 2004). The maximum human-caused mortality level that can be sustained by a grizzly bear population before resulting in population decline is 6 percent, when no more than 30 percent of mortalities are female bears (Harris 1984). The goal for the CYRZ is less than 4 percent human-caused mortality, with no more than 30 percent of total mortality consisting of female bears (USFWS 1993). Applying the mortality limit of 4 percent to the minimum calculated population results in a total mortality limit of 1.6 bears per year. The female limit is 0.5 females per year (30% of 1.6).

Grizzly bear vulnerability to shooting-related mortality is largely a function of habitat security. Kasworm et al. (2018) reported that 67 percent of human-caused mortalities occurring on NFS lands were within 500 meters of an open road, suggesting that minimum standards for core habitat by BMU provide an important deterrent to shooting-related mortality. Other important

factors that likely affect shooting-related mortality are the success of FWP's "know your bear" program and levels of law enforcement.

Grizzly bear mortality from management removals (i.e., food-conditioning-related mortality) is a substantial threat to bears wherever private lands or campgrounds have unprotected garbage. KNF food storage standards and the FWP bear management specialist provide important deterrents to food-conditioning-related mortality. The FWP Region 1 bear management specialist promotes human behaviors that reduce conflicts with and subsequent mortality of bears.

Six known or probable human-caused mortalities of grizzly bears have occurred in or within 10 miles of the CYRZ from 2012 to 2017, including one adult female, one adult male, three subadult males, and one male cub (Kasworm et al. 2018). Sources of human-caused mortality from 2012 to 2017 included human self-defense and illegal shootings. Causes of three mortalities are unknown until further investigation (Kasworm et al. 2018). Known and probable human-caused mortality averaged 1.0 total bears per year and 0.2 females per year from 2012 to 2017 (Kasworm et al. 2018). No known human-caused grizzly bear mortality occurred within 10 miles of the CYRZ in 2017 (Kasworm et al. 2018).

Kasworm et al. (2018) summarized mortality and survival rates in the CYRZ for three periods: 1983 to 1999, 1999 to 2006, and 2007 to 2017. Although grizzly bear survival of all sex and age classes decreased from 0.899 to 0.792 between the first two periods, it rose to 0.934 for the period 2007 to 2017. According to Kasworm et al. (2018), some of the 1999–2006 decrease could be attributed to an increase in natural mortality probably related to poor berry production from 1998 to 2004. A large increase in mortality occurring on private lands in the U.S. also contributed heavily to this increase in overall mortality and may also be related to poor berry production, which may have caused bears to search more widely for foods on private lands. Several mortalities occurring from 1999 to 2006 were associated with sanitation issues on private lands. Coincident with the initiation of the FWP bear management specialist position, mortality on private lands declined beginning in 2007 (Kasworm et al. 2018).

An important pattern in the CYRZ bear population is the apparent decreasing trend in mortalities occurring on public lands, including NFS lands, as summarized by Kasworm et al. (2018). Human-caused mortality occurring on public lands in the U.S. and British Columbia decreased between the 1983 to 1998 period and the 1999 to 2006 period, which is particularly noteworthy given the increase in overall mortality rates from 1999 to 2006 (Kasworm et al. 2018). Implementation of access management on U.S. public lands could be a factor in this apparent decline (ibid.). Kendall et al. (2015) and Kasworm et al. (2018) suggest that public education and outreach, reduction of bear attractants, and nonlethal management of potential problem grizzly bears accomplished by state and provincial bear managers have also been effective in reducing human/bear conflicts and mortality.

Outside the Recovery Zone

The 28,052-acre Cabinet Face BORZ includes 27,093 acres of NFS lands. KFP standard road miles are 165.0 miles of total roads and 133.6 miles of open roads, as documented and updated in the KNF Bear Year 2017 Monitoring Report (USDA Forest Service 2018c). The existing non-activity levels of linear roads meet the BORZ standards.

Table 353. Existing Linear Miles of Total and Open Roads in the BORZ compared to the BORZ Standards.

Bears Outside Recovery Zone	Grizzly Bear Recovery Zone	Size (acres)	National Forest System Lands		
			NFS Lands (acres)	Total Roads (miles) Standard/Existing	Open Roads (miles) Standard/Existing
Cabinet Face	Cabinet-Yaak	28,052	27,093	165.0/165.0	133.6/133.6

Source: USDA Forest Service 2018c.

3.25.5.2.3 Environmental Consequences

Alternative 1

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with the permitted activities at the Libby Adit Site. Increased activity at the Libby Adit Site and increased traffic during site closure would slightly increase noise in the surrounding area, temporarily intensifying disturbance in the existing influence zones for these activities. Grizzly bear habitat use and occurrence would return to existing conditions after site reclamation was completed. Effects of increased traffic on grizzly bear would be negligible because the increase in vehicle use of Libby Creek Road relative to existing use would be small and short-term and would not occur during the critical grizzly bear spring emergence period. Alternative 1 would have no effects on grizzly bear core habitat, OMRD, TMRD, or the width of the north, middle, or south constricted areas.

Alternative 2

Inside the Recovery Zone

Core Habitat, OMRD, and TMRD. In Alternative 2, percent core, OMRD, and TMRD in the analysis area and total acres of core would not change from existing conditions. The seasonal access changes shown in Table 306 would not change the status of these existing open roads during the active bear year and thus would not change OMRD or TMRD in the BMU or open or total linear miles in the BORZ.

Minimum Width of Core Habitat at Constricted Areas. Alternative 2 would not affect the minimum width of core at the north, middle, and south constricted areas. The width of continuous core grizzly bear habitat in the CMW would continue to be constricted, and grizzly bear movement along the north-south movement corridor would continue to be hampered in BMUs 5 and 6

Distribution of Seasonal Habitats. Displacement effects of Alternative 2 on low-elevation spring range adjacent to the Libby Adit Site would be similar to but slightly greater than Alternatives 3 and 4, due to increased human presence and machine and vehicle use. Maintaining the seasonal restrictions (see Table 306) on Upper Libby Creek Road (NFS road #2316) and Midas-Howard Creek Road (NFS road #4778) and its spur (NFS road #4778E) would provide improved spring grizzly bear habitat conditions (836 acres); however, because these roads would not be gated for the entire active bear season, habitat improved through these seasonal road access changes would not contribute to changes in OMRD or TMRD. No change would occur to core as the roads would not be barriered and would not change the distribution of seasonal habitats within core from existing conditions.

Application of Interagency Grizzly Bear Guidelines. Identifying and managing key stressors and trending toward desired vegetative conditions similar to what grizzly bears evolved with would meet the intent of the Interagency Grizzly Bear Guidelines (IGBC 1986) and KFP direction (FW-GDL-WL-15). The relevant language from the IGBC Guidelines (IGBC 1986) states: "Management decisions will favor the needs of the grizzly bear when grizzly habitat and other land use values compete. Land uses which can affect grizzlies and/or their habitat will be made compatible with grizzly needs or such uses will be disallowed or eliminated." The IGBC guidelines do not provide a specific definition of "compete" or "compatible"; however, the intent of these provisions is made clear by the discussion in the IGBC guidelines regarding Forest Service grizzly bear management policy: "The Forest Service will manage habitats essential to bear recovery for multiple land use benefits, to the extent these land uses are compatible with the goal of grizzly recovery. Land uses which cannot be made compatible with the goal of grizzly recovery, and are under Forest Service control, will be redirected or discontinued. The IGBC management guidelines and objectives, the cumulative effects process, and goals for habitat capability and mortality will be used to guide activities which are compatible with grizzly bear recovery. It is also the policy of the Forest Service to facilitate recreation use in occupied grizzly habitat to the extent such levels or use are compatible with both human safety and grizzly recovery objectives." Thus, the IGBC Guidelines recognize the multiple use nature of National Forest management. Furthermore, it is apparent that land uses that are, or can be made, compatible with grizzly bear recovery do not "compete" even if there is an impact on individual bears. The IGBC Guidelines provide a detailed process for determining compatibility between land uses and grizzly bear recovery, which utilizes the consultation process to assist in determining compatibility between proposed land uses and grizzly bear recovery.

The determination of compatibility is based on the proposed federal action, not on individual components of such action. This is apparent from the IGBC guidelines, which utilize the consultation process to assist in determining the compatibility of proposed land uses with grizzly bear recovery goals. Thus, the relevant consideration in the present case is whether the Montanore Evaluation Project, as consulted on with the USFWS, is compatible with grizzly bear recovery goals and objectives. If it is, or can be made compatible, then the land uses encompassed by this project do not "compete" within the meaning of the IGBC guidelines.

Further, the KFP established goals, desired conditions, objectives, standards, and guidelines for its programs to provide for a more consistent interpretation and implementation of the IGBC Guidelines on the KNF. This direction should be strived for in all management activities but may be altered on the basis of site-specific needs.

Although Alternative 2 would not change percent core, OMRD, or TMRD, displacement effects would continue to occur on grizzly bear habitat due to activities at the Libby Adit Site and year-round use of Upper Libby Creek Road (NFS road #2316). In addition, the increased presence of humans and use of Lower Libby Creek Road and Upper Libby Creek Road for access would increase the risk of grizzly bear mortality. Because Alternative 2 does not include measures to mitigate the effects of displacement from the Libby Adit Site or reduce mortality risks from increased vehicle use, it does not apply IGBC Guidelines. As discussed in the analysis for key stressors and habitat management and in Section 3.25.5.2.4, Alternative 2 would not be consistent with all KFP direction for grizzly bear management and would not minimize the potential impacts or effects of resource competition between bears and humans during the life of the project or maintain habitat conditions favorable for grizzly bears throughout the project area and the affected BMUs.

Disturbance and Displacement. Alternative 2 displacement effects on grizzly bears would be similar to Alternatives 3 and 4, except that short-term disturbance from the geotechnical investigations would not occur. Increased human activity at the Libby Adit Site and use of NFS road #2316 would continue to displace grizzly bears from surrounding habitat until site closure. Human-caused disturbance could displace grizzly bears from productive and familiar habitat, indirectly putting them (and their cubs) at higher risk of mortality from starvation, predation by other bears, or conflict with humans. After the Libby Adit Site was reclaimed and closed, project-related human activity and access road use would cease and return to existing conditions.

Mortality Risks. Alternative 2 effects on mortality risk would be similar to Alternatives 3 and 4, except that Alternative 2 would not include protection of grizzly bear habitat (mitigation lands), or road access changes that improve core habitat and OMRD and TMRD conditions. In addition, Alternative 2 would not include an employee transportation plan. Traffic on Libby Creek Road and Upper Libby Creek Road would increase by a maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development on Libby Creek Road and Upper Libby Creek Road (see Section 3.21.4). Alternative 2 would not result in increased speeds on these roads. Increased road use may slightly increase the risk of collisions with motor vehicles.

Outside the Recovery Zone

Alternative 2 would not change existing total or open roads in the BORZ. The seasonal access changes shown in Table 306 would not change the status of these existing open roads during the active bear year and thus would not change total linear miles within the BORZ. Total and open road miles in the Cabinet Face BORZ would continue to meet the existing standards (see Section 3.25.5.2.2).

Alternative 3

Inside the Recovery Zone

As described in Section 2.5.3.1, Alternative 3 includes design features that would improve habitat conditions for grizzly bears in the Analysis Area, including protecting 742.3 acres of mitigation lands from development, timber, harvest, grazing, or mining in perpetuity, and road and trail access changes, some of which would be on mitigation lands. MMC would fund or implement access changes and transfer fee title to or place a conservation easement on the mitigation lands before starting the Project. In addition, MMC would implement or fund monitoring of the effectiveness of closure devices at least twice annually and would complete any necessary repairs immediately. Effects of Alternative 3 on core habitat, OMRD, and TMRD are described below.

Core Habitat. Effects of Alternative 3 on core habitat are shown in Table 354. Implementing road access changes before the Project began, as included in Project design features, would create a total of 5,115 acres of core habitat (Figure 325). Percent core would increase by 4 percent in BMU 5 and 4 percent in BMU 6 and would be better than the BMU-specific standards (Table 350). Although the percent core would not change, 273 acres of core habitat would be created in BMU 2. By increasing core habitat, the Project would increase habitat security and reduce mortality risks for grizzly bears. Most of the created core (4,001 acres) would be in the north-south movement corridor. Of the 5,115 acres of created core, 3,992 acres of created core would be the result of access changes on NFS roads (Table 309) with the remaining 1,123 acres of created core resulting from access changes on NFS and private roads associated with mitigation lands (Table 310).

Table 354. Effects on Grizzly Bear Core Habitat by BMU.

BMU	KFP Core Standard (%)	BMU Size (acres)	Core in BMU (%)				
			Baseline	Pre-Evaluation	Evaluation	Post-Evaluation	% Change (Baseline to Post-Evaluation)
2	75	65,242	77	77	77	77	0
5	60	70,212	58	**62**	**62**	**62**	**+4**
6	55	64,151	53	**57**	**57**	**57**	**+4**

Note: Bolded values indicate improved conditions with the Evaluation Project relative to the baseline condition.
Source: KNF 2019a.

Alternative 3 activities at the Libby Adit Site would not directly affect core as all above ground activities are located within 0.31 mile of existing gated or open roads or are within the existing disturbance boundary on private land and the access routes are on existing roads where no core exists.

Alternative 3 geotechnical investigations would include construction of new access roads and reconstruction of existing but impassible or closed access roads. New or reconstructed access roads would not directly affect core habitat in BMU 5 because the activities (construction of new or reconstructed roads or construction of drill pad sites) would be located within 0.31 mile of existing gated or open roads where no core exists. Within the geotechnical investigation area, new or reconstructed roads would be short spur roads, access road use would be short-term, access road use would be relatively infrequent (four to six vehicle trips per day), and all new or reconstructed roads would be reclaimed as soon as practical after test work completion (KNF 2019a). Public motorized use on these short spur roads used for access would not be permitted.

OMRD. Effects of Alternative 3 on OMRD are shown in Table 355. OMRD would be reduced by 1 percent in BMU 5 and remain the same as existing conditions in BMUs 2 and 6. For all BMUs in the analysis area, OMRD would continue to be better than or equal to the BMU-specific standard established in KFP standard FW-WL-STD-02. Geotechnical investigations would have negligible effects on OMRD because the new or reconstructed existing road segments would be located adjacent to or between roads where existing OMRDs already range from 1 to 2 miles per square mile or are greater than 2 miles per square mile. The new or reconstructed existing roads would be short spur roads and would be reclaimed as soon as practical after test work completion (KNF 2019a).

Table 355. Effects of Alternative 3 on OMRD by BMU.

BMU	KFP OMRD Standard (%)	BMU Size (acres)	OMRD (>1 mi/mi^2) in BMU (%)				
			Baseline	Pre-Evaluation	Evaluation	Post-evaluation	% Change (Baseline to Post-Evaluation)
2	20	65,242	18	18	18	18	0
5	30	70,212	28	**27**	**27**	**27**	**-1**
6	34	64,151	29	29	29	29	0

Note: Bolded values indicate improved conditions with the Evaluation Project relative to the baseline condition.
Source: KNF 2019a.

TMRD. Effects of Alternative 3 on TMRD are shown in Table 356. TMRD would decrease (improve) by 4 and 3 percent in BMUs 5 and 6, respectively, and remain the same in BMU 2. Access changes on grizzly bear mitigation lands would result in TMRD in BMU 6 less (better) than the BMU-specific standard. Geotechnical investigations would have negligible effects on TMRD because the new or reconstructed existing road segments would be located in an area where existing TMRDs are already greater than 2 miles per square mile. The new or reconstructed existing road segments would be short spur roads and would be reclaimed as soon as practical after test work completion (KNF 2019a).

Table 356. Effects of Alternative 3 on TMRD by BMU.

BMU	KFP TMRD Standard (%)	BMU Size (acres)	TMRD (>2 mi/mi^2) in BMU (%)				
			Baseline	Pre-Evaluation	Evaluation	Post-Evaluation	% Change (Baseline to Post-Evaluation)
2	18	65,242	15	15	15	15	0
5	23	70,212	23	**19**	**19**	**19**	**-4**
6	32	64,151	34	**31**	**31**	**31**	**-3**

Note: Bolded values indicate improved conditions with the Evaluation Project relative to the baseline condition.
Source: KNF 2019a.

Minimum Width of Core Habitat at Constricted Areas. In Alternative 3, the minimum width of core habitat at the south constricted area would increase permanently by 2.4 miles from 0.9 mile to 3.3 miles and remain constant at the north and middle constricted areas (Figure 325). The widening of the south constricted area would be due to the access change on NFS road #150A and trail #935 (East Fork Rock Creek Road and Rock Lake Trail) included in the Project design features (Table 309) and is in conjunction with the mitigation land parcel #21. A barrier on NFS road #6745 (Standard Creek Road) would add core to the northeast of the south constricted area, further connecting habitat in the north-south movement corridor. Along with these access changes, additional improvement in connectivity and movement through the north-south corridor would be attained through protection of Project mitigation lands, which decrease risk for future human development. One of the mitigation parcels (#34) would result in a 529-acre change in management situation (MS) classification from MS-3 (land where grizzly bear presence was actively discouraged) to MS-1 where the land would be managed for grizzly bears. A detailed discussion of the MS land classification improvements are provided under *Application of Interagency Grizzly Bear Guidelines*.

Distribution of Seasonal Habitats. Displacement on low-elevation spring range adjacent to the Libby Adit Site within the influence zone would continue to occur during Alternative 3 (ERO Resources Corp. 2018b). In Alternative 3, seasonal habitat (i.e., spring range, avalanche chutes, and denning habitat) in core habitat would increase (Table 357) due to access changes that create core habitat. The influence zone of the geotechnical activities would not include spring or denning habitat, and disturbance of grizzly bears during the critical spring period would be avoided because geotechnical investigations would occur between June 16 and October 14. Maintaining seasonal restrictions on Upper Libby Creek Road (NFS road #2316) and Midas-Howard Creek Road (NFS road #4778) and its spur (NFS road #4778E) would improve conditions on 836 acres of spring grizzly bear habitat; however, because these roads would not be

gated for the entire active bear season, these seasonal road access changes would not contribute to changes in OMRD or TMRD. No change would occur to core as the roads would not be barriered.

Application of Interagency Grizzly Bear Guidelines. The context for determining if IGBC Guidelines have been applied is described above for Alternative 2. ESA compliance would be ensured through Section 7 consultation, which is in progress for Alternative 3, which is the preferred alternative. The KNF will submit a BA to the USFWS that describes the potential effect of the preferred alternative (Alternative 3) on threatened and endangered species that may be present in the area, including the grizzly bear. With implementation of the agencies' mitigation plan and design features specified in the Montanore Evaluation Project BA, Alternative 3 would result in improved conditions for grizzly bears compared to baseline conditions, would be compatible with grizzly bear recovery goals and objectives, and would apply IGBC Guidelines. Alternative 3 design features would ensure that grizzly bear resource indicators and conditions are maintained or improved post-Project and would minimize potential impacts or effects of resource competition between bears and humans. In addition, the mitigation lands would be managed for grizzly bears in perpetuity. Prior to initiation of evaluation activities and after requirements of the fee title or a conservation easement were met, the 83-acre parcel #34 and associated disturbance buffer would be reclassified from MS-3 to MS-1. In total, 443 acres would be reclassified from MS-3 to MS-1 in BMU 6, with an additional 86 acres reclassified in BMU 7. As discussed in the analysis for key stressors and habitat management and in Section 3.25.5.2.4, Alternative 3 would be consistent with all KFP direction for grizzly bear management. Therefore, Alternative 3 would minimize the potential impacts or effects of resource competition between bears and humans during the life of the Project or maintain habitat conditions favorable for grizzly bears throughout the Project area and the affected BMUs.

Disturbance and Displacement. Alternative 3 displacement effects are described in detail in a displacement analysis memo (ERO Resources Corp. 2018b). The influence zone of the Alternative 3 geotechnical investigation area would overlap with 77 acres of existing core habitat. No activities are proposed in this core, but effectiveness of this core habitat could be reduced due to noise and increased human activity in the investigation area for the 12-week period. Geotechnical investigations would last 12 weeks between June 16 and October 14 and could temporarily disturb any grizzly bear in the vicinity. Activities would not occur in the entire geotechnical investigation area during the 12-week period, and implementation of the KNF's noise mitigation would help reduce noise, which would return to existing levels at the end of the 12-week geotechnical investigations. Any potential grizzly bear disturbance resulting from the geotechnical investigations would be short-term and negligible given existing displacement occurring from the existing year-round open roads and existing human disturbance of the area affected, the duration of the activities, and incorporated design features.

In Alternative 3, increased human activity at the Libby Adit Site and use of NFS road #2316 would continue to disturb and displace grizzly bears and result in underuse of habitat in the influence zone surrounding the Libby Adit Site during the 18–24 months of Project activity and during site closure, expected within 5 years of Project initiation. After the Libby Adit Site was reclaimed and closed, Project-related human activity and access road use would cease and return to existing conditions.

Table 357. Alternative 3 Effects on Seasonal Habitats by BMU.

BMU	Phase	Spring Range			Avalanche Chutes			Denning Habitat		
		In BMU	In Core		In BMU	In Core		In BMU	In Core	
		(acres)	(acres)	(%)	(acres)	(acres)	(%)	(acres)	(acres)	(%)
2	Baseline Condition	13,293	12,498	94	4,389	4,216	96	17,492	17,050	97
2	Pre-Evaluation	13,293	12,503	94	4,389	4,216	96	17,492	17,054	97
2	Evaluation	13,293	12,503	94	4,389	4,216	96	17,492	17,054	97
2	Post-Evaluation	13,293	12,503	94	4,389	4,216	96	17,492	17,054	97
Change from Baseline to Post-evaluation			**5**	**0**		0	0.0		**4**	**0**
5	Baseline Condition	17,626	11,953	68	3,179	2,431	76	14,410	11,725	81
5	Pre-Evaluation	17,626	12,236	69	3,179	2,431	76	14,410	11,868	82
5	Evaluation	17,626	12,236	69	3,179	2,431	76	14,410	11,868	82
5	Post-Evaluation	17,626	12,236	69	3,179	2,431	76	14,410	11,868	82
Change from Baseline to Post-evaluation			**283**	**1**		0	0.0		**143**	**1**
6	Baseline Condition	14,092	10,981	78	571	134	23	12,149	10,355	85
6	Pre-Evaluation	14,092	11,649[1]	83[1]	571	180	32	12,149	10,927[1]	90[1]
6	Evaluation	14,092	11,649[1]	83[1]	571	180	32	12,149	10,927[1]	90[1]
6	Post-Evaluation	14,092	11,649[1]	83[1]	571	180	32	12,149	10,927[1]	90[1]
Change from Baseline to Post-evaluation[2]			**668**	**5**		**46**	**9**		**572**	**5**

Note: Bolded values indicate improved conditions with the Evaluation Project relative to the baseline condition.
Differences may vary due to rounding.

As described in Section 3.25.5.2.1, the analysis of habitat displacement estimated the extent of the displacement, or zone of influence, and the degree to which suitable grizzly bear habitat is used. Within the Libby Adit Site influence zone, Alternative 3 would increase displacement effects from motorized point 24-hour activities on 598 acres (currently affected existing MS-3 lands and a low-use road) and 211 acres previously not affected, while increased use would occur on 354 acres currently affected by existing low-use roads. In total, Alternative 3 displacement effects would occur on 1,163 acres of grizzly bear habitat. Female grizzly bears in particular have a strong home range affinity (IGBC 1990, 1998). Bears that are forced out of their familiar home range use more energy finding food and den sites than bears within their undisturbed home range (USFWS 2003, 2006). Increases in human or mechanical activities above levels to which resident grizzly bears are accustomed have a number of well-documented effects on bears (McLellan and Shackleton 1988, 1989a, 1989b; USFWS 1993; Mace and Manley 1993; Kasworm and Thier 1994; Kasworm et al. 1995; Mace et al. 1996; Wakkinen and Kasworm 1997; Mace et al. 1999). Bears tend to avoid areas of increased activity, and suitable habitat could be underused or avoided even if it was available. Bears prevented from using important resources in their home range may experience impacts affecting breeding and feeding.

Although female home ranges vary widely depending on numerous factors, such as age, breeding status, population density, and habitat conditions, the 1,163 acres in the Project zone of influence represents less than 2 percent of an average female home range size of 64,000 acres (Christensen and Madel 1982). Because displacement effects, which could result in underuse of habitat located within the Libby Adit Site influence zone, would be concentrated in areas adjacent to the adit location, large blocks of undisturbed core habitat would remain available for bears. Prior to Project activities, Alternative 3 access changes would result in a 4 percent increase in core habitat in both BMU 5 and BMU 6 over the baseline condition, and each BMU would be 2 percent better than the BMU-specific standards (Table 354). BMU 2 core would remain 2 percent better than its standard. OMRD would decrease (improve) in BMU 5 by 1 percent over the baseline condition and would be 3 percent better than its standard (Table 355), while both BMU 2 and BMU 6 would remain better (lower) than their BMU specific standards by 2 to 5 percent. Access changes would result in a 3 to 4 percent decrease (improvement) in TMRD over the existing baseline in both BMU 5 and 6, resulting in BMU 5 being 4 percent better (lower) and BMU 6 being 1 percent better (lower) than their BMU-specific standards (Table 356).

The Alternative 3 improvements to grizzly bear habitat parameters in BMUs 2, 5, and 6 would occur before the Project starts and would result in core areas (77 percent, 62 percent, and 57 percent, respectively; see Table 354) comparable to or larger than the core area in the average female home range reported in research (55 percent; Wakkinen and Kasworm 1997). Outside of core areas, as described above, percent OMRD and TMRD would improve or remain the same and would be better (lower) than the BMU-specific standards for all BMUs. These substantial core areas and moderate road densities would provide secure and sufficient alternative habitat for grizzly bears, including females with cubs within their home ranges, during Project activities.

Compensatory mitigation for displacement effects from the Libby Adit Site was determined based on disturbance coefficients and compensation levels assigned to the different activities associated with the Project. Protection and enhancement of 500 acres of grizzly bear habitat would be needed to compensate for Alternative 3 displacement effects on 1,163 acres of grizzly bear habitat. The protection of 742.3 acres included in Alternative 3 would be 242.3 acres more than the 500 acres of required modeled habitat compensation and would occur before project activities began.

Because habitat quality differs among land parcels, priorities for selecting potential mitigation lands in the CYRZ were established (Kasworm et al. 2013a) and were followed for Alternative 3 (MMC 2018f). Land where core can be created or that enhances grizzly bear movement in the north-south movement corridor is of greatest value to grizzly bears in the analysis area (Kasworm et al. 2013b). The habitat value of the mitigation lands is based on the mitigation land and evaluation criteria developed collaboratively by the Forest Service and USFWS (Kasworm et al. 2013a) and Kasworm et al.'s (2013b) mitigation credit process paper. The habitat value of the mitigation lands is 1,436 acres (Table 358). All mitigation lands are within the north-south corridor in BMUs 2, 5, and 6.

Table 358. Mitigation Lands and Habitat Values.

Parcel ID[1]	Location	Owner	Size (acres)	Mitigation Multiplier		Habitat Value (acres)
				Evaluation Criteria #	Value	
11	Rock Lake	MMC	14.503	3	1.5	22
21	Rock Creek Meadow	Mines Management, Inc.	4.488	4	2.0	9
26	Trail Creek	Hecla Montana, Inc.	640	4	2.0	1,280
34	Upper Trail Creek	MMC	83.29	3	1.5	125
Total			742.281			1,436

[1]Parcel ID based on tabulation of possible mitigation lands developed by Kasworm et al. 2013a.
Habitat value is derived from multiplying the mitigation multiplier value by the parcel's size, as described in Kasworm et al. (2013b).

The short-term disturbance effects of Alternative 3 geotechnical investigations and monitoring in the CMW were also evaluated (ERO Resources Corp. 2018b). Any potential grizzly bear disturbance resulting from the geotechnical investigations would be short-term and negligible given displacement occurring from the existing year-round open roads and existing human disturbance of the area affected, the duration and timing (June 16 to October 14) of the activities, and anticipated effectiveness of the design features. Increased use of NFS road #278 (Bear Creek Road), NFS road #6212 (Little Cherry Creek Loop Road), and short spur roads during the 12-week geotechnical investigations could create additional human-related disturbance, but given the current use of these roads, long-term displacement effects of existing open roads, and the number of trips anticipated, effects would be negligible and short-term.

Alternative 3 monitoring activities, described in Section 2.5.3.3, could result in increased human disturbance of grizzly bears in BMUs 5 and 6, but effects would be negligible, short-term, and dispersed over a large area. Before any monitoring would occur in the CMW, the KNF would conduct a Minimum Requirements Analysis according to the Minimum Requirements Decision Guide to ensure that adverse effects on wilderness character are minimized, which also would reduce effects on grizzly bears. For these reasons, grizzly bear disturbance effects from monitoring activities in the analysis area would be negligible.

Mortality Risks. The increased presence of humans associated with Alternative 3 could result in slight, short-term (18–24 months) increases of grizzly bear mortality risk from shooting of bears in self-defense, poaching, or collisions with motor vehicles. In addition, human presence would

increase potential for food attractants, resulting in bear removal due to food conditioning. Several design features described in Section 2.5.3.1 would be implemented before starting the project and would help counteract increased mortality risks, including MMC's funding of a FWP law enforcement officer and grizzly bear specialists, implementation of a public outreach program, removal of big game killed along access roads, funding and distribution of bear-resistant refuse containers, funding for electric fencing around bear problem sites, and implementation of a wildlife awareness plan for employees. Increases in traffic are anticipated to be relatively small, with implementation of an employee transportation plan that would result in an additional 10 trips per day on Project access roads. MMC would monitor and report within 24 hours all grizzly bear, lynx, wolf, and black bear mortalities in the Libby Adit Site permit area and along Alternative 3 access roads. The additional reporting requirements for both MMC and KNF employees to immediately report any grizzly or black bear incidents, observations, or mortalities to the FWP grizzly bear specialist and law enforcement officer ensure that preemptive management, hazing, or removal of food attractants would occur to avoid risks of habituation, mortality, or displacement of grizzly bears. Both MMC and the KNF would be required to provide an annual summary of all sanitation incidents and corrective measures taken in the previous year, which would inform development of adaptive management strategies to reduce mortalities. Use of salt would be prohibited on roads during winter plowing operations. Salt can attract big game, which may result in mortality from vehicles. The presence of carcasses in turn could attract grizzly bears to the road corridor and increase mortality risk.

The increase in core habitat in BMUs 2, 5, and 6; the decrease in OMRD in BMU 5; and the decrease in TMRD in BMUs 5 and 6 described above would provide more secure habitat for recovery in the CYRZ, which would reduce mortality risks. The aforementioned substantial increase in the minimum width at the constricted areas, protection of the mitigation lands, and increase in acres of lands classified as MS-1 to be managed for grizzly habitat would also reduce mortality risks by providing more secure habitat for uninterrupted north-south movement through the CYRZ.

Outside the Recovery Zone

Road access changes in the BORZ are shown on Figure 312. Alternative 3 access changes would reduce total roads in the BORZ (#4776A, #4776C, and #4776F) from existing levels by 2.5 miles and open roads (#4776A) (any passable road not closed via gate or barrier) by 1.2 miles (Table 359). The seasonal access change to a gate on 0.9 mile of open road #4778 would not change the existing total or open road linear miles in the BORZ. Total and open roads in the BORZ would be 1.9 and 2.5 miles less than baseline existing conditions (Table 309).

Table 359. Alternative 3 Effects on Open and Total Roads in the Cabinet Face BORZ.

Road Type	Standard (miles)	Existing Condition (miles)	Pre-Evaluation, During and Post Project (miles)	Change from Existing Condition and Standard Due to Project (miles)
Total Linear Road	165.0	165.0	162.5	-2.5
Open Linear Road	133.6	133.6	132.4	-1.2

Reducing the miles of open roads in the BORZ would reduce the risk of grizzly bear mortality and displacement of grizzly bears from high-quality habitat. Reducing the total miles of road in

the BORZ would minimize motorized human access into grizzly bear habitat and further reduce the risk of human-caused grizzly bear mortality. The seasonal access change would temporarily reduce the open miles of road as shown in Table 359 by an additional 0.9 mile during the grizzly bear spring use period April 1 to June 15, as long as MMC snowplowed access roads to the Libby Adit Site.

Alternative 4

Inside the Recovery Zone

Core Habitat, OMRD, and TMRD. Effects of Alternative 4 on core habitat, OMRD, TMRD, would be similar to and slightly less than Alternative 3, because fewer temporary access roads would be used for geotechnical studies (KNF 2019a).

Minimum Width of Core Habitat at Constricted Areas. Effects of Alternative 4 on the minimum width of core habitat at the south, middle, and north constricted areas would be the same as Alternative 3.

Distribution of Seasonal Habitats. Alternative 4 effects on the distribution of seasonal habitats would be the same as Alternative 3.

Disturbance and Displacement. Alternative 4 displacement and disturbance effects would be the same as Alternative 3, except that disturbance from Alternative 4 geotechnical investigations would be slightly less because the geotechnical investigation area would be smaller.

Application of Interagency Grizzly Bear Guidelines. Alternative 4 effects on grizzly bears would be similar to Alternative 3 and would require the same mitigation plan. Like Alternative 3, Alternative 4 would result in improved conditions compared to baseline conditions, would be compatible with grizzly bear recovery goals and objectives, and would apply IGBC Guidelines.

Mortality Risks. Mortality risks would be the same in Alternative 4 as Alternative 3.

Outside the Recovery Zone

Alternative 4 effects on open and total road miles in the Cabinet Face BORZ would be the same as in Alternative 3.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past and present activities on grizzly bear are described in the JFEIS and Section 3.25.5.2.2 above. Cumulative effects of the Montanore Evaluation Project activities on grizzly bears were not specifically described in the JFEIS and are addressed below, based on more detailed currently available information about Project activities. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Cumulative effects from concurrent development of the Rock Creek Project's Phase II activities and the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Inside the Recovery Zone

Core Habitat, OMRD, and TMRD. Road construction, road use, and mitigation-related access changes affecting core habitat, OMRD, and TMRD associated with the Miller-West Fisher Vegetation Management Project would occur, at least in part, in BMU 6 where Alternative 3 and 4 access changes would be implemented. Access changes in Alternatives 3 and 4 would be implemented in the Trail Creek and Standard Creek drainages; both creeks are tributaries of West Fisher Creek. Because the access changes would not change the existing public motorized access status (Table 309 and Table 310), they would not have cumulative effects with the Miller-West Fisher Vegetation Management Project.

Decisions made by private landowners regarding management of motorized roads and trails on their lands could result in cumulative adverse effects on core, OMRD, and TMRD. In many cases, the Forest Service may mitigate for these effects through additional access changes on federal lands within the individual BMU. However, in other cases, the amount of core area potentially reduced due to development on private property could exceed the Forest Service's ability to compensate on NFS lands. The small proportion of privately owned (non-MMC) land (3 percent) in the analysis area BMUs may minimize this potential, but for private in-holdings requiring long-distance access through NFS lands, future road access needs may worsen habitat components and result in declining habitat conditions for grizzly bears.

Activities that decrease core or increase OMRD and TMRD components are less likely to occur on corporate or state-owned land because of access restrictions that could result in increased effective grizzly bear habitat. For example, in 2000, Plum Creek Timber Company (now Weyerhaeuser) completed a Native Fish HCP for 17 native fish species (Plum Creek Timber Company 2000). The HCP requires Weyerhaeuser to accompany any increases in road density greater than 1 mile per square mile with overall decreases in human access by gating all new roads and through additional commitments to restrict access to roads (USFWS and National Marine Fisheries Service 2000). Similarly, the DNRC Trust Land Management Division HCP applicable to state lands in the analysis area commits to no net increase in open roads at the administrative unit level. Core habitat would not decrease and OMRD and TMRD would not increase on state land in the analysis area.

Increases in core grizzly bear habitat, OMRD, and TMRD resulting from Alternative 3 and 4 access changes would contribute to grizzly bear habitat improvements, and in combination with the Miller-West Fisher Vegetation Management Project access changes; effects of road construction, use, and management on state and private land; and past and present actions, these changes would cumulatively improve grizzly bear habitat in the long term. Alternatives 1 and 2 would not contribute to cumulative effects on grizzly bear core habitat, OMRD, or TMRD.

Minimum Width of Core Habitat at Constricted Areas. Alternative 2, in combination with Rock Creek Phase I, could disrupt the movement of bears along the north-south corridor by some bears. Alternatives 3 and 4 would increase the minimum width of core at the south constricted area and, in combination with the protection of 153 acres of grizzly bear habitat and the access change on Upper Bear Creek Road (NFS road #4784) included in Rock Creek Phase I, would improve habitat security in the north-south movement corridor. Alternatives 1 and 2 would have no effect on the minimum width of core habitat in the north-south movement corridor.

Distribution of Seasonal Habitats. Disturbance effects on surrounding grizzly bear habitat would occur in BMU 5 from Rock Creek Phase I and in BMU 6 from the Miller-West Fisher

Vegetation Management Project. Displacement on low-elevation spring range adjacent to the Libby Adit Site would continue to occur during the Evaluation Project. In all action alternatives, cumulative effects on grizzly bear spring range would be reduced through maintenance of the seasonal restrictions on Upper Libby Creek Road (NFS road #2316) and Midas-Howard Creek Road (NFS road #4778) and its spur (NFS road #4778E). Alternatives 3 and 4 would create core in spring habitat, further improving spring habitat conditions and reducing cumulative effects on spring habitat.

Disturbance and Displacement. The Miller-West Fisher Vegetation Management Project, the Kootenai Forestwide Young Growth Vegetation Management Project, and the Coyote Improvement Vegetation Management Project may result in minor, short-term disturbance of grizzly bears as a result of human activity, equipment noise, and increases in traffic. Future timber harvest or similar forest management disturbances on state, corporate, and private lands are likely to occur during the Montanore Evaluation Project. Timber harvest usually increases early successional vegetation that improves bear food sources and provides increased foraging areas. Disturbances associated with forest management activities would result in short-term reductions in effectiveness of adjacent habitat and short-term increases in disturbance to bears that might be in the area. Disturbance and displacement effects above a bear's tolerance level could cause it to avoid suitable habitat or be displaced to other areas with lower levels of disturbance. Displacement effects of Rock Creek Phase I could also cause grizzly bears to move into other occupied space, resulting in potential conflicts with other bears or competition for food sources, or ultimately increased mortality. Rock Creek Phase I effects would be minimized through protection of 153 acres of grizzly bear habitat and installation of the barrier on Upper Bear Creek Road (NFS road #4784) within 1 year of the KNF issuing the permit for the Rock Creek Evaluation Adit, as required by Rock Creek Phase I.

All action alternatives would result in displacement effects on grizzly bear habitat adjacent to the Libby Adit Site and the Libby Creek and Upper Libby Creek access roads, contributing to cumulative disturbance of grizzly bears and reductions in effective habitat. Alternatives 3 and 4 include habitat protection and road access changes that would minimize disturbance of grizzly bears and improve grizzly bear habitat conditions, reducing cumulative displacement and disturbance effects on grizzly bears.

Mortality Risks. The action alternatives, in combination with other reasonably foreseeable actions, may increase mortality risk due to the influx of employees and vehicles into the analysis area. Alternatives 3 and 4 and the reasonably foreseeable Rock Creek Phase I include measures to counteract the increased risk of grizzly bear mortality, such as busing employees to the project site, educating employees about the biology and behavior of grizzly bears, and equipping project sites and surrounding areas with bear-resistant garbage containers. The new law enforcement and bear specialist positions included in Alternatives 3 and 4 and the Rock Creek Project Phase I would help reduce the risk of illegal killing of grizzly bears in the area, increase public awareness, and help increase acceptance and support of grizzly bear management across the CYE and adjacent BORZ, not just in the directly affected BMUs. Alternatives 3 and 4 would require MMC and KNF employees to immediately report all grizzly and black bear incidents, observations, and mortalities to the FWP grizzly bear specialist and law enforcement officer, to ensure that preemptive management would occur to avoid risks of habituation, mortality, or displacement of grizzly bears. Both MMC and the KNF would be required to report annually all sanitation incidents and corrective measures taken during the previous year, which would inform development of adaptive management strategies to reduce mortality risk. Alternative 3 and 4

habitat protection and road access changes would increase core habitat, improve OMRD and TMRD, and increase the minimum width of core habitat at constricted areas along the north-south movement corridor, providing more secure habitat and reducing cumulative mortality risks.

Outside the Recovery Zone

On National Forest System lands, neither the reasonably foreseeable actions nor Alternatives 1 and 2 would change the baseline miles of open and total roads as established in the KFP. Alternatives 3 and 4 would reduce total and open road miles in the Cabinet Face BORZ, minimizing cumulative effects on grizzly bears.

3.25.5.2.4 Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Mineral Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. Alternative 2 would not include access changes, grizzly bear habitat protection, or other practicable measures that would improve grizzly bear core habitat, OMRD, or TMRD and decrease mortality risk; therefore, Alternative 2 would not include all practicable measures to maintain and protect grizzly bear or grizzly bear habitat, would not comply with the KFP, and would not comply with 36 CFR 228.8. Alternatives 3 and 4, which would include design features to maintain and protect grizzly bear habitat, would comply with 36 CFR 228.8 by including practicable measures to achieve KFP standards before activity with road access mitigation and would maintain and protect grizzly habitat that may be affected by the operations.

National Forest Management Act/Kootenai Forest Plan

Consistency with KFP direction is described below.

GOAL-WL-01. Alternative 2 road access changes described in Section 2.4.4.2 and design features described in Section 2.4.3.3 and Alternative 3 and 4 design features described in Section 2.5.3.1 would contribute to species recovery; therefore, all action alternatives would help make progress toward achieving this goal.

FW-DC-WL-01. No grizzly bear den sites have been identified in the analysis area, and all alternatives are neutral toward achieving this desired condition.

FW-DC-WL-02. Alternative 2 would not have surface impacts on grizzly bear habitat and would be neutral to achieving progress toward this desired condition. Alternatives 3 and 4 would disturb grizzly bear habitat in the geotechnical investigation area but would include the protection of grizzly bear habitat and the creation of core grizzly bear habitat. Therefore, Alternatives 3 and 4 would contribute to achieving progress toward this desired condition.

FW-DC-WL-03. All action alternatives would reduce effectiveness of habitat near the Libby Adit Site and Upper Libby Creek Road due to ongoing displacement effects but would improve conditions in grizzly bear spring habitat through road access changes. Alternative 2 would not change core, OMRD, or TMRD. Alternatives 3 and 4 would contribute to grizzly bear recovery through additional design features described in Section 2.5.3.1. Alternatives 3 and 4 would create core habitat and increase the width of core habitat in the south constricted area. Alternative 3 and 4 design features were developed in coordination with FWP and USFWS, and consultation with

the USFWS on potential impacts from the preferred alternative (Alternative 3) is in progress. Alternative 2 would be neutral toward achieving this desired condition. Alternatives 3 and 4 would contribute to making progress toward achieving this desired condition.

FW-DC-WL-04. All action alternatives would reduce effectiveness of habitat near the Libby Adit Site and Upper Libby Creek Road due to ongoing displacement effects but would improve conditions in grizzly bear spring habitat through road access changes. Alternatives 3 and 4 include protection of grizzly bear habitat and additional access changes that would create core habitat, which would reduce human/bear conflicts and potential bear mortality. Alternative 2 would be neutral toward achieving this desired condition. Alternatives 3 and 4 would contribute to making progress toward achieving this desired condition.

FW-DC-WL-05. None of the alternatives would decrease core habitat or increase OMRD or TMRD. Alternative 2 seasonal road access changes described in Section 2.4.4.2 would improve conditions on grizzly bear spring habitat but would not improve percent core, OMRD, or TMRD in the analysis area; therefore, Alternative 2 would be neutral toward achieving this desired condition. Alternative 3 and 4 road access changes described in Section 2.5.2 would improve percent core, OMRD, and TMRD in the analysis area. Alternatives 3 and 4 would contribute to making progress toward achieving this desired condition.

FW-STD-WL-02. None of the alternatives would decrease core habitat or increase OMRD or TMRD. Alternative 2 would not change percent core, OMRD, or TMRD in the analysis area. In Alternatives 3 and 4, percent core, OMRD, and TMRD would be above the KFP standard in the analysis area BMUs due to road access changes described in Section 2.5.2. All action alternatives were designed in exact accordance with this standard.

FW-STD-WL-04. All action alternatives were designed in exact accordance with this standard. All alternatives would implement a food storage order for the BMUs affected by the project. Other measures to reduce grizzly bear attractants are described in Section 2.4.3.3 and Section 2.5.3.1. Through the wildlife awareness plan for employees, MMC would prohibit feeding of animals, provide bear-proof garbage containers at the Libby Adit Site, and require all employees to follow KNF mandatory food storage guidelines at the Libby Adit Site and during geotechnical field investigations on National Forest System lands. Food storage and attractant issues will also be considered in the pending Biological Assessment for the preferred alternative.

FW-STD-WL-05. None of the action alternatives authorize snowmobile grooming; therefore, all action alternatives were designed in exact accordance with this standard.

FW-GDL-WL-01. All action alternatives would result in displacement effects on denning habitat adjacent to the Libby Adit Site as a result of human and mechanical activity. In Alternatives 3 and 4, effects on denning habitat would be minimized through creation of secure core habitat in modeled denning habitat; therefore, Alternatives 3 and 4 were designed in accordance with the guideline. Alternative 2 would not include measures to reduce effects on denning habitat and was not designed in accordance with this guideline.

FW-GDL-WL-12. None of the alternatives authorize construction or reconstruction of highways or high-use forest roads. There are no sites along routes used for the alternatives where Project activities are expected to create a connectivity or movement barrier. No crossing features are warranted for inclusion in the Project design. All alternatives were designed in accordance with this guideline. Alternative 2 would not include a transportation plan to minimize traffic.

Alternatives 3 and 4 would include a transportation plan to minimize vehicular traffic traveling between US 2 and the Libby Adit Site and would contribute to connectivity of wildlife populations by minimizing vehicular trips.

FW-GDL-WL-14. The north-south movement corridor has been identified as a wildlife linkage area. Federal ownership would be maintained, and all alternatives were designed in accordance with this guideline. Alternative 3 and 4 Project mitigation lands either would have the potential to increase federal ownership if fee title transfer was used or would protect the lands by conservation easements within the north-south corridor and would be consistent with this guideline.

FW-GDL-WL-15. Implementation of alternatives that are consistent with the 2015 Forest Plan's established goals, desired conditions, objectives, standards, and guidelines would meet the intent of IGBC Guidelines. This would minimize the potential impacts of resource competition between bears and humans during the life of the Project and would maintain habitat conditions favorable for grizzly bears throughout the analysis area and the affected BMU. See *Application of Interagency Grizzly Bear Guidelines* in Section 3.25.5.2.2.

Although Alternative 2 would not change percent core, OMRD, or TMRD, displacement effects would continue to occur on grizzly bear habitat due to activities at the Libby Adit Site and year-round use of Upper Libby Creek Road (NFS road #2316). In addition, the increased presence of humans and use of Lower Libby Creek Road and Upper Libby Creek Road for access would increase the risk of grizzly bear mortality. Because Alternative 2 does not include measures to mitigate the effects of displacement from the Libby Adit Site or reduce mortality risks from increased vehicle use and human presence, it does not apply IGBC Guidelines and was not designed in accordance with this guideline.

Alternatives 3 and 4 would create core habitat, reduce OMRD and TMRD, and increase the width of core habitat in the south constricted area before Project activities began, measures that would reduce human/bear conflicts and potential bear mortality. Alternatives 3 and 4 would include other measures to minimize grizzly bear mortality, such as implementation of an employee transportation plan and funding for FWP law enforcement and grizzly bear specialists. Alternatives 3 and 4 were designed in accordance with this guideline.

GA-DC-WL-CLK-03; GA-DC-WL-FSH-01; GA-DC-WL-LIB-04. Alternative 2 would not contribute toward improving movement through the north-south corridor. Alternatives 3 and 4 would contribute toward desired conditions for north-south movement through the Cabinet Mountains by implementing access changes in the Clark, Fisher, and Libby GAs and protecting mitigation lands located in BMUs 5 and 6 in the Clark and Fisher GAs. In the north-south corridor, the access changes would contribute toward creation of core habitat, reduction in TMRD, and increased width of constricted areas, while protection of mitigation lands would decrease existing development, decrease risk for future human development, and increase MS-1 lands specifically managed for grizzly bear habitat.

Endangered Species Act

For any selected alternative, ESA compliance would be ensured through Section 7 consultation, which is in progress. The KNF will submit a BA to the USFWS that describes the potential effect of the preferred alternative (Alternative 3) on threatened and endangered species that may be present in the area, including the grizzly bear. After review of the BA and consultation, the USFWS will issue either a concurrence letter or a Biological Opinion.

Statement of Findings

Alternative 1 may affect, is not likely to adversely affect the grizzly bear for the following reasons: (1) all existing habitat indicators would be maintained in the short term, including those that do not meet the individual BMU standard; and (2) in the long term and in the time-frame specified by KFP, habitat indicators in the analysis area would meet their individual BMU standards for OMRD, TMRD, and core.

Although none of the baseline habitat indicators would change, Alternative 2 may affect, is likely to adversely affect the grizzly bear for the following reasons: (1) Alternative 2 would not be consistent with the KFP, specifically standard FW-STD-WL-02 and Guidelines FW-GDL-WL-01 and FW-GDL-WL-15; (2) displacement effects on low-elevation grizzly bear spring habitat would continue to occur; (3) displacement effects on habitat surrounding the Libby Adit Site and Upper Libby Creek Road would continue to occur; and (4) the increased presence of humans and use of access roads would increase the risks of grizzly bear mortality.

Alternatives 3 and 4 may affect, are not likely to adversely affect the grizzly bear because they would include design features to counteract displacement effects and increased risks of grizzly bear mortality that would be implemented before Project activities began. Among the key design features are the following:

- Protection of 742.3 acres of mitigation lands, through fee title transfer or conservation easement, which is 242.3 acres more than the 500 acres of modeled habitat compensation. The biological habitat value of the mitigation lands would be 1,436 acres (Table 358). Mitigation lands would be located in the north-south movement corridor, which would help ensure habitat connectivity in the Cabinet Mountains.
- Road access changes on NFS lands and on mitigation lands, resulting in the creation of 5,115 acres of core habitat, increasing habitat security and reducing mortality risks for grizzly bears. Most of the created core (4,001acres) would be in the north-south movement corridor, which would further facilitate grizzly bear movement along the corridor.
- Widening of the south constricted area due to an access change on NFS road #150A and trail #935 (East Fork Rock Creek Road and Rock Lake Trail) from 0.9 mile to 3.3 miles, improving grizzly bear habitat connectivity.
- Improving conditions on 836 acres of spring grizzly bear habitat through seasonal restrictions on Upper Libby Creek Road (NFS road #2316) and Midas-Howard Creek Road (NFS road #4778) and its spur (NFS road #4778E).
- Monitoring of the effectiveness of road closure devices at least twice annually during the Evaluation Project and completing any necessary repairs immediately.
- Funding of an FWP law enforcement officer and one grizzly bear specialist and implementation of a public outreach program. The grizzly bear specialist would help educate the public about measures to reduce conflicts with grizzly bears. The law enforcement officer would help reduce grizzly bear shootings and other criminal activities that could be detrimental to grizzly bears. These positions have shown to be effective in reducing grizzly bear mortalities (see Section 3.25.5.2.2).

- Funding of a local FWP habitat conservation specialist if both the Evaluation Project and Rock Creek Project are concurrent to address grizzly bear/land use issues, coordinate and account for implementation of the mitigation plan, and coordinate securing and protection of mitigation lands. The position would work with both Sanders and Lincoln County planners to provide them with information on grizzly bears and other wildlife to use in planning.
- Implementation of a transportation plan that would include busing employees to the Libby Adit Site, requiring managers to carpool to the extent practicable, and establishing a supply staging area in Libby to consolidate shipments to the Libby Adit Site. Minimizing traffic on access roads would help reduce mortality risks due to vehicle collisions.
- Prohibition of the use of salt, which could attract prey, during winter plowing operations.
- Daily removal of big game killed along access roads and monitoring of road-killed animals, which would further help reduce mortality risks due to vehicle collisions.
- Funding for electric fencing around bear problem sites, which would help reduce mortality risks associated with food-conditioning.
- Mortality reduction measures would be subject to modification based on adaptive management, where new information supports changes. Measures to collect information would include reporting all grizzly, black bear, and lynx mortalities within 24 hours, and mandatory requirements for both MMC and KNF employees to report all grizzly and black bear incidents, observations, and mortalities immediately to the FWP grizzly bear specialist and law enforcement officer. These measures would ensure that preemptive management, hazing, or removal of food attractants would occur in a timely manner to avoid risks of habituation, mortality, or displacement of grizzly bears.
- Additional annual reporting of all sanitation incidents and corrective measures taken during the previous year would be required for both MMC and the KNF.

Implementation of mitigation and design criteria incorporated in Alternatives 3 and 4 would offset potential adverse effects on grizzly bears. The access changes included in the Project would improve core, OMRD, and TMRD conditions on NFS lands and would decrease the miles of road in the BORZ, minimizing displacement effects and reducing the risk of human-caused mortality.

All KFP standards applicable to grizzly bears would be met with implementation of the Project. In addition, the Project would include protection of grizzly bear habitat in the north-south movement corridor, improving habitat connectivity. Access changes would create a total of 5,115 acres of core habitat, including 4,001 acres in the north-south movement corridor, which would widen the minimum width of the north-south movement corridor by 2.4 miles, further offset displacement effects, reduce mortality risks, and facilitate grizzly bear habitat connectivity. Project mitigation lands would also improve connectivity, reduce fragmentation, and increase MS-1 lands managed for grizzly bear habitat in the north-south corridor. Other measures, such as funding of law enforcement and bear specialist positions, implementation of the employee transportation plan, implementation of the wildlife awareness plan, prohibition of salt use on snowplowed roads, and daily removal of road-kill along access roads would further mitigate mortality risks. Implementation of Alternative 3 or 4 would have a long-term beneficial effect on

grizzly bears and their habitat, improving habitat security and connectivity, and reducing the risk of grizzly bear mortality.

3.25.5.3 Canada Lynx

3.25.5.3.1 Analysis Area and Methods

Based on the KFP, the analysis area for analyzing and monitoring project effects (direct and indirect) on lynx habitat are the affected Lynx Analysis Units (LAUs). This is an appropriate scale for analysis because (1) the LAU represents the size of a home range of a female lynx, (2) maintaining habitat conditions at the scale of a lynx home range will allow for good distribution of lynx habitat components, and (3) expanding the analysis area could dilute the effects of the Project. In addition, the boundaries of a LAU remain constant and therefore provide for monitoring of and compliance with KFP objectives, standards, and guidelines. The lynx analysis area is centered 18 miles south of Libby, on the KNF Libby Ranger District, with potential effects occurring on the Libby and Cabinet Ranger Districts. The analysis area for direct, indirect, and cumulative effects consists of three LAUs: Crazy, West Fisher, and Rock (Figure 326).

Lynx habitat in each LAU, defined as boreal forest (i.e., subalpine fir, Englemann spruce, moist lodgepole pine forest) was last summarized in the KNF database in 2014. Lynx habitat components, including early stand initiation, stand initiation, stem exclusion, and potential multistory habitat, in lynx habitat are identified in the 2014 KNF database.

Lynx population ecology, biology, and habitat description and relationships are described in Squires et al. (2010). Further information on den site availability is described in Squires et al. (2008). Habitat components and rationale for management actions are discussed in Interagency Lynx Biology Team (2013). The Northern Rockies Lynx Management Direction (USDA Forest Service 2007) provides further details on lynx management actions. More detailed information about the Canada lynx and habitat variables particularly applicable to the KNF are provided in the 2013 Forest Plan FEIS and associated 2015 Errata to the FEIS, (USDA Forest Service 2013, 2015b), the KFP (USDA Forest Service 2015a), Holbrook et al. (2016, 2017, 2018), Kolbe et al. (2007), and Brundin and Johnson (2008). These documents are incorporated herein by reference.

For the Canada lynx analysis, the following resource indicators were used to evaluate the effects of the Project (Table 360).

Habitat Connectivity

Changes to lynx habitat connectivity and linkage areas. The KFP requires maintaining or restoring habitat connectivity in and between LAUs and linkage areas (Objective ALL O1) and, in areas of intermingled landownership, working with landowners to pursue conservation easements, habitat conservation plans, land exchanges, or other solutions to reduce the potential of adverse impacts on lynx and lynx habitat (Objective LINK O1). The Project would include protection of lands intended to provide grizzly bear habitat security. These mitigation lands would be protected from development and would include motorized access restrictions that would reduce human activity. The amount (acres) of lynx habitat protected in linkage areas was quantified and evaluated to determine potential benefits of the grizzly bear mitigation lands to lynx.

Table 360. Resource Indicators and Measures for Assessing Effects on Canada Lynx.

Resource Element	Resource Indicator	Measure	Source
Habitat connectivity	Acres of habitat protected and qualitative discussion of effects on lynx habitat. Number of vehicle trips on US 2 and high use forest road #231 in lynx habitat or linkage areas; number of vehicle trips and speed on access roads	Acres of protected habitat and increased use on US 2 and existing high use forest road #231	FW-STD-WL_01 NRLMD Objective ALL O1, Standard ALL S1, and Objective LINK O1 NRLMD Objective HU O6 and Guideline HU G6
Human disturbance	Qualitative discussion of activities in lynx habitat	Qualitative discussion	NRLMD Objective HU O3 and HU O5
Over-snow vehicles and winter access	Time periods when over-snow vehicle access is allowed; change in miles of over-snow access; changes in miles of plowed roads; qualitative discussion of winter access	Number of days, miles of trail and road closed or plowed during winter, and qualitative discussion	NRLMD Objectives HU O1 and HU O2, and Guidelines HU G4 and HU G12

Changes in lynx habitat connectivity from the existing high use forest road (Libby Creek Road) and highway effects. The KFP contains objectives and guidelines to reduce adverse road effects on lynx (Guideline ALL G1) by working cooperatively with other agencies (Objective HU O6), to limit public access on new roads, and to reclaim roads if not needed for other management objectives (Guideline HU G9). The guidelines and objectives provide for lynx movement and habitat connectivity and reduce the potential of lynx mortality. The KFP also contains a guideline to avoid or reduce effects on lynx when upgrading unpaved roads in lynx habitat if the result will be increased traffic speeds and volumes (Guideline HU G6). The Project includes use of US 2 south of Libby, which is partially located in a wildlife approach area identified by Brundin and Johnson (2008). The increase in vehicle trips on US 2 was quantified and the effects described qualitatively. Although the Project access roads are located in the Crazy LAU, none would be in lynx habitat, and their potential effects on lynx mortality were described based on duration of use and estimated increase in vehicle trips for the Project alternatives.

Human Disturbance

Changes in activities in lynx habitat. The KFP contains objectives to concentrate activities in existing developed areas, rather than developing new areas in lynx habitat (Objective HU 03) and to manage human activities to reduce impacts on lynx and lynx habitat (Objective HU 05). Activities in lynx habitat were qualitatively described for the existing conditions and the Project alternatives.

Public motorized use and maintenance of roads. The KFP contains guidelines restricting public access on new roads built for projects and requiring the roads to be reclaimed if not needed for other management objectives (Guideline HU G9), and minimizing brush cutting to the

minimum level to protect public safety (Guideline HU G11). These types of human activities were qualitatively described for the existing conditions and the Project alternatives.

Effects of Over-Snow Vehicles and Winter Access

The KFP contains objectives to maintain the lynx's natural competitive advantage over other predators in deep snow by discouraging the expansion of snow-compacting activities in lynx habitat (Objective HU O1). The KFP also contains guidelines to reduce snow compaction and to limit winter access for non-recreational purposes, including mineral exploration and development, to designated routes or designated over the snow routes (Guideline HU G12). Time periods when over-snow vehicles would be allowed, changes in miles of over-snow access, and changes in miles of plowed roads were quantified and evaluated for the Project alternatives.

3.25.5.3.2 Affected Environment

Canada lynx occupy northern boreal forests, which are primarily composed of cool, moist subalpine fir and Engelmann spruce, and moist lodgepole pine forests, which receive abundant snowfall. Snowshoe hares are the primary prey of lynx, and habitat use by lynx is associated with conditions that support hare populations. Dense seedling-sapling stands and mature multistory forest that provide habitat for snowshoe hares are important to lynx conservation. Denning habitat is found in forests with abundant dead and down trees. Recent studies have suggested the importance of horizontal cover, young regenerating forests, and mature spruce fir forests as components of lynx habitat (Holbrook et al. 2016; Holbrook et al. 2017).

Squires et al. (2008) identified two relatively high-density reproducing lynx populations in northwest Montana: one located in the Yaak drainage on the KNF, and one located in the Seeley-Swan area on the Flathead and Lolo National Forests. Scattered individuals have been located over much of the remainder of northwestern Montana west of the continental divide, but at much lower densities. Occurrences of lynx outside of that zone (i.e., northern Idaho, eastern Montana, and northwestern Wyoming) are uncommon. Squires et al. (2008) demonstrated that lynx are capable of long-distance movements. Maintaining connectivity with source populations to the north in Canada is especially important for lynx in Montana (Squires et al. 2013). Squires et al. (2013) found that connectivity between lynx habitat in Canada and in the conterminous U.S. is facilitated by a few presumed corridors that extend south from the international border; therefore, maintaining the integrity of these connectivity corridors is of primary importance to lynx conservation in the Northern Rockies. These corridors identified by Squires et al. (2013) are not located near or in the southern Cabinet Mountains.

Exact lynx population numbers for the KNF are unknown, although the population seems to be doing well (Squires, pers. comm. 2012). Lynx are known to occur throughout the KNF, based on historic and recent trapping records. Although the Cabinet Mountains appear to provide lynx habitat, they do not appear to support lynx, perhaps due to a combination of climatic conditions, topography, aspect, and other habitat attributes (ibid.).

Both natural (e.g., fire, insects) and human disturbances (e.g., timber harvest, prescribed fires) can affect lynx habitat (USDA Forest Service 2007). Holbrook et al. (2018) found that there was little lynx use for about 10 years after silvicultural treatments such as regeneration cuts, selection cuts, and thinnings. Because those disturbances directly affect the amount and arrangement of lynx habitat, management direction, including the Northern Rockies Lynx Management Direction (USDA Forest Service 2007) and the KFP (USDA Forest Service 2015a), emphasizes vegetation management that retains and recruits foraging habitat. Lynx do not have the same sensitivity to

human disturbance or food attractants that other listed species (e.g., grizzly bears) have (Ruediger et al. 2000; Ruggiero et al. 2000; Interagency Lynx Biology Team 2013). Therefore, management direction is largely focused on vegetation changes resulting from natural or human-caused disturbance.

Historically, natural disturbances (e.g., fire, insect, disease, wind) and long periods without disturbances resulted in a mix of foraging and denning conditions for lynx. For instance, post-fire stands provide no hare habitat for approximately 15 years. For the next 20–40 years, however, dense seedling-sapling stands provide high-quality hare foraging habitat for lynx. As those stands reach dense, pole-sized conditions (e.g., stem exclusion), hare habitat is no longer available. For mature stands that have had low- or moderate-severity disturbances (e.g., windthrow, insects, low-severity wildfire), the reduction in canopy allows dense understories to reestablish, again providing high-quality hare foraging habitat. Denning habitat can occur after major disturbances (post-fire accumulations of large, woody debris), or after long periods of no disturbance resulting in accumulations of large, woody debris within mature stands. The KFP direction emphasizes the importance of disturbances for lynx and the need to consider sustaining various habitat components over time.

Past and current actions in the analysis area include road construction and maintenance, grazing (through the 1970s and 1980s), timber harvest, noxious weed management, mining, and construction of the existing evaluation adit. Construction of unpaved roads in the analysis area, including Libby Creek Road (NFS road #231) and Upper Libby Creek Road (NFS road #2316), resulted in removal of vegetation within the road corridor and fragmentation of habitat. Ongoing use of these roads creates noise from traffic and the potential for vehicle collisions with wildlife. Past fires and timber harvest in the analysis area have resulted in changes to the forest structure. The most recent timber harvest activity in the analysis area was pre-commercial thinning on 308 acres in the Crazy LAU from 2007 to 2011. A detailed list of past and current actions is available in the Project record.

Wildfire creates structural changes in lynx habitat by reducing timber overstory, resulting in a variety of age classes and higher species diversity. The most recent large-scale fires in the analysis area occurred between 1885 and 1939, with the 1910 fires affecting the largest area. Fire suppression since the early 1900s has altered stand structure, resulting in more homogenous stands with greater canopy closure and poorly developed understories in some areas and reducing snowshoe hare habitat and lynx foraging opportunities. Within the last 15 years, fires occurred on the south-facing slopes in Leigh and Big Cherry Creeks in the Crazy LAU. Conditions on the KNF suggest that it takes approximately 15 years after major disturbances (e.g., stand-replacing wildfire, regeneration logging) for trees in early stand initiation conditions to reach heights sufficient to support high densities of hares during the winter. Forested habitats that experienced stand-replacing fire are in the stand initiation structural stage and will soon become snowshoe hare winter foraging habitat.

Since the lynx data were compiled in 2014, large wildfires occurred in areas surrounding the analysis area in 2015 and 2017, but impacts on the analysis area were relatively minor. In 2015, the Smearl Fire burned about 177 acres in the Crazy LAU, the Midas Fire burned about 7 acres in the Crazy LAU, and the Government Fire burned about 125 acres in the Rock LAU. No fires were recorded in the analysis area in 2017 or 2018.

Figure 326 shows the distribution of lynx habitat in the analysis area, including high-elevation boreal forest (i.e., lynx habitat), early stand initiation (i.e., seedling-sapling stands too small to provide winter hare habitat), stand initiation (dense seedling-sapling stands that provide high-quality hare habitat), stem exclusion, and potential multistory forage. The latter category is designated "potential" habitat because it meets the definition of multistory habitat in terms of tree size and stand density but has not been verified to determine if it contains sufficient high-density understory to fully qualify as multistory hare habitat. Potential multistory habitat is often synonymous with denning habitat. The occurrence of dense, large-diameter stands in boreal forests generally indicates a long period without disturbance and subsequent accumulation of large, woody debris. Thus, it is assumed that denning habitat is abundant in such stands. Figure 326 also shows non-lynx habitat—boreal below 4,000 feet, non-lynx habitat not boreal, and lynx habitat unknown stage. The pre-fire distribution of lynx habitat components in the analysis area, based on KNF data from 2014, is summarized in Table 361.

A large tract of lynx habitat in the analysis area occurs in the CMW (Figure 326). The wilderness area forms the central section of a potential north-to-south movement corridor for large carnivores (USDA Forest Service 2007).

Table 361 shows a typical distribution of habitat for landscapes that have not experienced recent, large wildfires, suggesting that long-term fire suppression has allowed potential multistory habitat to occur at higher than historic conditions. Lynx habitat conditions in the analysis area are consistent with KFP standards as follows:

> **Standard VEG S1.** If more than 30 percent of the lynx habitat in a LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.

Less than 30 percent of lynx habitat is in early stand initiation stage in each analysis area LAU and no adjacent LAUs exceed 30 percent lynx habitat in unsuitable condition (USDA Forest Service 2013). Therefore, baseline conditions are consistent with this standard.

> **Standard VEG S2.** Timber management projects shall not regenerate more than 15 percent of lynx habitat on NFS lands within a LAU in a ten-year period.

Baseline conditions in the analysis area are consistent with this standard because less than 15 percent of lynx habitat in each LAU has been changed to early stand initiation in the last 10 years.

3.25.5.3.3 Environmental Consequences

Alternative 1

Lynx Habitat Connectivity

DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150 and modified by revisions 06-001, 06-002, and 08-001, would remain in effect. MMC probably would not continue with the permitted activities at the Libby Adit Site. Alternative 1 would not result in new surface disturbance within lynx habitat, and LAU vegetation management standards would continue to be met. Although noise from increased activity at the Libby Adit Site and increased traffic on NFS roads #231 and #2316 during site closure could disturb lynx in adjacent habitat, Alternative 1 effects on lynx movement along the Cabinet Mountains would be negligible because human activity is already occurring at the Libby Adit, the magnitude of increased activity would be small, and lynx are less sensitive to human disturbance than other wildlife species.

Table 361. Lynx Habitat Components in the Crazy, West Fisher, and Rock LAUs.

Lynx Habitat Component	14504-Crazy LAU			14503-West Fisher LAU			14702-Rock LAU		
	NFS Lands (acres)	Total All Ownership (acres)	Percent Lynx Habitat (All Lands)	NFS Lands (acres)	Total All Ownership (acres)	Percent Lynx Habitat (All Lands)	NFS Lands (acres)	Total All Ownership (acres)	Percent Lynx Habitat (All Lands)
Early stand initiation[1]	25	25	0	138	231	2	368	368	1
Stand initiation[2]	3,406	3,406	13	493	686	5	872	873	3
Potential multistory[3]	19,259	19,469	75	11,320	11,936	83	26,216	26,392	87
Stem exclusion[4]	1,970	2,010	8	1,449	1,449	10	2,613	2,613	9
Lynx habitat unknown stage	1,115	1,194	5	0	0	0	14	14	<1
Total Lynx Habitat	**25,774**	**26,103**	100	**13,401**	**14,302**	100	**30,083**	**30,260**	100
Non-lynx habitat—boreal <4,000 feet	9,511	10,298		6,176	8,282		91	92	
Non-lynx habitat—not boreal	16,156	16,232		10,087	10,404		10,616	10,665	
No data	0	0		0	0		1,180	1,925	
Total	**51,441**	**52,634**		**29,664**	**32,988**		**41,971**	**42,943**	

[1]Early stand initiation structural stage is habitat not providing sufficient vegetation quantity or quality (height—trees do not protrude above snow) to be used by snowshoe hare and lynx in winter (considered unsuitable lynx habitat).
[2]Stand initiation structural stage currently provides winter snowshoe hare habitat.
[3]Multistory structural stage with many age classes and vegetation layers that provide winter snowshoe hare habitat; standard is no reduction of snowshoe hare habitat in multistory mature or late successional forests.
[4]Stem exclusion structural stage is closed canopy with limited understory and does not provide snowshoe hare habitat.

Increased lynx mortality due to increased traffic during site closure is unlikely because of the relatively low speeds (less than 30 mph) and traffic volumes anticipated on access roads. In addition, lynx use of the area near the access roads is likely rare because the roads are not in suitable lynx habitat.

Human Disturbance

In Alternative 1, increases in human activity and traffic associated with site closure would be negligible because activities would be concentrated on existing roads and disturbed areas and would not be within mapped lynx habitat. The increased presence of humans associated with activity in the analysis area may result in a very small increase in the risk of lynx mortality, through either poaching or vehicle collisions. The risk of a Project-related vehicle striking a lynx is very small, as described above under *Lynx Habitat Connectivity*.

Effects of Over-Snow Vehicles and Winter Access

Alternative 1 would not change over-snow access or affect areas of existing snow compaction.

Alternative 2

Lynx Habitat Connectivity

Changes to lynx habitat connectivity and linkage areas. Alternative 2 would not result in new surface disturbance within lynx habitat (Figure 326), and LAU vegetation management standards would continue to be met. Lower Libby Creek Road (NFS road #231) is outside of the lynx analysis area and at an elevation below which lynx habitat occurs (4,000 feet). Only the upper segment (from the Libby Adit Site and beyond) of Upper Libby Creek Road (NFS road #2316) is at an elevation greater than 4,000 feet. Although increased human activity at the Libby Adit Site and use of NFS road #2316 could disturb lynx in adjacent habitat, Alternative 2 effects on lynx movement along the Cabinet Mountains would be negligible because human activity is already occurring at the Libby Adit, the magnitude of increased activity would be small, and lynx are less sensitive to human disturbance than other wildlife species.

Changes in lynx habitat connectivity from the existing high use forest road (Libby Creek Road) and highway effects. Alternative 2 would generate increased traffic from activities at the Libby Adit Site, resulting in a maximum of 20 additional vehicle trips per day during adit dewatering and 70 trips per day during drift development on Libby Creek Road and Upper Libby Creek Road (see Section 3.21.4). Alternative 2 would not result in increased speeds on these roads. Although some Alternative 2 access roads are located in the Crazy LAU, only the uppermost segments of Upper Libby Creek Road (NFS road #2316) would be in mapped lynx habitat.

Alternative 2 includes use of US 2 south of Libby, which, although not in lynx habitat, is partially located in a wildlife approach area identified by Brundin and Johnson (2008). Project activities would generate 10 or fewer additional vehicle trips per day on US 2 south of Libby to the intersection with NFS road #231. Relative to existing traffic, this increase in vehicles would be small, and effects on lynx movement across US 2 would be negligible.

Increased lynx mortality due to Alternative 2 traffic is unlikely because of the relatively low speeds (less than 30 mph) and traffic volumes anticipated on access roads. In addition, lynx use of the area near the access roads is likely rare because the roads are not in suitable lynx habitat. Project design features would include monitoring and reporting of any wildlife (including lynx)

roadkill along access roads. There is also a small possibility of a lynx being struck by vehicles associated with the proposed activities at the Libby Adit Site or the vehicles or equipment haulers associated with the activities at the geotechnical investigation area; however, lynx mortality is unlikely because the addition of less than 10 vehicle trips per day is small compared to the existing traffic on the highway.

Human Disturbance

Changes in activities in lynx habitat. Alternative 2 would result in an increase in human activity and traffic during the 18 to 24 months of Project activity and during site closure, expected within 5 years of Project initiation. The effects of disturbance would be minimal because Project activities would be concentrated mostly on existing roads and disturbed areas and would not be within mapped lynx habitat. The increased presence of humans associated with Alternative 2 activity in the analysis area may result in a small increase in the risk of lynx mortality through poaching.

Public motorized use and maintenance of roads. The increased presence of humans associated with activity in the analysis area may result in a small increase in the risk of lynx mortality through vehicle collisions; however, the risk of a Project-related vehicle striking a lynx is small, as described above under *Lynx Habitat Connectivity*. Some brush-clearing would occur along access roads. Alternative 2 does not include specific measures to minimize brush-clearing.

Effects of Over-Snow Vehicles and Winter Access

MMC would implement or fund yearlong access changes on National Forest System and private roads before starting the Project (Table 306). Libby Creek Road and Upper Libby Creek Road (4.5 miles) would be plowed in the winter, improving winter recreation access to areas off the roads but eliminating snowmobile and cross-country skiing use of these segments. Except for MMC traffic, no motor vehicles, including over-snow vehicles, would be allowed from April 1 to May 15. MMC also would implement seasonal access changes on Midas-Howard Creek Road and its spur (NFS roads #4778 and #4778E) eliminating motorized recreational access and use between April 1 and June 15 on a total of 7.7 miles in the Midas Creek drainage (see Section 2.4.4.2). Non-motorized access would be maintained. After the Libby Adit Site was reclaimed and closed, seasonal access changes shown in Table 306 and winter and spring recreational opportunities would return to pre-Project conditions.

Some researchers have suggested that the presence of compacted snow routes into lynx habitat allows lynx competitors, such as coyotes, or predators, such as mountain lions, into deep snow habitats where they would normally not venture (Bunnell et al. 2006), which could negatively affect lynx. Other researchers have suggested that the overall influence of compacted snowmobile trails on coyote movements and hunting success is minimal, and that compacted routes would not significantly affect competition with lynx for snowshoe hare (Kolbe et al. 2007). Upper Libby Creek Road is at lower elevations where suitable lynx habitat does not occur, and Lower Libby Creek Road is outside of the lynx analysis area. Although snow would be compacted on Alternative 2 access roads, effects on lynx would be negligible because mapped lynx habitat would not be affected by Alternative 2 activities and winter access in lynx habitat would be reduced through over-snow access restrictions.

Alternative 3

Lynx Habitat Connectivity

Changes to lynx habitat connectivity and linkage areas. Alternative 3 effects on lynx habitat connectivity and linkage areas would be similar to Alternative 2, except that Alternative 3 would include 12-week long geotechnical investigations, and Alternative 3 design features would facilitate lynx habitat connectivity. Geotechnical investigations would last 12 weeks and would not occur in mapped lynx habitat and thus would have a negligible effect on lynx habitat connectivity. Alternative 3 would include protection of 742.3 acres of grizzly bear mitigation lands, including a parcel in the CMW (Figure 327), through fee title transfer or conservation easement. The mitigation lands are limited to formerly private lands that were at risk of subdivision or mining activities (Kasworm et al. 2013a), which would have made them unsuitable as lynx habitat. Table 362 shows acres of lynx habitat protected by three of the mitigation land parcels by category of habitat component and LAU. In the West Fisher LAU, protected acres include 71 acres of early stem exclusion, 53 acres of stand initiation, and 85 acres of potential multistory habitat. In the Rock LAU, they include 13 acres of potential multistory habitat.

Table 362. Lynx Habitat Protected on Mitigation Lands.

Habitat Component	Parcel 11 (acres)	Parcel 26 (acres)	Parcel 34 (acres)
LAU	Rock	West Fisher	West Fisher
Early stand initiation	0	71	0
Stand initiation	0	53	0
Potential multistory	13	0	85
Stem exclusion	0	0	0
Lynx habitat unknown stage	0	0	0
Total Lynx Habitat	**13**	**124**	**85**
Non-lynx habitat—boreal <4,000 feet	0	510	0
Non-lynx habitat—not boreal	0	<1	<1
Total	**13**	**634**	**85**

Acres shown are rounded to the nearest acre. Acreage calculated by GIS varies from acreage shown in Figure 327, which is from each parcel's title.

Figure 327 shows the location of habitat components protected, LAU boundaries, and lands protected. A total of 222 acres of lynx habitat would be protected on grizzly bear mitigation lands. To improve grizzly bear habitat quality on the mitigation lands, MMC would also implement or fund road access changes on private and NFS roads (Table 310 and Figure 312). Motorized access to lynx habitat would be reduced where roads were converted to trails or where gated roads were barriered in lynx habitat, such as in the upper Trail Creek drainage, the upper Standard Creek drainage, and the upper Rock Creek drainage, potentially enhancing lynx movement in the Cabinet Mountains.

Changes in lynx habitat connectivity from the existing high use forest road (Libby Creek Road) and highway effects. Implementation of Alternative 3 design features to reduce mortality risk to grizzly bears would also reduce potential mortality risk to lynx, including limiting the use of personal vehicles and transporting employees to the Libby Adit Site by buses, vans, and pickup

trucks. Activities at the Libby Adit Site would result in 10 or fewer additional vehicles per day traveling on Libby Creek Road and Upper Libby Creek Road. New roads constructed for the geotechnical investigations or existing gated or barriered NFS roads used would not be in mapped lynx habitat and would be closed to public motorized vehicles. New roads would be decommissioned and rehabilitated when no longer needed for Project purposes. Increased lynx mortality due to vehicle collisions is unlikely because of the relatively low speeds (less than 30 mph) and traffic volumes anticipated on access roads and because the roads are not in mapped suitable lynx habitat. The possibility of a lynx being struck by a Project-related vehicle on US 2 is the same as described for Alternative 2. Use of salt, which can attract big game that could be struck by vehicles, which in turn could attract lynx and increase lynx mortality risk, would be prohibited on roads during winter plowing operations. Other Alternative 3 design features would include monitoring and reporting of any lynx roadkill along access roads and implementing adaptive management measures if mortality occurred. While design features, such as the employee transportation plan, do not eliminate the risk of lynx mortality, risk of direct lynx mortality is very low with their implementation.

Human Disturbance

Changes in activities in lynx habitat. Effects of human disturbance associated with Alternative 3 would be the same as Alternative 2, except that Alternative 3 includes geotechnical investigations and additional design features that would benefit lynx. The effects of the geotechnical investigations would be negligible because the activities would be short-term (12 weeks) and would not occur in mapped lynx habitat. As described above under *Lynx Habitat Connectivity*, Alternative 3 includes protection of grizzly bear mitigation lands, including 222 acres of lynx habitat. These mitigation lands would be protected from development and would include motorized access restrictions that would reduce human activity that may disturb lynx on the mitigation lands.

Public motorized use and maintenance of roads. The risk of a Project-related vehicle striking a lynx would be the same as described above under *Lynx Habitat Connectivity*. Alternative 3 would include measures to ensure that MMC would keep brush clearing on all roads used by the Project to the minimum level necessary to provide for public safety.

Effects of Over-Snow Vehicles and Winter Access

In Alternative 3, MMC would implement or fund yearlong access changes on National Forest System and private roads before starting the Project (Table 309). The effect of snowplowing of Libby Creek Road and Upper Libby Creek Road and the seasonal closures of Libby Creek Road, Upper Libby Creek Road, and Midas-Howard Creek Road and its spur would be the same as Alternative 2. Other access changes potentially affecting snow compaction in lynx habitat are shown in Table 337 in Section 3.16.4.

Some researchers have suggested that the presence of compacted snow routes into lynx habitat allows lynx competitors, such as coyotes, or predators, such as mountain lions, into deep snow habitats where they would normally not venture (Bunnell et al. 2006), which could negatively affect lynx. Other researchers have suggested that the overall influence of compacted snowmobile trails on coyote movements and hunting success is minimal, and that compacted routes would not significantly affect competition with lynx for snowshoe hare (Kolbe et al. 2007). Upper Libby Creek Road is at lower elevations where suitable lynx habitat does not occur, and Libby Creek Road is outside of the lynx analysis area. Alternative 3 would increase over-snow access from

December 1 to March 1 on 1.6 miles of road in the upper segment of Midas Howard Creek C road (NFS road #4778C), most of which lies along the boundary of the West Fisher LAU below the elevation at which lynx normally occur or in non-forested areas. Alternative 3 would decrease over-snow access for 1 month annually on a total of 12.4 miles of roads. In addition, over-snow access would be prohibited on 2.7 miles of Upper Bear Creek Road (NFS road #4784) in the Bear Creek drainage, which is currently open to over-snow vehicles from December 1 through April 30. Alternative 3 would result in an overall decrease of snow-compacted routes in lynx habitat in the analysis area due to restrictions in over-snow use and because access roads would not be in lynx habitat.

Alternative 4

The effects of Alternative 4 on lynx habitat connectivity, human disturbance, and effects of over-snow vehicles and winter access would be the same as Alternative 3.

Cumulative Effects

Past and current projects considered in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past and present activities on lynx are described in the JFEIS and in Section 3.25.5.3.2, *Affected Environment*, above. Cumulative effects of the Montanore Evaluation Project activities on lynx were not specifically described in the JFEIS and are addressed below, based on more detailed currently available information about Project activities. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

The KNF approved a Plan of Operations for the Rock Creek Project Phase I activities in 2018; underground evaluation will be similar to the Montanore Evaluation Project. Cumulative effects from concurrent development of the Rock Creek Project's Phase II activities and the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Lynx Habitat Connectivity

None of the action alternatives would result in new surface disturbance in lynx habitat or contribute to cumulative surface disturbance of lynx habitat. Access changes associated with the Miller-West Fisher Vegetation Management Project would occur, at least in part, in the West Fisher LAU where Alternative 3 and 4 access changes would be implemented. Access changes in Alternatives 3 and 4 would be implemented in the Trail Creek and Standard Creek drainages, both tributaries of West Fisher Creek. Because the access changes would not change the existing public motorized access status (Table 309 and Table 310), they would not have cumulative effects with the Miller-West Fisher Vegetation Management Project. Effects of the action alternatives on lynx movement near access roads or at the wildlife approach area along US 2 would be negligible and would not contribute to cumulative effects on lynx habitat connectivity.

Alternatives 3 and 4 would include protection of 222 acres of lynx habitat. Except for habitat protection, no Rock Creek Phase I activities would occur in areas that provide lynx habitat connectivity or linkage. Rock Creek Phase I includes the protection of 153 acres of grizzly bear habitat. Parcels protected as part of Rock Creek Phase I could improve or contribute suitable lynx habitat if they provided lynx habitat characteristics and were managed to improve lynx habitat through road access changes or other means. For example, an increase in grizzly bear core habitat in lynx habitat on the mitigation parcels may reduce disturbance of lynx and minimize risk of

poaching due to decreased motorized access. The 2018 Rock Creek ROD incorporated the applicable Rock Creek BO terms and conditions into Rock Creek Phase I and therefore would require the KNF to install a barrier on Upper Bear Creek Road (NFS road #4784) within 1 year of the KNF issuing the permit on the Rock Creek Evaluation Adit. This access change would increase grizzly bear core habitat and provide secure habitat benefits to lynx. Alternatives 3 and 4, in combination with Rock Creek Phase I, may improve lynx habitat connectivity where habitat was protected. Alternative 2 would have negligible effects on lynx habitat connectivity and would not substantially contribute to cumulative effects.

Human Disturbance

Actions on state or private lands that are likely to occur include private land development for homes or businesses, regeneration timber harvest, data collection and other administrative use, prescribed fire, fire suppression, and pre-commercial thinning or other non-commercial treatments of vegetation. Effects of timber harvest and land development could result in reduced habitat and an increased risk of human-caused mortality. Administrative activities are not known to have negative effects on lynx. Disturbances related to the use of prescribed fire are generally considered beneficial because disturbances are essential in maintaining a mix of foraging habitat components for lynx. State and private land not owned by MMC comprises less than 3 percent of analysis area LAUs, mostly at lower elevations where lynx habitat does not occur. Given the small amount of lynx habitat in state and private land potentially affected, cumulative effects of activities on state land in combination with the Project would be negligible.

The Miller-West Fisher Vegetation Management Project, the Kootenai Forestwide Young Growth Vegetation Management Project, and the Coyote Improvement Vegetation Management Project may result in minor, short-term disturbance of lynx due to human activity, equipment noise, and increases in traffic. All action alternatives would result in an increase in human activity and traffic, but disturbance effects would be minimal because activities would be concentrated mostly on existing roads and disturbed areas and would not be in mapped lynx habitat. Alternatives 3 and 4, in combination with Rock Creek Phase I, would reduce human disturbance due to habitat protection included as design features. Parcels protected as part of Rock Creek Phase I could improve or contribute suitable lynx habitat if they provided lynx habitat characteristics and were managed to improve lynx habitat through road access changes or other means. Human disturbance to lynx from Alternative 2 would be negligible and therefore would not substantially contribute to cumulative effects.

Effects of Over-Snow Vehicles and Winter Access

All action alternatives would include access changes that would reduce overall over-snow use and snow-compacted routes in the analysis area. Over-snow use may increase on state land and private land not owned by MMC due to land development, timber harvest, and other activities, but given the small amount of suitable lynx habitat affected, effects would be negligible when combined with Project alternative design features.

3.25.5.3.4 Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Mineral Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. While Alternative 2

access changes would reduce snow compaction in lynx habitat, this alternative would not include habitat protection or other practicable measures that would improve lynx habitat; therefore, Alternative 2 would not include all practicable measures to maintain and protect lynx or lynx habitat, would not comply with the KFP, and would not comply with 36 CFR 228.8. Alternative 3 and 4, which would include additional design features to maintain and protect lynx habitat, would comply with 36 CFR 228.8 by including practicable measures such as implementation of over-snow vehicle use restrictions, habitat protection, and implementation of an employee transportation plan that would maintain and protect lynx habitat that may be affected by the Project.

National Forest Management Act/Kootenai Forest Plan

Consistency with KFP direction is described below.

FW-DC-WL-01. None of the alternatives would affect any known lynx den sites or have surface impacts in lynx habitat; therefore, all alternatives would be neutral toward achieving this desired condition.

FW-DC-WL-02. Alternative 2 would not have surface impacts on lynx habitat and would be neutral to achieving progress toward this desired condition. Alternatives 3 and 4 would include the protection of grizzly bear habitat that would include lynx habitat. Therefore, Alternatives 3 and 4 would contribute to achieving progress toward this desired condition.

FW-DC-WL-03. Baseline lynx habitat conditions in the analysis area LAUs are consistent with applicable KFP standards. None of the alternatives would have surface impacts on lynx habitat. For all action alternatives, disturbance effects on lynx habitat adjacent to the Libby Adit Site and access roads would be minimal because Project activities would be concentrated mostly on existing roads and disturbed areas and would not be in mapped lynx habitat. Alternatives 3 and 4 include design elements developed in coordination with FWP and USFWS that would improve lynx security, such as protection of lynx habitat on mitigation lands, and consultation with the USFWS on potential impacts from the preferred alternative (Alternative 3) is in progress. Alternative 2 would be neutral toward achieving this desired condition. Alternatives 3 and 4 would contribute to making progress toward achieving this desired condition.

FW-STD-WL-01. Alternatives 3 and 4 were designed in exact accordance with Northern Rockies Lynx Direction objectives, standards, and guidelines, as described for each applicable element below. Alternative 2 was designed in accordance with most applicable Northern Rockies Lynx Direction objectives, standards, and guidelines, except where indicated.

Objective ALL O1. None of the alternatives would have surface impacts on lynx habitat. For all action alternatives, disturbance effects on lynx habitat adjacent to the Libby Adit Site and access roads would be minimal because Project activities would be concentrated mostly on existing roads and disturbed areas and would not be in mapped lynx habitat. Effects of snowplowing Libby Creek Road on lynx would be negligible because, except for the uppermost segments of Upper Libby Creek Road, the road does not pass through mapped lynx habitat and because over-snow access in lynx habitat would be reduced through seasonal restrictions. In Alternatives 3 and 4, habitat connectivity would be maintained in and between linkage areas through protection of 222 acres of lynx habitat. Alternatives 3 and 4 would contribute to making progress toward achieving this objective. Alternative 2 would not include design features that improve habitat connectivity and would be neutral toward achieving this objective.

Standard ALL S1. See discussion of consistency with Objective ALL 01. Alternative 3 and 4 geotechnical investigations would have negligible effects on lynx habitat connectivity because they would be short-term and temporary, would be located on the lower edge and mostly outside of the Crazy LAU, and would not be located in a known movement corridor. All action alternatives were designed in accordance with this standard.

Objective HU O1. For all action alternatives, the effects of snowplowing Libby Creek Road on lynx would be negligible because, except for the uppermost segments of Upper Libby Creek Road, the road does not pass through mapped lynx habitat. Alternative 2 would decrease over-snow access for 1 month during late winter/early spring annually on a total of 7.7 miles of roads and would eliminate over-snow access on Libby Creek and Upper Libby Creek Roads, neither of which are in suitable lynx habitat. Alternative 2 would have negligible effects on snow compaction and would be neutral toward achieving this objective. Alternatives 3 and 4 would increase over-snow access from December 1 to March 1 on 1.6 miles of road in the upper segment of Midas Howard Creek C road (NFS road #4778C), most of which lies along the boundary of the West Fisher LAU below the elevation at which lynx normally occur or in non-forested areas, but would decrease over-snow access for 1 month annually on a total of 12.4 miles of roads. In addition, over-snow access would be prohibited on 2.7 miles of Upper Bear Creek Road (NFS road #4784) in the Bear Creek drainage, which is currently open to over-snow vehicles from December 1 through April 30. Alternatives 3 and 4 would result in an overall decrease of snow-compacted routes in lynx habitat in the analysis area and would contribute to making progress toward achieving this objective.

Objective HU O2. See the discussion for consistency with Objective HU 01 above. Alternative 2 would have negligible effects on recreational activities in lynx habitat and would be neutral toward achieving this objective. Alternatives 3 and 4 would result in an overall decrease of over-snow vehicle use in lynx habitat in the analysis area and would contribute to making progress toward achieving this objective.

Objective HU O3. In all action alternatives, project activities would be concentrated in developed areas, and no new surface disturbance in lynx habitat would occur. All action alternatives would contribute to making progress toward achieving this objective.

Objective HU O5. In all action alternatives, human activities would be managed to reduce impacts on lynx and lynx habitat through design features such as seasonal restrictions on over-snow vehicle use. All action alternatives would contribute to making progress toward achieving this objective.

Objective HU O6. All action alternatives would result in 10 additional trips on US 2 south of Libby to the intersection with NFS road #231, which, although not in lynx habitat, is partially located in a wildlife approach area identified by Brundin and Johnson (2008). Effects on lynx movement and mortality would be negligible for all action alternatives because increases in traffic would be small and because activities would not occur in mapped lynx habitat. Alternative 2 would be neutral toward achieving this objective. Alternatives 3 and 4 would contribute to making progress toward achieving this objective due to design features developed in coordination with FWP and USFWS to improve lynx habitat connectivity, such as habitat protection, road access changes, and implementation of an employee transportation plan.

Guideline HU G4. Remote monitoring is difficult and impractical, and new off-road use can easily be monitored from the access roads. All action alternatives would include over-snow access restrictions that would reduce snow compaction, and the employee transportation plan included in Alternatives 3 and 4 would reduce MMC traffic on access roads. Thus, all action alternatives would meet the intent of the guideline.

Guideline HU G5. All action alternatives would include a reclamation plan that over the long term would likely restore affected lynx habitat (see Section 2.4.4.1 and Section 2.5.5.1) and were designed in accordance with this guideline. Reclamation plans were developed with the goal of establishing a post-mining environment compatible with existing and proposed land uses, and consistent with the KFP.

Guideline HU G6. No unpaved roads in lynx habitat would be upgraded to increase traffic speeds or volumes in any of the action alternatives. All action alternatives were designed in accordance with this guideline.

Guideline HU G8. For all action alternatives, some brush-clearing would occur along access roads. Alternative 2 does not include specific measures to minimize brush-clearing and was not designed in accordance with this guideline. Alternatives 3 and 4 would include measures to ensure that MMC would keep brush-clearing on all roads used by the Project to the minimum level necessary to provide for public safety. Alternatives 3 and 4 were designed in accordance with this guideline.

Guideline HU G9. No new roads would be built in Alternative 2. Roads constructed in Alternatives 3 and 4 for the geotechnical investigations would be reclaimed when no longer needed. All action alternatives were designed in accordance with this guideline.

Guideline HU G12. In all action alternatives, winter access to the Libby Adit Site would be via Lower Libby Creek Road and Upper Libby Creek Road, which are identified as open to motor vehicle use. All action alternatives were designed in accordance with this guideline.

Objective LINK O1. In Alternatives 3 and 4, MMC would transfer fee title or place a conservation easement on land protected for grizzly bear habitat. These grizzly bear mitigation lands include 222 acres of lynx habitat. Alternatives 3 and 4 would contribute to making progress toward achieving this objective. Alternative 2 would not include habitat protection and would be neutral toward achieving this objective.

Endangered Species Act

For any selected alternative, ESA compliance would be ensured through Section 7 consultation, which is in progress. The KNF will submit a BA to the USFWS that describes the potential effect of the preferred alternative (Alternative 3) on threatened and endangered species that may be present in the area, including the lynx. After review of the BA and consultation, either the USFWS will concur with the KNF's finding for lynx or the KNF will undergo formal Section 7 consultation with the USFWS on effects on lynx.

Statement of Findings

Alternative 1 may affect, is not likely to adversely affect, the Canada lynx for the following reasons: (1) no activities would take place that would alter lynx habitat, (2) all LAU vegetation management standards would continue to be met in the short term with no increases in mortality

risk, (3) active fire suppression would continue the trend toward uncharacteristic vegetative and fuel conditions, (4) risk of severe fire behavior or insects and disease would increase, and (5) the potential for large-scale changes in available suitable and unsuitable lynx habitat in the affected LAUs would increase.

Alternative 2 may affect, is not likely to adversely affect, the lynx for the following reasons: (1) no activities would take place that would alter lynx habitat; (2) all LAU vegetation management standards would continue to be met in the short term; (3) Alternative 2 activities could disturb lynx in the area adjacent to the Libby Adit; (4) effects on lynx movement along the Cabinet Mountains would be negligible because activity is currently occurring at the Libby Adit, the magnitude of effects would be small, and lynx are less sensitive to disturbance than other wildlife species; (5) Alternative 2 activities would be concentrated on existing roads and disturbed areas; (6) increases in lynx mortality due to vehicle collisions would be negligible because increases in traffic volumes and speeds on access roads would be relatively low, and access roads would not be in lynx habitat; (7) snowplowing of Libby Creek and Upper Libby Creek Roads would increase winter recreation access to areas off the roads but eliminate snowmobile and cross-country skiing use of these segments; (8) effects on lynx movement at the US 2 wildlife approach area would be negligible because increases in vehicles on this segment would be small; and (9) effects on lynx due to snow compaction would be negligible because mapped lynx habitat would not be affected by Alternative 2 activities, and winter access in lynx habitat would be reduced through over-snow access restrictions.

Alternatives 3 and 4 may affect, are not likely to adversely affect, the lynx for the same reasons stated above for Alternative 2. Additionally, Alternatives 3 and 4 would (1) increase over-snow access on 1.6 miles of road in the upper segment of Midas Howard Creek C Road, most of which does not occur in suitable lynx habitat; (2) would include protection of 222 acres of lynx habitat, improving habitat security and supporting lynx habitat connectivity; (3) would restrict over-snow access for 1 month annually on 12.4 miles of roads, resulting in an overall decrease in snow compacted routes in the analysis area; and (4) would include implementation of an employee transportation plan, which would minimize vehicle use and mortality risks.

Lynx Critical Habitat

The USFWS published the final revised critical habitat rule in 2014 (USFWS 2014). The final revised rule updated previously delineated lynx critical habitat units across the lower 48 states from Maine to Washington. On the KNF, critical habitat falls north of US 2. Based on this delineation, the Project, which is located south of US 2, falls outside the Northern Rocky Mountains Critical Habitat Unit #3 (ibid.). Thus, as lynx critical habitat would not be affected, it will not be discussed in further detail.

Statement of Findings for Lynx Critical Habitat

Implementation of any of the alternatives would have no effect on Canada lynx critical habitat. The Project does not occur in Canada lynx critical habitat and therefore would not affect any attributes of critical habitat.

3.25.5.4 North American Wolverine

3.25.5.4.1 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on wolverines and their habitat is the Crazy, Rock, and Silverfish PSUs. USFWS's proposal to list the wolverine (USFWS 2013)

identified two main factors potentially affecting wolverine populations: the availability of snow and trapping mortalities. Forest Service Region 1 currently has no open trapping seasons for wolverines. Mining was not identified as an activity likely to threaten the wolverine in the proposed listing (USFWS 2013). The analysis of effects on the wolverine is based on alternative impacts on the contiguous area of persistent spring snow, as defined by Copeland et al. (2010) and Inman et al. (2013), and wolverine dispersal and movement areas, as described in the JFEIS. The methods for designating the area of persistent spring snow, data collection, and effects analysis are the same as described in the JFEIS. The effects analysis includes an evaluation of the benefits to or effects on wolverine from mitigation measures.

3.25.5.4.2 Affected Environment

The affected environment for wolverines or their habitat is described in JFEIS Section 3.25.4.5.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on wolverines in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.5.4.3 Environmental Consequences

Alternative 1

Alternative 1 would not affect areas of persistent spring snow or affect trapping, nor would it affect individual wolverines.

Alternative 2

No additional ground disturbance would occur in Alternative 2, and no wolverine habitat would be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1. Alternative 2 does not include activities listed as primary or secondary threats in the programmatic BA for the North American wolverine, and impacts on individuals or their habitat would be minimal.

Alternative 3

Alternative 3 would disturb 6.4 acres of male dispersal habitat, as defined by Inman et al. (2013). Effects on wolverine would be negligible because the extent of disturbance would be small relative to available higher-quality habitat in the Cabinet Mountains immediately adjacent to the analysis area and because of the low quality of the affected habitat, the mobility of the species, and their apparent ability to coexist in areas of human activities. In addition, USFWS (2013b) states that mining is not expected to affect wolverine populations.

Higher elevations where most wolverine habitat occurs in the Cabinet Mountains are mostly National Forest System land, although a few private parcels may contain wolverine habitat. Grizzly bear mitigation land parcels would encompass 102 acres of primary wolverine habitat, as defined by Inman et al. (2013), that would be protected from future development. In North America, Copeland et al. (2010) found that 69 percent of den sites were located in areas where snow cover persists until mid-May for an average of 6 to 7 years while 98 percent of all den sites were located in areas of at least 1 year of snow cover (i.e., “persistent snow”). Three of the four mitigation parcels (#11, #21, and #34) are in areas that on average retain persistent snow from 1 to 5 years out of every 7 years and would provide potential denning habitat. The protection of these parcels would not change the extent of persistent spring snow or change state trapping regulations, the two factors identified in USFWS (2013c) as the main concerns for wolverine

populations. Alternative 3 grizzly bear mitigation would include construction of a barrier on NFS road #150A (Table 309), which may decrease human access to wolverine habitat, reducing wolverines caught either incidentally or during a wolverine trapping season, if it is reopened by the State.

Alternative 4

Direct and indirect effects from Alternative 4 on wolverines would be similar to Alternative 3, except that less habitat would be disturbed at the geotechnical investigation area. Alternative 4 would disturb 1.5 acres of male dispersal habitat. Effects on wolverine would be negligible because the extent of disturbance would be small relative to available higher-quality habitat in the Cabinet Mountains immediately adjacent to the analysis area and because of the low quality of the affected habitat, the mobility of the species, and the wolverine's apparent ability to coexist in areas of human activities.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. Climate change also would contribute to degradation or loss of wolverine habitat quality by changing seasonal precipitation and temperature patterns influencing vegetation and snow cover. The effects of past, present, and reasonably foreseeable activities on wolverines are described in the JFEIS. Effects of the Project alternatives on wolverines would be negligible and would not substantially contribute to cumulative effects on the species. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Mineral Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. All alternatives would comply with 36 CFR 228.8 because effects on wolverines would be negligible.

National Forest Management Act/Kootenai Forest Plan

As discussed in the JFEIS, wolverines are generalists that are not tied to a specific vegetation type. Alternative 2 would not affect wolverine habitat. Alternatives 3 and 4 would physically affect male dispersal habitat, which is widespread throughout northwestern Montana. Alternative effects on wolverines would be negligible because the extent of disturbance would be small relative to available higher-quality habitat in the Cabinet Mountains immediately adjacent to the analysis area and because of the low quality of the affected habitat, the mobility of the species, and their apparent ability to coexist in areas of human activities. All alternatives were designed in accordance with FW-GDL-WL-21.

Endangered Species Act

Human activity associated with all alternatives would not result in effects on wolverine populations. Alternative activities are included among those the USFWS found would not affect wolverine populations (USFWS 2013) and are covered under the Region 1 programmatic BA for the North American wolverine (USDA Forest Service 2014). Mining was specifically mentioned

as one of the activities not expected to affect wolverine populations (USFWS 2013; USDA Forest Service 2014).

The KNF completed a Summary Sheet for Wolverine Programmatic Assessment (KNF 2019b); it is available in the Project record. The completed summary sheet will document the KNF's determination regarding conformance of Alternative 3 with the Region 1 programmatic BA for the North American wolverine (USDA Forest Service 2014).

Statement of Findings

Implementation of the alternatives would not be likely to jeopardize the continued existence of the distinct population segment of the North American wolverine.

3.25.6 Migratory Birds

3.25.6.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS. The Migratory Bird Treaty Act (MBTA) prohibits activities that may harm migratory birds, their young, or their eggs, including the removal of active nests that results in the loss of eggs or young. Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, requires analysis of effects of federal actions on migratory birds as part of the environmental analysis process. In 2008, the USDA Forest Service and USFWS signed an MOU outlining the responsibilities of both parties in implementing the Executive Order. Under the MOU, the Forest Service will, during the NEPA process, evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors.

The KFP direction considered in the analysis of migratory birds is:

> **GOAL-WL-01.** The KNF manages wildlife habitat through a variety of methods (*e.g.*, vegetation alteration, prescribed burning, invasive species treatments, etc.) to promote the diversity of species and communities and to contribute toward the recovery of threatened and endangered terrestrial wildlife species.
>
> **FW-DC-WL-19.** By trending towards the desired conditions for vegetation, habitat is provided for native fauna adapted to open forests and early seral habitats, or whose life/natural history and ecology are partially provided by those habitats.
>
> **FW-GDL-WL-16. Raptors.** Management activities on NFS lands should avoid/minimize disturbance at known active raptor nests, including owls. Timing restrictions and distance buffers should be based on the best available information, as well as site-specific factors (e.g., topography, available habitat, etc.). Birds that establish nests near pre-existing human activities are assumed to be tolerant of that level of activity.

3.25.6.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on migratory birds is the Crazy PSU. The Silverfish and Rock PSUs are not included in the analysis area. Although migratory bird habitat would be protected from development through protection of grizzly bear mitigation lands in the Silverfish and Rock PSUs in Alternatives 3 and 4, migratory birds would not be measurably

affected by this design feature. The methods for data collection and effect analysis are the same as described in the JFEIS.

3.25.6.3 Affected Environment

The affected environment for migratory birds and their habitat is described in JFEIS Section 3.25.6.3, *Affected Environment*. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on migratory birds in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

Table 363 displays the vegetation types in the Crazy PSU that support migratory birds. KNF vegetation was grouped into categories that matched habitats for the priority landbird habitats shown in JFEIS Table 244 as closely as possible. Dry mixed conifer habitat supports species such as chipping sparrow, Cassin's finch, and red crossbill. Moist Douglas-fir/grand fir provides habitat for species such as Townsend's warbler, sharp-shinned hawk, and pileated woodpecker. Cedar-hemlock habitats are used by species such as brown creeper, Vaux's swift, chestnut-backed chickadee, golden-crowned kinglet, and varied thrush. Clark's nutcracker use whitebark pine habitat. The riparian deciduous or hardwoods, particularly aspen, provide habitat for ruffed grouse and red-naped sapsucker, among others. Other species associated with riparian hardwoods and shrubs include McGillivray's warbler, rufous hummingbird, warbling vireo, song sparrow, and Hammond's flycatcher.

Table 363. Existing Vegetation Types in the Analysis Area.

Existing Vegetation Type	Acres	Percent of PSU
Cedar/hemlock	4,893	7
Dry mixed conifer	7,700	11
Miscellaneous forest	9,155	13
Moist Douglas-fir/grand fir	18,310	27
Non-vegetated	4,968	7
Riparian—conifer	1,531	2
Riparian—deciduous	94	<1
Riparian—shrub/hardwoods	5,637	8
Sod (e.g., grass, meadow)	0	0
Wet subalpine fir/lodgepole pine	15,809	23
Whitebark pine	84	<1
Total	68,180	100

Dry mixed conifer includes ponderosa pine and dry Douglas-fir; miscellaneous forest includes larch, whitepine, whitebark/subalpine larch, and mountain hemlock/subalpine fir. Aspen and other hardwoods also occur intermixed with the other stand types.
Percentages and acres do not tally to 100 percent due to rounding.

Forest Service Region 1 has an ongoing landbird monitoring effort, and one of the monitoring transects is located adjacent to Project activities along the Bear Creek Road access route for the geotechnical investigations proposed in Alternatives 3 and 4 in the Crazy PSU (transect MT-BCR10-KO10). This transect has been surveyed annually (except in 2012) since 2010.

3.25.6.4 Environmental Consequences

3.25.6.4.1 Alternative 1

Increased activity at the Libby Adit Site and increased traffic during site closure would slightly increase noise in the surrounding area, temporarily intensifying disturbance in the existing influence zones for these activities. Migratory bird habitat use and occurrence would return to existing conditions after site reclamation was completed. No other effects would occur under this alternative. Natural disturbance processes and succession would be the main factors determining the types and amounts of habitat within the analysis area. Disturbances at the Libby Adit Site would remain until reclaimed in accordance with Operating Permit No. 00150. Over time, with continued fire suppression and lack of active forest management, indirect effects of this alternative would include a continued trend toward later successional habitats.

3.25.6.4.2 Alternative 2

Ground disturbance would be limited to existing revegetated areas and an existing soil stockpile in the existing 11.6-acre, privately owned disturbance area (Figure 310), and no migratory bird habitat would be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1. Increased human activity at the Libby Adit Site would slightly increase noise in the surrounding area (see Section 3.20, *Sound*), which may alter the behavior of migratory birds inhabiting it as well as the bird community composition. Chronic noise exposure has been shown to impair the ability of some migratory birds to perceive threats and ultimately reduce their fitness (Kleist et al. 2018). Responses to noise are complex, however; medium noise levels have been found to be associated with potentially higher fitness for some birds (Kleist et al. 2018). Other bird species that are less tolerant to noise disturbance may avoid nearby suitable habitat. Woodland songbird use may decline when noise levels reach an average of 42 decibels (dB), and grassland birds may decline at average noise levels of 48 dB (Forman and Alexander 1998). Depending on the activity, noise levels may exceed those in Forman and Alexander (1998) for several hundred feet or more from activities while they were ongoing. This may result in declines in bird use or fitness in habitats adjacent to construction activities. Activity at the Libby Adit Site would continue until the adit was plugged. Migratory bird habitat use and occurrence would return to existing conditions after site reclamation was completed. Because the increase in disturbance relative to existing conditions would be small and short-term, Alternative 2 would have negligible disturbance effects on migratory birds.

3.25.6.4.3 Alternative 3

Geotechnical investigations would disturb 2.5 acres of miscellaneous forest habitat, 0.2 acre of moist Douglas-fir/grand fir habitat, and 3.8 acres of wet subalpine fir/lodgepole pine habitat. Less than 1 percent of each habitat type would be affected in the analysis area. MMC would leave snags in the geotechnical investigation area, unless required to be felled for safety or operational reasons. This mitigation would be incorporated into the Vegetation Removal and Disposition Plan and would reduce effects on cavity-nesting birds. Disturbance effects from Alternative 3 would be similar to Alternative 2, except that noise also would increase temporarily in the geotechnical investigation area. Implementation of the noise mitigation would help minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. Grizzly bear mitigation lands would be protected from development and would include access restrictions that would reduce human activity, which would also benefit migratory birds. Over the long term, land protection would reduce the likelihood that those parcels would be developed, thus maintaining habitat for migratory birds on those parcels. Alternative 3 would have a negligible effect on

migratory birds because the amount of habitat affected would be less than 1 percent of the habitat available in the analysis area, the increase in noise relative to existing noise would be small and short-term, and effects on migratory birds would be reduced through implementing design features such as noise mitigation, retention of snags, and grizzly bear habitat land protection.

3.25.6.4.4 Alternative 4

Effects of Alternative 4 on migratory birds would be similar to Alternative 3 except that human disturbance from geotechnical investigations would be shorter in duration, and less habitat would be disturbed at the geotechnical investigation area. In Alternative 4, geotechnical investigations would disturb 0.7 acre of miscellaneous forest habitat and 0.8 acre of wet subalpine fir/lodgepole pine habitat. Alternative 4 would have a negligible effect on migratory birds because the amount of habitat affected would be less than 1 percent of the habitat available in the analysis area, the increase in noise relative to existing noise would be small and short-term, and effects on migratory birds would be reduced through implementing design features such as noise mitigation, retention of snags, and grizzly bear habitat land protection.

3.25.6.4.5 Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. Climate change also would contribute to changes in migratory bird habitat quality by changing seasonal precipitation and temperature patterns influencing vegetation. The effects of past, present, and reasonably foreseeable activities on migratory birds is described in the JFEIS. Effects of the Project alternatives on migratory birds would be negligible and would not substantially contribute to cumulative effects on the species. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

3.25.6.4.6 Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. All alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

The Project is not a habitat management activity, so all alternatives would be neutral toward GOAL-WL-01and FW-DC-WL-19. Although there would be site-specific reductions of forest habitats in Alternatives 3 and 4, none of the alternatives would preclude achievement of the forestwide desired condition over the long term. No raptor nests have been identified in the vicinity of the alternative facilities. All alternatives were designed in accordance with guideline FW-GDL-WL-16 to avoid or minimize disturbance at known active raptor nests, including those of owls.

Statement of Findings

Alternative 2 would not affect migratory bird habitat. Alternatives 3 and 4 would affect less than 1 percent of the migratory bird habitats in the analysis area. ***Due to the small disturbance area compared to the analysis area, none of the action alternatives are expected to measurably change overall migratory bird species composition or abundance in the analysis area.***

Migratory Bird Treaty Act and Executive Order 13186

All alternatives would comply with the Migratory Bird Treaty Act, Executive Order 13186, and associated MOU by evaluating the effects of federal actions on migratory birds as part of the NEPA process and promoting conservation of and minimizing adverse effects on migratory birds.

3.25.7 Other Species of Interest

3.25.7.1 Moose

3.25.7.1.1 Regulatory Framework

Federal requirements under the Organic Administration Act and the National Forest Management Act are described in the JFEIS. The KFP direction considered in the analysis of big game habitat is described under Section 3.25.3.2, *Big Game (Elk/Deer) Habitat*.

3.25.7.1.2 Analysis Area and Methods

The analysis area for direct, indirect, and cumulative effects on moose habitat on National Forest System lands is the Crazy PSU, where Project activities would occur. The Crazy PSU is large enough to account for effects on the various components of moose habitat and use in this area. Grizzly bear mitigation lands are not near moose habitat and are not discussed further. The methods for data collection and effect analysis are described in the JFEIS.

Effects on moose were quantitatively evaluated based on effects on moose winter range and wetlands providing important moose foraging habitat and changes in cover-to-forage ratios. Effects of increased traffic and disturbance from geotechnical investigations are qualitatively described. Effects on habitat connectivity areas are described in Section 3.25.3.2, *Big Game (Elk/Deer) Habitat*.

The effects of noise mitigations described in Section 2.5.4.3.3, *Noise Mitigation*; winter construction timing restrictions in moose winter range, development and implementation of a Transportation Plan, and monitoring road-killed animals along access roads to determine if improved access resulted in increased wildlife mortality were also evaluated.

3.25.7.1.3 Affected Environment

The affected environment for moose is described in JFEIS Section 3.25.7.1.3, *Affected Environment*. Moose winter range in the Crazy PSU is shown on Figure 328. The KNF determined that the available data and methods used are adequate to evaluate and disclose reasonably foreseeable significant adverse effects of the Project on moose in the analysis area, and to enable the decision makers to make a reasoned choice among alternatives.

3.25.7.1.4 Environmental Consequences

Alternative 1

Alternative 1 would not have direct effects on moose. In the Crazy PSU, cover would remain at 82 to 96 percent and forage at 4 to 18 percent. Traffic during site closure would slightly increase, but any effects of Alternative 1 on moose winter range would be negligible because the disturbance from increased vehicle use of Libby Creek and Upper Libby Creek Roads relative to existing use would be small and short-term. Moose habitat use and occurrence would return to existing conditions after site reclamation was completed. Cover would be provided in the Libby Adit Site after reclamation was complete. Forage habitat would decrease over time unless harvest

or other natural events, such as a wildfire or windstorm, created additional forage, and vegetation communities would continue to trend toward later successional habitats.

Alternative 2

Ground disturbance would be limited to existing revegetated areas and an existing soil stockpile in the existing 11.6-acre, privately owned disturbance area (Figure 310), and neither moose winter range nor forage and cover would be affected. Closure of the Libby Adit and reclamation of the site would be the same as Alternative 1. Forage would be provided at the Libby Adit Site after reclamation was completed. Libby Creek and Upper Libby Creek Roads, which are open to motorized use on the Motor Vehicle Use Map, pass through moose winter range. Snowplowing and year-round road use would occur throughout the Project. Traffic on Libby Creek Road and Upper Libby Creek Road would increase by a maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development (see Section 3.21.4). Increased road use by MMC and recreational users may affect wintering moose and cause them to decrease use near the road. During heavy snow years, snowplowing berms may restrict moose movement across the road. Activity at the Libby Adit Site would continue until the adit was plugged. Moose habitat use and occurrence would return to existing conditions after site reclamation was completed. Snowplowing and year-round use of Libby Creek Road, including during the critical midwinter period, could increase displacement of moose from habitat and increase mortality risk in the road corridor; however, increased vehicle use of Libby Creek Road and Upper Libby Creek Road relative to existing use would be small (maximum of 20 trips per day during adit dewatering and 70 trips per day during drift development) and short-term and located within an existing open road corridor.

Alternative 3

Like Alternative 2, in Alternative 3 construction at the Libby Adit Site would occur in the existing 11.6-acre disturbance area. Alternative 3 geotechnical investigations would disturb 6.4 acres of moose winter range, which would slightly reduce cover. Alternative 3 would contribute to forage after reclamation of the geotechnical investigation area was complete and the area was revegetated. Effects on the amount of cover relative to forage would be negligible, resulting in a change in the proportion of cover in the Crazy PSU of less than 1 percent. No wetlands providing potential moose habitat would be affected in by Alternative 3.

Traffic would be less than Alternative 2, due to implementation of the Transportation Plan. Traffic would increase slightly above existing conditions by up to 10 trips per day during Project activities at the Libby Adit Site. Four to six vehicle trips per day would be made during the 12-week geotechnical investigations. In Alternative 3, human disturbance during summer and early fall would increase temporarily in the geotechnical investigation area, which may cause moose to avoid surrounding habitat. Implementation of the noise mitigation would minimize noise, which would return to existing levels at the end of the 12-week geotechnical investigation. Geotechnical activities would be restricted to the period between June 16 and October 14 and would not occur during winter. MMC also would monitor road-killed animals along access roads, which would provide information on the effects of increased activity on moose mortality. Snowplowing and year-round use of Libby Creek and Upper Libby Creek Roads, including during the critical midwinter period, could increase displacement of moose from habitat and increase mortality risk in the road corridor. Alternative 3 effects on moose would be minimized because increased vehicle use of Libby Creek and Upper Libby Creek Roads relative to existing use would be small, short-term, and would occur in an existing open road corridor, disturbance from geotechnical

activities would be short-term and would not occur in winter, and effects would be reduced through mitigation measures such as timing restrictions in moose winter range, implementation of the Transportation Plan, and noise mitigations.

Alternative 4

Effects on moose from Alternative 4 would be similar to Alternative 3, except that less moose winter range would be disturbed at the geotechnical investigations area and the duration of geotechnical activities would be shorter. Like Alternative 3, in Alternative 4 geotechnical activities would not occur during winter. In Alternative 4, geotechnical investigations would result in surface disturbance of 1.4 acres of moose winter range. Alternative 4 effects on moose would be minimized because increased vehicle use of Libby Creek and Upper Libby Creek Roads relative to existing use would be small, short-term, and would occur in an existing road corridor, disturbance from geotechnical activities would be short-term and would not occur in winter, and effects would be reduced through mitigation measures such as timing restrictions in moose winter range, implementation of the Transportation Plan, and noise mitigations.

Cumulative Effects

Past and current projects used in the cumulative effects analysis are described in Section 3.2. Reasonably foreseeable projects considered for the cumulative effects analysis are described in Section 3.3. The effects of past, present, and reasonably foreseeable activities on moose are described in the JFEIS. In all action alternatives, snowplowing and year-round use of Libby Creek and Upper Libby Creek Roads could increase displacement of moose from winter range and increase mortality risk in the road corridor, but effects would be small and short-term and would not substantially contribute to cumulative effects on the species. Cumulative effects of the Montanore Project, if it were approved and implemented, are described in the JFEIS.

Regulatory/Forest Plan Consistency

Organic Administration Act and Forest Service Locatable Minerals Regulations

36 CFR 228.8 requires that mineral operations minimize, where feasible, adverse environmental effects on National Forest surface resources and take all practicable measures to maintain and protect fisheries and wildlife habitat that may be affected by the operations. Effects of all alternatives on moose habitat would be negligible. In addition, Alternatives 3 and 4 include timing restrictions for geotechnical activities to reduce effects on moose winter range. All alternatives would comply with 36 CFR 228.8.

National Forest Management Act/Kootenai Forest Plan

FW-GDL-WL-09. Other than increased use of Libby Creek Road and Upper Libby Creek Road, none of the alternatives would affect moose during the winter period. In all action alternatives, Libby Creek Road and Upper Libby Creek Road would be snowplowed and used during the winter. Although activities would be concentrated on existing roads and disturbed areas, disturbance from increased vehicle use of these two roads could result in increased displacement of moose from winter range and increased mortality risk in the road corridor. Libby Creek Road and Upper Libby Creek Road pass through moose winter range. Snowplowing and year-round use of these two roads would occur during the critical midwinter period (January and February) when snow depths most likely influence ungulate movement and availability of forage. Both Libby Creek Road and Upper Libby Creek Road provide access to private land and are year-round open roads identified on MVUM as open to motor vehicle use. Evaluation Project management

activities that would occur during winter are concentrated within the existing open road corridor, which minimizes disturbance to the surrounding winter range during the critical midwinter period. Although snowplowing would increase wheeled motorized vehicle traffic on the plowed roads, a reduction in snowmobile traffic would be expected on these roads. In Alternatives 3 and 4, geotechnical work would be restricted to the period between June 16 and October 14 to reduce impacts on grizzly bears and on moose winter range. Implementation of the Transportation Plan in Alternatives 3 and 4 would minimize Project-related increases in traffic on Libby Creek Road. Therefore, all alternatives would meet the intent of this guideline.

Consistency with FW-DC-WL-16, FW-DC-WL-08, FW-DC-WL-17, FW-DC-WL-19, FW-GDL-WL-08, FW-GDL-WL-11, FW-GDL-WL-12, FW-GDL-WL-13, FW-GDL-WL-14, GA-DC-WL-FSH-01, GA-DC-WL-FSH-02, and GA-DC-WL-LIB-04 is discussed in Section 3.25.3, *Elk Security, Big Game Habitat (Elk and Deer), and Mountain Goat*.

3.25.8 Other Required Disclosures

3.25.8.1 Unavoidable Adverse Environmental Effects

In the preceding wildlife analysis subsections, the direct, indirect, and cumulative environmental effects of the alternatives are discussed in detail. Effects that cannot be avoided are summarized below. Depending on the action alternative and species affected, the severity of the effects would be minimized by adhering to the required mitigation, including mitigation measures for vegetation removal, road access changes, and habitat protection. Other features of the alternatives, such as adhering to BMPs and other KFP standards and guidelines, also would minimize effects. If the project is implemented, some effects cannot be avoided. The preceding wildlife subsections provide a detailed analysis of effects and description of these effects.

The action alternatives would affect a range of wildlife habitat in the analysis area. The wildlife resources would be affected by direct surface disturbance, noise, vibration, light, dust, increased human activity, and increased traffic. Unavoidable adverse effects on wildlife habitat would vary depending on the amount of habitat disturbed or affected by each action alternative and the intensity and duration of human activities. Increased activities would occur at the Libby Adit Site and in the geotechnical investigation area. Adverse effects that cannot be avoided include temporary surface disturbance of big game winter range and other wildlife habitat, displacement due to activities at the Libby Adit Site and slight increases in traffic on access roads, short-term disturbance of wildlife due to noise and other human disturbance during geotechnical activities, and an increased risk of vehicle collisions due to minor increases in traffic. Areas successfully reclaimed would provide wildlife habitat post-closure over time.

3.25.8.2 Short-Term Uses and Long-Term Productivity

The intensity and duration of the effects described for the wildlife resource would vary by alternative. Refer to the wildlife subsections for detailed analysis of effects and description of these short- and long-term effects. Effects on wildlife and wildlife habitat would include temporary habitat disturbance during geotechnical activities, disturbance from human activities and machinery associated with Project activities, and direct mortality from increased Project-related traffic. Surface disturbance of wildlife habitat due to geotechnical activities would have long-term effects on wildlife habitat, lasting until reclamation or beyond. Project-associated disturbance may result in habitat displacement from the area adjacent to the Libby Adit Site and

short-term, temporary disturbance of wildlife near the geotechnical investigations, which may result in a post-reclamation delay in the reestablishment of use.

Disturbance and any direct mortality would cease when the evaluation adit was closed, and reclamation would eventually allow wildlife habitat to reestablish through vegetation succession. This may take decades or longer, and considering cumulative effects of climate change and human population increase, it is not certain that current habitat conditions on the affected lands would be reestablished. Depending on the alternative, incorporated mitigation would reduce the total amount of roads in the analysis area over time, providing long-term benefits for many species.

3.25.8.3 Irreversible or Irretrievable Commitments

Specific effects of the proposed alternatives are described in the various preceding wildlife subsections. Although reclamation of the geotechnical investigation area would provide forage habitat for some species, habitat for other species, such as grizzly bears, black-backed woodpeckers and other cavity-nesting species, and western toad, would be disturbed and not reestablished until forest communities matured, a process that may require more than 100 years after disturbance for those species.

Chapter 4. Consultation and Coordination

4.1 Preparers and Contributors

The following tables provide the names and credentials of the Forest Service SEIS preparers and those of its third-party consultant, ERO Resources Corporation.

4.1.1 Forest Service

Name	Responsibilities	Education	Experience (years)
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Gier, John	Soils	M.S. Soil Science	29
Hagarty, Lynn	Program Manager (2017-2018)	B.S., Geology	30
Hemry, Cindy	Cultural Resources	M.A., Anthropology B.A., Anthropology, Liberal Arts	30
Holifield, Jennifer	Wildlife Biology	B.S., Wildlife Biology B.S., Forestry/Range Management B.S., Resource Conservation	29
Huffine, Mike	Regional Geologist	B.S., Hydrogeology A.S., Earth Science	9
Kindel, Kenny	Soils and Water	B.A., Biology	27
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Peel, Timory	Forest Plan	B.S., Fisheries and Wildlife Biology	17
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4.1.1.1 Forest Service Contractors

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4.1.2 SEIS Consultant Team

Name/Firm	Responsibilities	Education	Experience (years)
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Galloway, Michael ERO Resources Corp.	Hydrogeology Review	M.S., Geology B.S., Geology	45
Hesker, David ERO Resources Corp.	Graphics	B.F.A., Graphic Design	26
Olmsted, Brian ERO Resources Corp.	Hydrology/ Geochemistry	M.S., Geochemistry B.S., Geology	15
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4.1.3 Other Federal, Tribal, State, and Local Agencies

The Forest Service consulted the following individuals and federal, state, and local agencies and agency personnel during the development of the SEIS.

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Allen, Dana Environmental Protection Agency	NEPA Compliance and Review
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Cole, Mike	Lincoln County Commissioner
Conard, Ben U.S. Fish and Wildlife Service	Fish, Wildlife and Threatened & Endangered Species
Felsman, Kyle	Confederated Salish Kootenai Tribes

Name/Agency or Tribe	Responsibilities
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Kasworm, Wayne U.S. Fish and Wildlife Service	Wildlife and Threatened & Endangered Species
Letcher, Josh	Lincoln County Commissioner
Peck, Mark	Lincoln County Commissioner
Snyder, Shannon Environmental Protection Agency	NEPA Compliance and Review

4.2 Agencies, Organizations, and Persons to Whom Copies of the Draft SEIS Have Been Distributed

The Draft SEIS has been distributed to individuals, federal agencies, tribal governments, state and local governments, and organizations that have specifically expressed interest in the Montanore Evaluation Project or the Montanore Project. The mailing list used for SEIS distribution is available in the administrative record. It was compiled using the names and addresses of the following:

- Parties who participated in public meetings or who submitted written comments on the Montanore Project (i.e., Draft EIS, Supplemental Draft EIS, and Objection-Review Final EIS)
- Parties who have requested copies of the Montanore Evaluation Project SEIS
- Agencies, governments, tribes, and companies potentially affected by the proposed Evaluation Project
- Agencies and groups consulted during Montanore Evaluation Project SEIS preparation

A copy of the SEIS can be reviewed at the following locations or via the Internet on the Forest Service web page (https://www.fs.usda.gov/land/kootenai/landmanagement/projects):

- Supervisor's Office, Kootenai National Forest, Libby, MT
- Libby Ranger Station, Libby, MT
- Montana State Library
- Mansfield Library, University of Montana, Missoula, MT
- Lincoln County Library, Libby, MT
- Troy Library, Troy, MT

Copies of this document are also available on request from:

Kootenai National Forest
31374 US 2 West
Libby, MT 59923-3022
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Chapter 6. List of Acronyms

Acronym	Acronym Description
ABA	acid-base accounting
ANFO	ammonium nitrate fuel oil
APE	area of potential effect
ARM	Administrative Rules of Montana
ATM	Access Travel Management
BA	Biological Assessment
BCF	bioconcentration factor
BE	Biological Evaluation
BHES	Board of Health and Environmental Sciences
BMP	Best Management Practice
BMU	Bear Management Unit
BORZ	(Grizzly) Bear Outside the Recovery Zone
BPA	Bonneville Power Administration
CFR	Code of Federal Regulations
CMP	corrugated metal pipe
CMW	Cabinet Mountains Wilderness
CPI	Consumer Price Index
CSKT	Confederated Salish and Kootenai Tribes
CYRZ	Cabinet-Yaak Recovery Zone
DBH	diameter at breast height
DEQ	Montana Department of Environmental Quality
DHES	Montana Department of Health and Environmental Sciences (now DEQ)
DNRC	Montana Department of Natural Resources and Conservation
DSL	Montana Department of State Lands (now DEQ)
ECAC	Equivalent Clearcut Acres Calculator
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FLM	Federal Land Managers
FMEA	Failure Modes and Effects Analysis
FSH	Forest Service Handbook
FSM	Forest Service Manual
FWP	Montana Fish, Wildlife, and Parks
GDE	groundwater-dependent ecosystem
GIS	Geographic Information System
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HDPE	high-density polyethylene
HR	Hayes Ridge
HU	Habitat Unit
IGBC	Interagency Grizzly Bear Committee
INFS	Inland Native Fish Strategy
IRA	inventoried roadless area

Acronym	Acronym Description
JFEIS	Joint Final Environmental Impact Statement
KFP	Kootenai Forest Plan
KNF	Kootenai National Forest
KOP	Key Observation Point
KTOI	Kootenai Tribe of Idaho
LAU	Lynx Analysis Unit
LOS	Level of Service
LPO	Lake Pend Oreille
MA	Management Area
MAQP	Montana Air Quality Permit
MCA	Montana Code Annotated
MDT	Montana Department of Transportation
MEPA	Montana Environmental Policy Act
MIS	Management Indicator Species
MMC	Montanore Minerals Corporation
MMI	Mines Management, Inc.
MNHP	Montana Natural Heritage Program
MOU	Memorandum of Understanding
MPDES	Montana Pollutant Discharge Elimination System
MR	Minor Revision
MRDG	Minimum Requirements Decision Guide
MT	Montana
NA	not applicable
NCDE	Northern Continental Divide Ecosystem
NEPA	National Environmental Policy Act
NFS	National Forest System
NMC	Noranda Minerals Corporation
NRHP	National Register of Historic Places
NRIS	Natural Resource Information System
NS	not suspected
NTU	nephelometric turbidity unit
OHV	Off Highway Vehicle
OMRD	Open Motorized Route Density
PHABSIM	Physical Habitat Simulation System
PSU	planning subunit
PVC	polyvinyl chloride
RCR	RC Resources, Inc.
RHCA	Riparian Habitat Conservation Area
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SPLP	Synthetic Precipitation Leaching Procedure
SWPPP	Stormwater Pollution Prevention Plan
TIN	total inorganic nitrogen
TMDL	Total Maximum Daily Load
TMRD	Total Motorized Route Density
USC	United States Code

Acronym	Acronym Description
USDA	U.S. Department of Agriculture
USFWS	USDI Fish and Wildlife Service
USGS	U.S. Geological Survey
WEPP	Water Erosion Prediction Project

Chapter 7. Glossary

adit	A nearly horizontal passage, driven from the surface, by which a mine may be entered, ventilated, and dewatered.
ambient	Surrounding, existing.
aquifer	Rock or sediment that is saturated with water and sufficiently permeable to transmit quantities of water.
area of potential effect (APE)	The geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.
baseflow	The contribution of near-channel alluvial groundwater and deeper bedrock groundwater to a stream channel. Does not include any direct runoff from rainfall or snowmelt into the stream.
bear management unit (BMU)	Land area containing sufficient quantity and quality of all seasonal habitat components to support a female grizzly.
Bears Outside Recovery Zone (BORZ)	Delineated areas outside of the Grizzly Bear Recovery Zone where recurring grizzly bear use has been documented.
Best Management Practices (BMPs)	Practice or set of practices that enable a planned activity to occur while still protecting the resource managed, normally implemented and applied during the activity rather than after the activity.
Best Management Practices (BMPs) (Watershed)	A practice or a combination of practices that is determined by the state (or designated area-wide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.
blasting	To remove, open, or form by or as if by an explosive.
corridor (wildlife)	A linear area along which wide-ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can be replenished from other areas.
critical habitat	The specific area within the geographic area, occupied by a listed species at the time it is listed, on which are found those physical or biological features essential to conserve the species and that may require special management considerations or protection; and specific areas outside the geographic area occupied by the species at the time it is listed upon a determination that such areas are essential to conserve the species.
Cumulative Effects Model	A computer model designed to (1) quantify individual and collective effects of land uses and activities in space and through time and (2) provide managers an analytic tool for evaluating alternative decisions relative to *Ursus arctos horribilis* recovery goals and objectives.
degradation	A process by which the quality of water in the natural environment is lowered.

deposition analysis threshold	The additional amount of nitrogen or sulfur deposition within an FLM area, below which estimated effects from a proposed new or modified source are considered negligible.
dilution	A process in which the chemical concentration of constituents in a stream decreases as a result of mixing with cleaner water.
downgradient	A direction characterized by lower fluid potential or hydraulic head.
drift	A nearly horizontal passageway driven on or parallel to the course of a vein or rock stratum.
drilling	To bore or drive a hole in.
effluent	Waste water discharge.
endangered	Any species that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.
ephemeral stream	A stream that flows only as a direct response to rainfall or snowmelt events; having no baseflow from groundwater.
fault	A fracture or fracture zone where there has been displacement of the sides relative to one another.
fragmentation	A condition in which a continuous area is reduced and divided into smaller sections. Habitat can be fragmented by natural events or development activities.
Grizzly Bear Core Habitat	An area of secure habitat within a BMU that contains no motorized travel routes or high use non-motorized trails during the non-denning season and is more than 0.31 mile (500 meters) from a drivable road. Core areas do not include any gated roads but may contain roads that are impassible due to vegetation or constructed barriers. Core areas strive to contain the full range of seasonal habitats that are available in the BMU.
guideline (as used in the KFP)	Operational practice and procedure that is applied to project and activity decision-making to achieve goals, desired conditions, and objectives
habitat displacement	The avoidance or reduction in use of suitable habitat due to disturbance from human activities.
hardness	A measure of the amount of calcium, magnesium, and iron dissolved in the water.
home range	An area in which an individual animal spends most of its time doing normal activities.
hydraulic conductivity	A measure of the ease with which water moves through soil or rock; permeability.
intermittent stored service	A Forest Service designation for roads that are closed to motorized traffic and pose little risk when not maintained; typically require some work to return them to a drivable condition.
intermittent stream	A stream that flows for several weeks or months in response to precipitation; the source is direct runoff and groundwater discharge.

inventoried roadless area	Areas identified in a set of inventoried roadless area maps, contained in the Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000, and any subsequent update or revision of those maps through the land management planning process.
large woody debris	Large pieces of relatively stable woody material located within the bankfull channel and appearing to influence bankfull flows. These are categorized as singles, aggregates, or rootwads. Single – A single piece that has a length equal to or greater than 3 meters or ⅔ of the wetted stream width and is 10 cm in diameter ⅓ of the way from the base. Aggregate – Two or more clumped pieces, each of which qualifies as a single piece. Rootwad – Rootmass or boles attached to a log less than 3 meters in length.
leachate	A solution obtained by leaching, as in the downward percolation of water through tailings materials, and containing soluble substances.
linkage area	The area between larger blocks of habitat where animals can live at certain seasons and where they can find the security they need to successfully move between these larger habitat blocks.
long term	A period greater than the life of the Project, expected to be 5 years (i.e., after adit closure).
macroinvertebrate	Small animals without backbones that are visible without a microscope (for example, insects, small crustaceans, and worms).
management area (as used in the KFP)	A land area identified within a planning area that has the same set of applicable plan components. A management area does not have to be spatially contiguous (36 CFR 219.19).
management indicator species	The management indicator species for the KFP were chosen to estimate the effects of the KFP alternatives on fish and wildlife populations and to establish KFP objectives for the maintenance and improvement of their associated habitats or habitat components. Management indicator species for the KFP are elk, a specific landbird assemblage, and a specific macroinvertebrate assemblage.
mitigation	An action to avoid, minimize, reduce, eliminate, replace, or rectify the effect of a management practice.
mixing zone	An area established in a permit or final decision on nondegradation issued by DEQ where water quality standards may be exceeded, subject to conditions that are imposed by DEQ and that are consistent with the rules adopted by the Board of Environmental Review and a limited area of a surface water body or a portion of an aquifer, where initial dilution of a discharge takes place and where water quality changes may occur and where certain water quality standards may be exceeded.

noxious weed	Any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.
old growth	Old-growth stands are defined as those that meet the definitions in Green et al. 1992 (errata corrected 12/11).
Ore	Mineralized rock that may be economic to mine.
peak flow	The highest streamflow in a specified period of time.
perennial stream	A stream that flows from source to mouth throughout the year; the source is groundwater and surface runoff.
periphyton	Organisms (as some algae) that live attached to underwater surfaces.
piezometer	A small well used to locate the groundwater surface.
planning subunit	An analysis area based on watersheds to be used for certain wildlife species in the Forest Plan and NEPA analysis.
population	A collection of individuals that share a common gene pool. In this document, local population refers to those breeding individuals within the analysis area.
rain-on-snow event	A meteorological occurrence in the months of December through February during which the heat contained in rainfall melts the existing snow cover, producing large amounts of runoff and high streamflow in a short time frame.
reclamation	The concept of reclamation of land has been defined as including all desirable and practical methods for (a) designing and conducting a surface disturbance in a manner that minimizes the effect of the disturbance and enhances the reclamation potential of the disturbed lands; (b) handling surficial material in a manner that ensures a root zone that is conducive to the support of plant growth where required for future use; and (c) contouring the surface to minimize hazardous conditions, to ensure stability, and to protect the surface against wind or water erosion.
regeneration	Regrowth of a tree crop, or other vegetation, whether by natural or artificial means.
regeneration harvest	Removal of an existing stand to prepare the site for regeneration. Clearcut, shelterwood, and seed tree harvests are examples of regeneration treatments.
riparian	Areas with distinct resource values and characteristics that compose an aquatic ecosystem, and adjacent upland areas that have direct relationships with the aquatic system. This includes floodplains, wetlands, and lake shores.
ripped	To tear, split apart, or open.
salmonid	Member of the fish family Salmonidae; includes salmon and trout.

Scenic Integrity	The highest scenic integrity ratings are given to those landscapes where the valued landscape attributes appear complete and little or no visible deviations are evident. Scenic Integrity is used to describe both existing (Existing Scenic Integrity) and desired (Scenic Integrity Objective) conditions. Very High: Landscape is intact with only minor changes from the valued landscape character associated with significant scenic landscapes. This SIO Scenic Integrity Objective is typically (but not exclusively) associated with specially designated areas such as wilderness or other designations that imply the landscape is natural appearing. High: Management activities are unnoticed and the landscape character appears unaltered. Moderate: Management activities are noticeable but are subordinate to the landscape character. The landscape appears slightly altered. Low: Management activities are evident and sometimes dominate the landscape but are designed to blend with surroundings by repeating line, form, color, and texture of valued landscape character attributes. The landscape appears altered. Very Low: Management activities create a "heavily altered landscape." Changes may strongly dominate the landscape. Note: This SIO is not a goal or objective.
security habitat	An area with low levels of human disturbance. This general definition covers most uses of the term security habitat, except for elk, which has a specific definition.
security habitat (elk)	Generally timbered stands on National Forest System lands at least 250 acres in size greater than 0.5 mile away from open motorized routes during the hunting season. Security is calculated for individual planning subunits. Roads not open to the public for motorized uses during the hunting season are not included in this calculation. The effects of non-motorized use and administrative motorized use of closed or temporary roads during the hunting season are not included in this calculation and would instead be analyzed separately at the project level.
seismic	Of, or produced by, earthquakes.
sensitive species	Those species identified by the Regional Forester for which population viability is a concern, as evidenced by (1) significant current or predicted downward trend in population numbers or density or (2) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
short term	A period of time less than 5 years (i.e., life of Project).

stability	The ability of a population to remain at about the same population size over time through stable natality and mortality rates.
standard (as used in the KFP)	Limitation or requirement that is applied to project and activity decision-making to help achieve goals and objectives.
subpopulation	A well-defined set of interacting individuals that comprise a portion of a larger, interbreeding population.
subsidence	The sudden sinking or gradual downward settling of the earth's surface with little or no horizontal motion.
threatened species	Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, as identified by the Secretary of the Interior.
total suspended solids	Undissolved particles suspended in liquid.
transect	A line, strip, or series of plots from which biological samples, such as vegetation, are taken.
trigger value	Values listed as trigger values in Circular DEQ-7 for parameters categorized as toxic; used to determine if proposed activities will cause degradation.
waste rock	Rock that does not contain a valuable constituent at concentrations suitable for mining.
waters of the U.S.	Waters that include the following: all interstate waters, intrastate waters used in interstate or foreign commerce, tributaries of the above, territorial seas at the cyclical high tide mark, and wetlands adjacent to all the above.
Wetlands **Corps' definition of a wetland (33 CFR 328.3(b))**	Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
Wetlands **KFP definition**	Those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, peatlands, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.
wetted perimeter	The area at a stream cross section that contains streamflow.

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Figures for Supplemental Environmental Impact Statement for the Montanore Evaluation Project

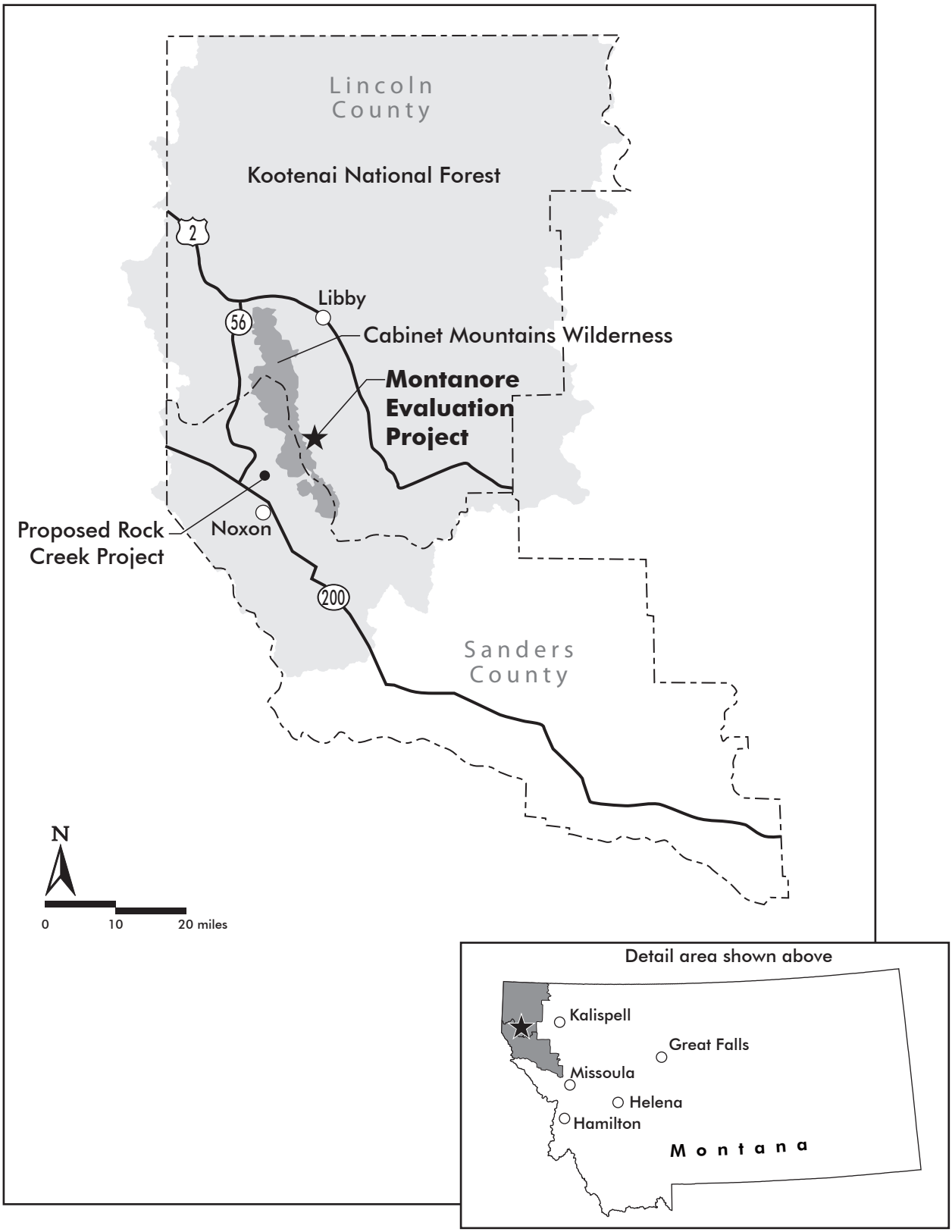


Figure 301. General Location of Montanore Evaluation Project

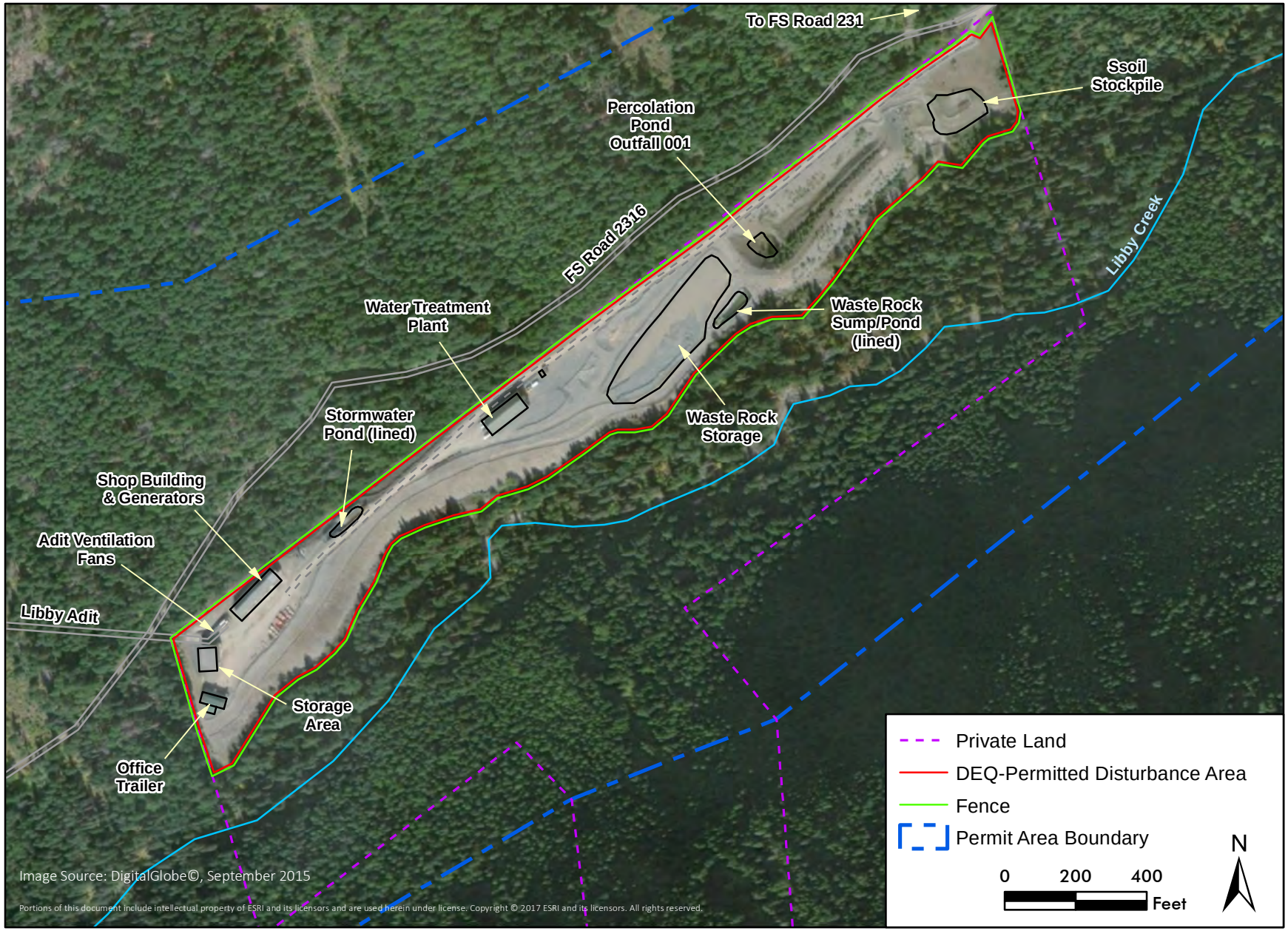


Figure 302. Existing Libby Adit Site

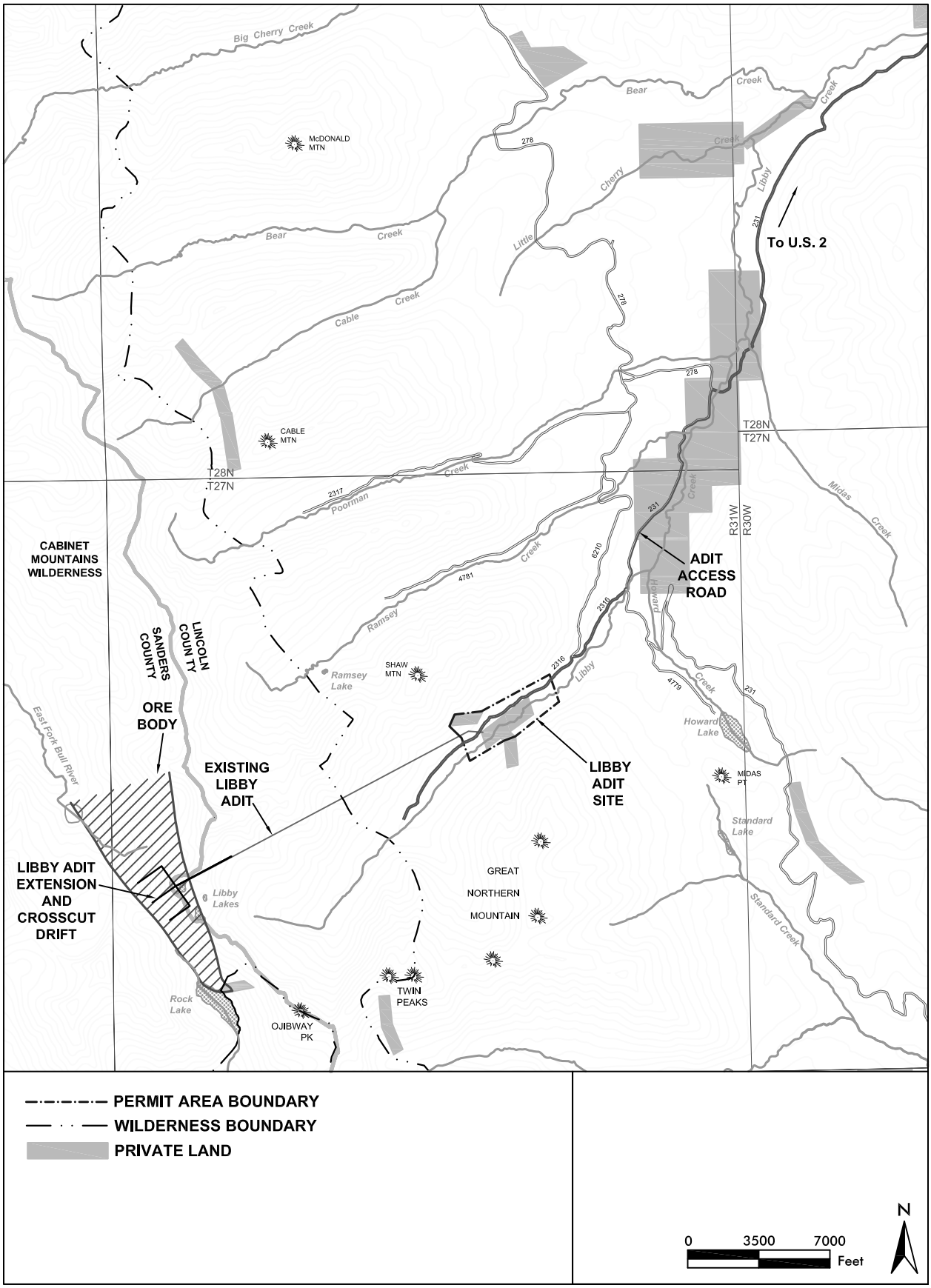
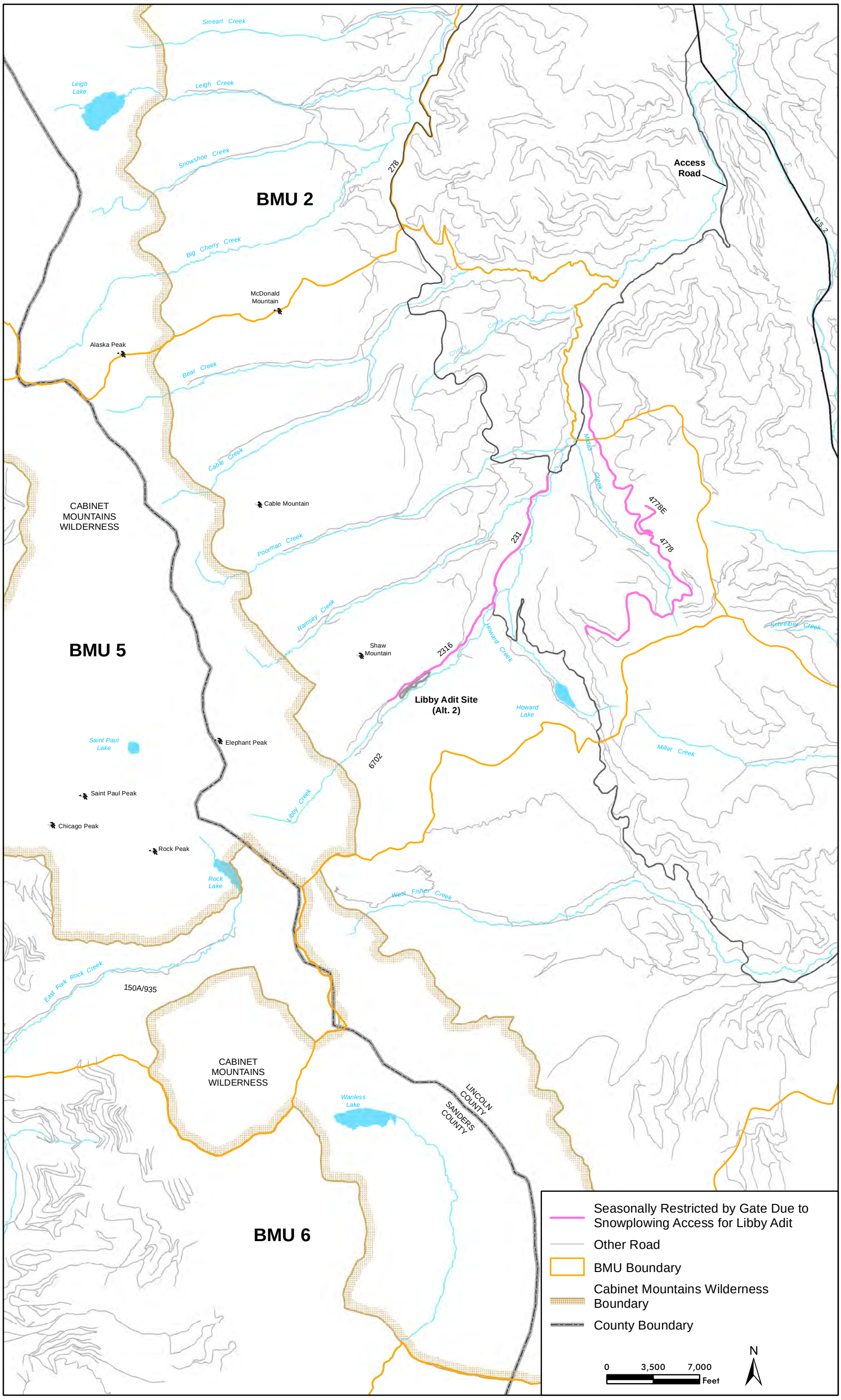


Figure 303. Evaluation Project Activities, Alternative 2



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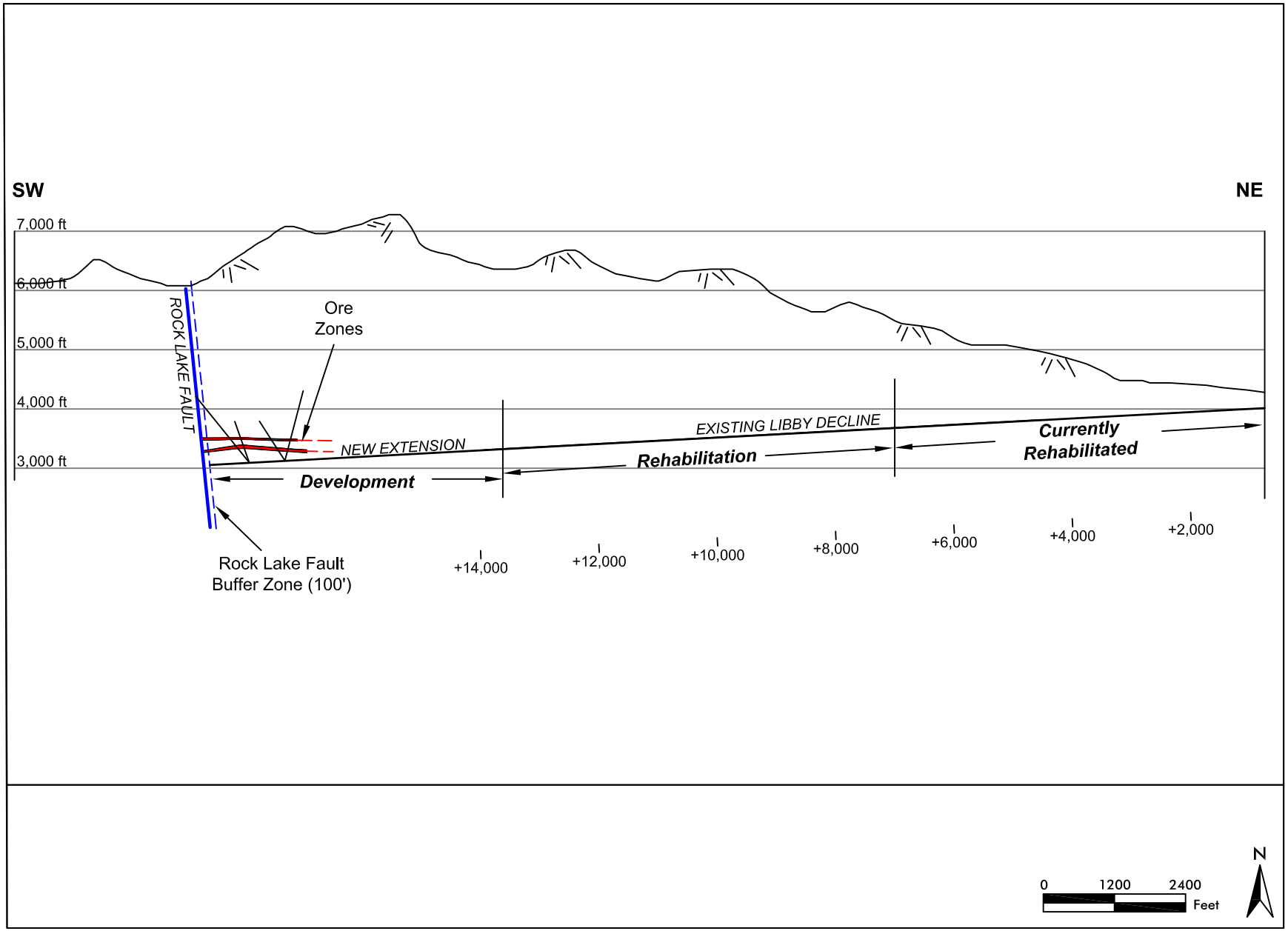

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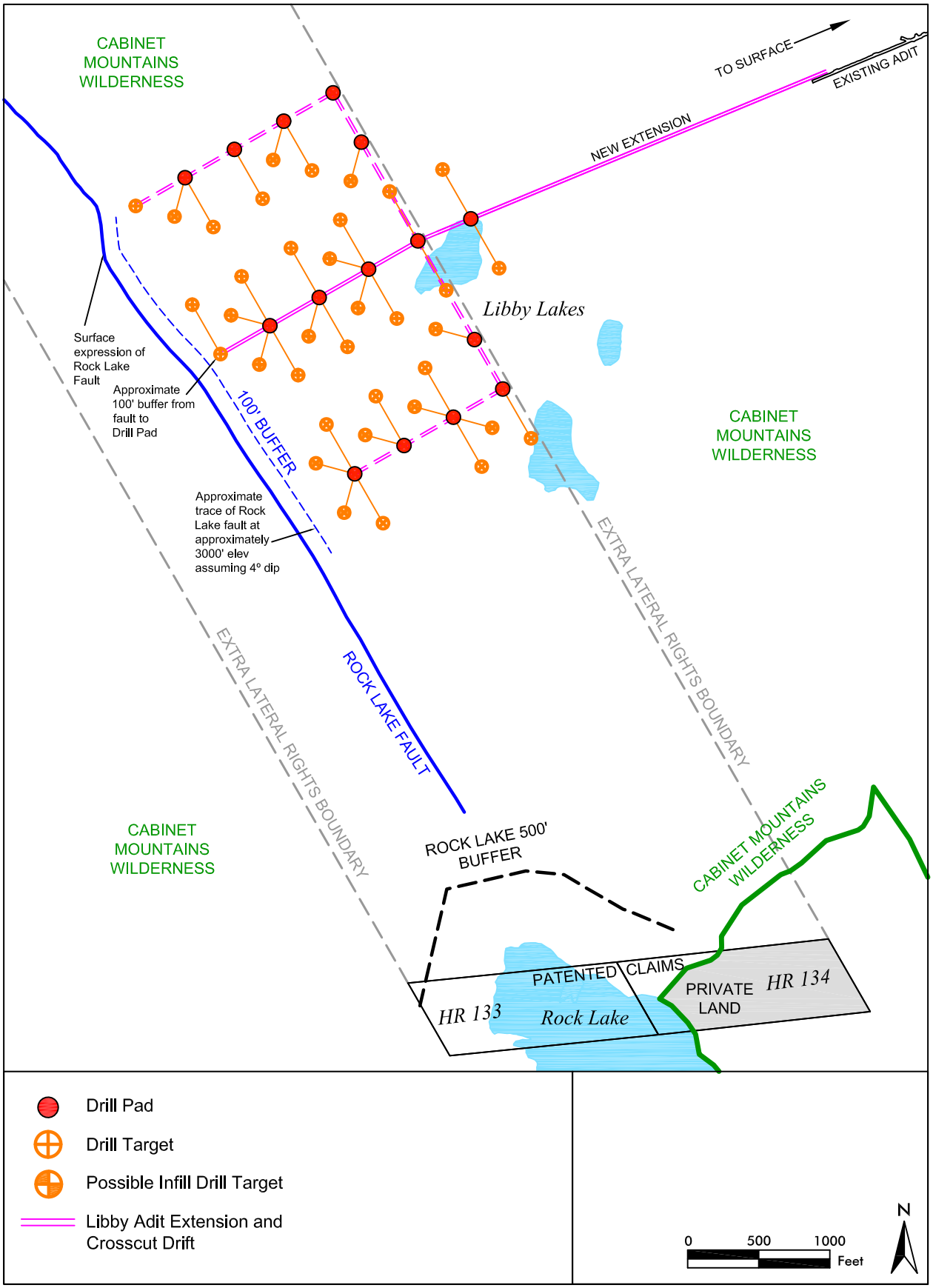

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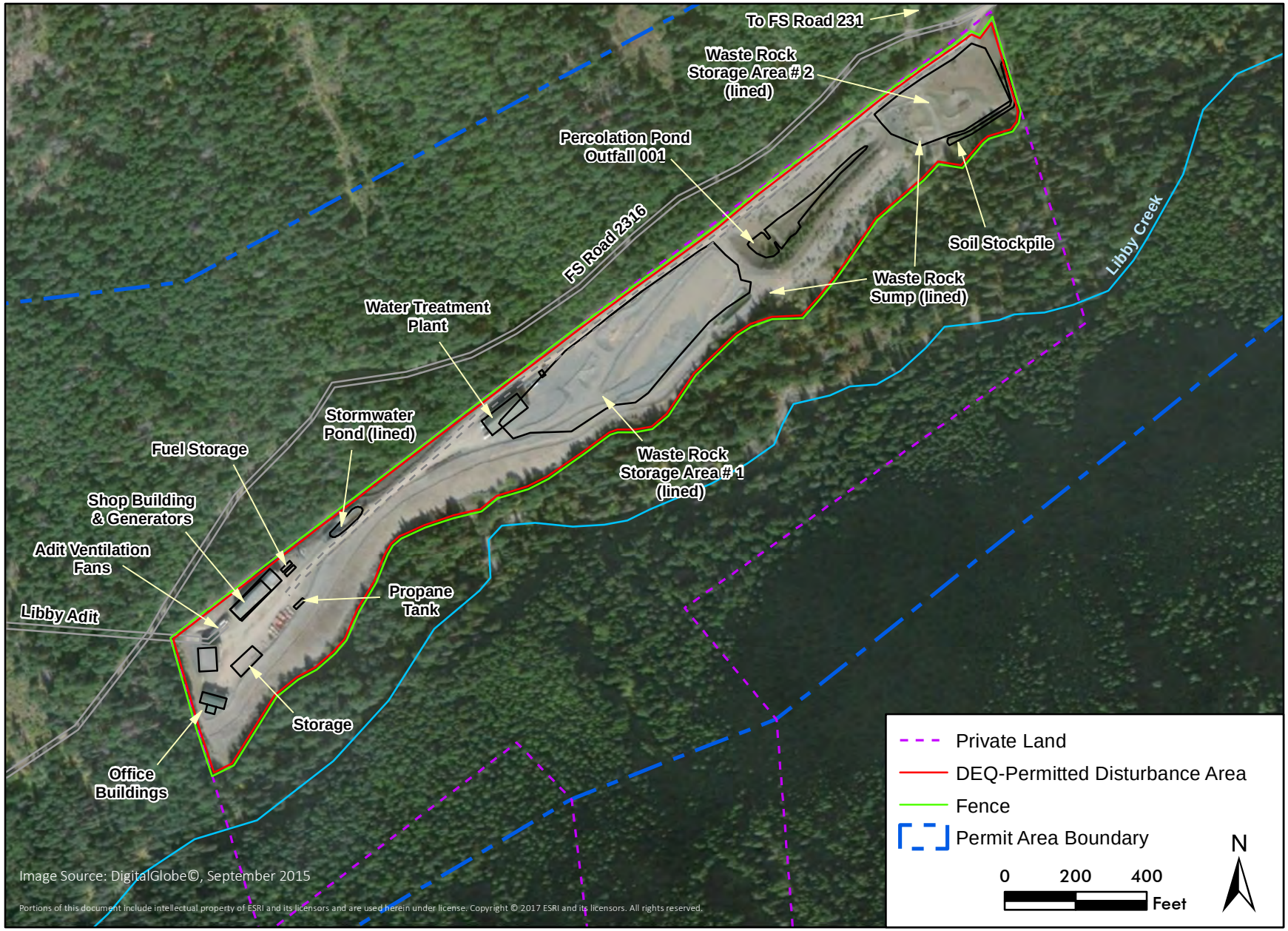

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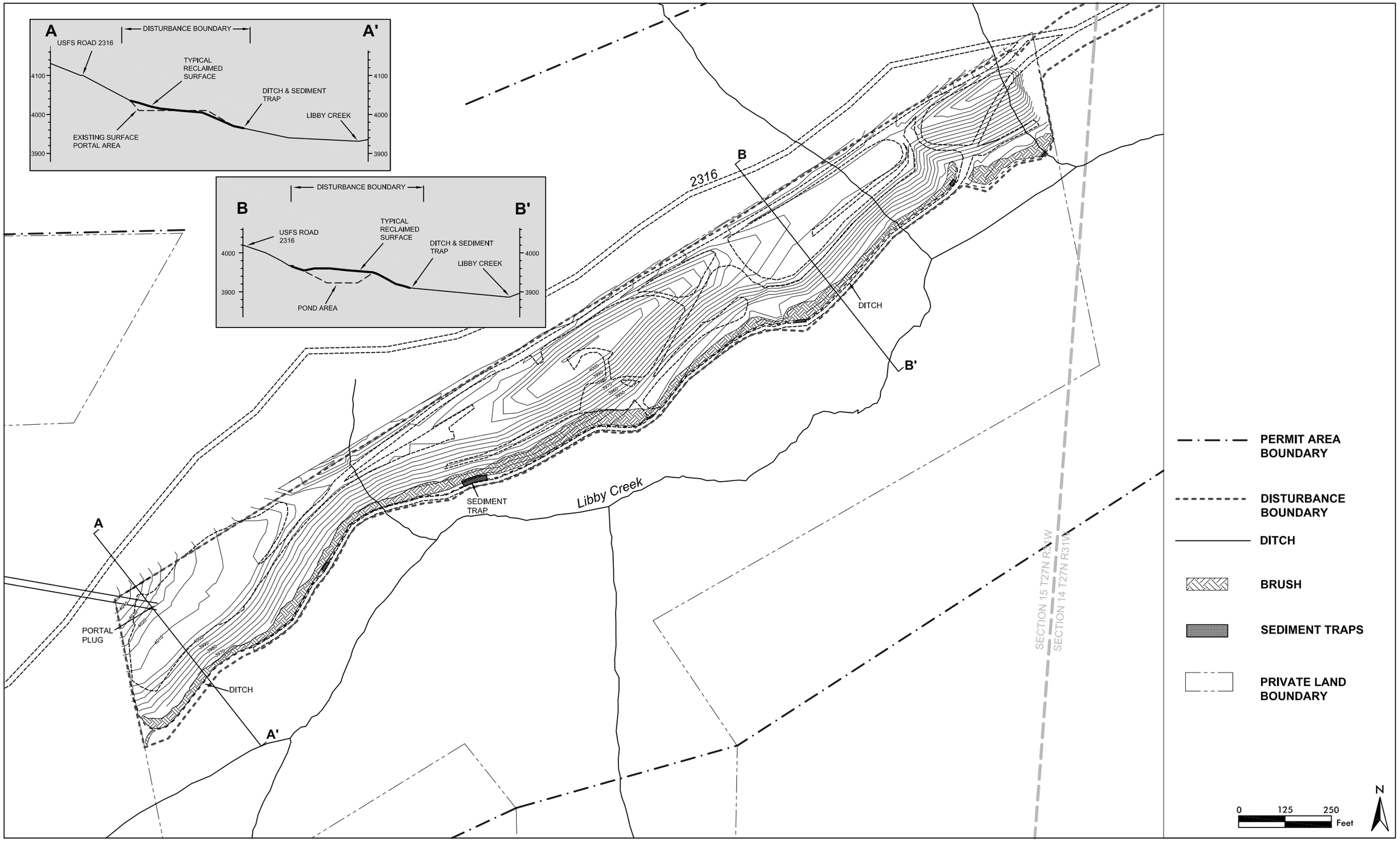

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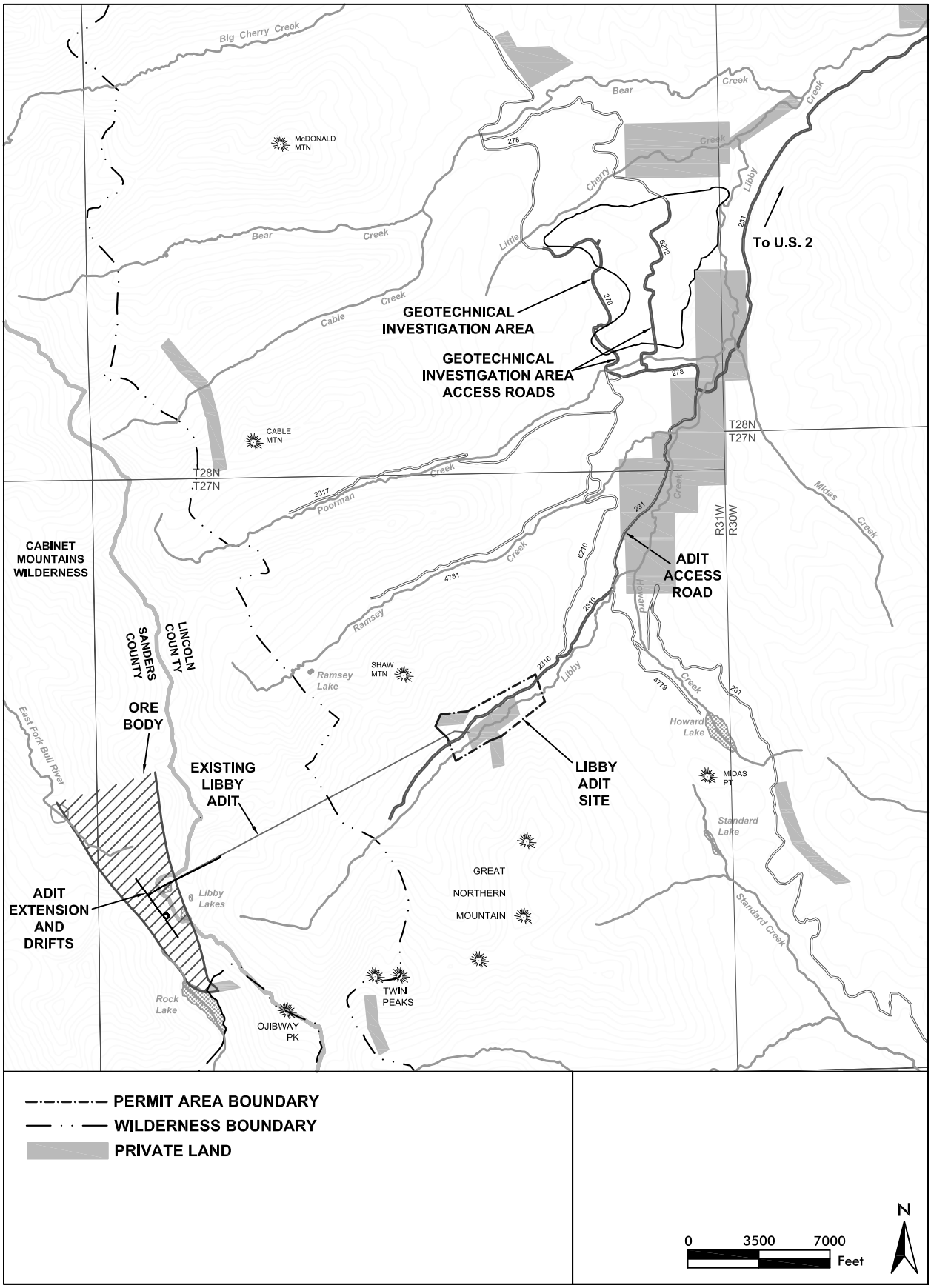

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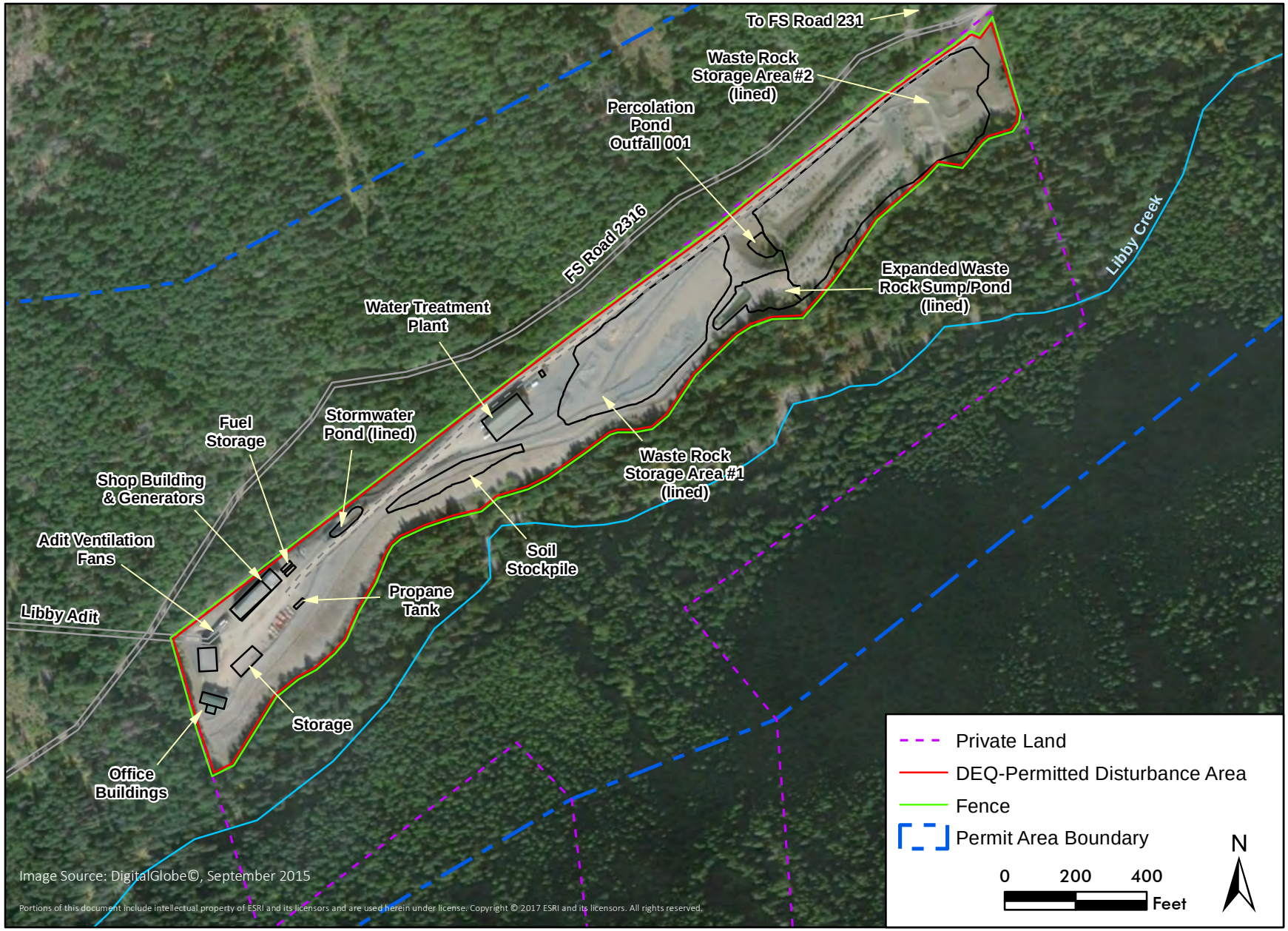

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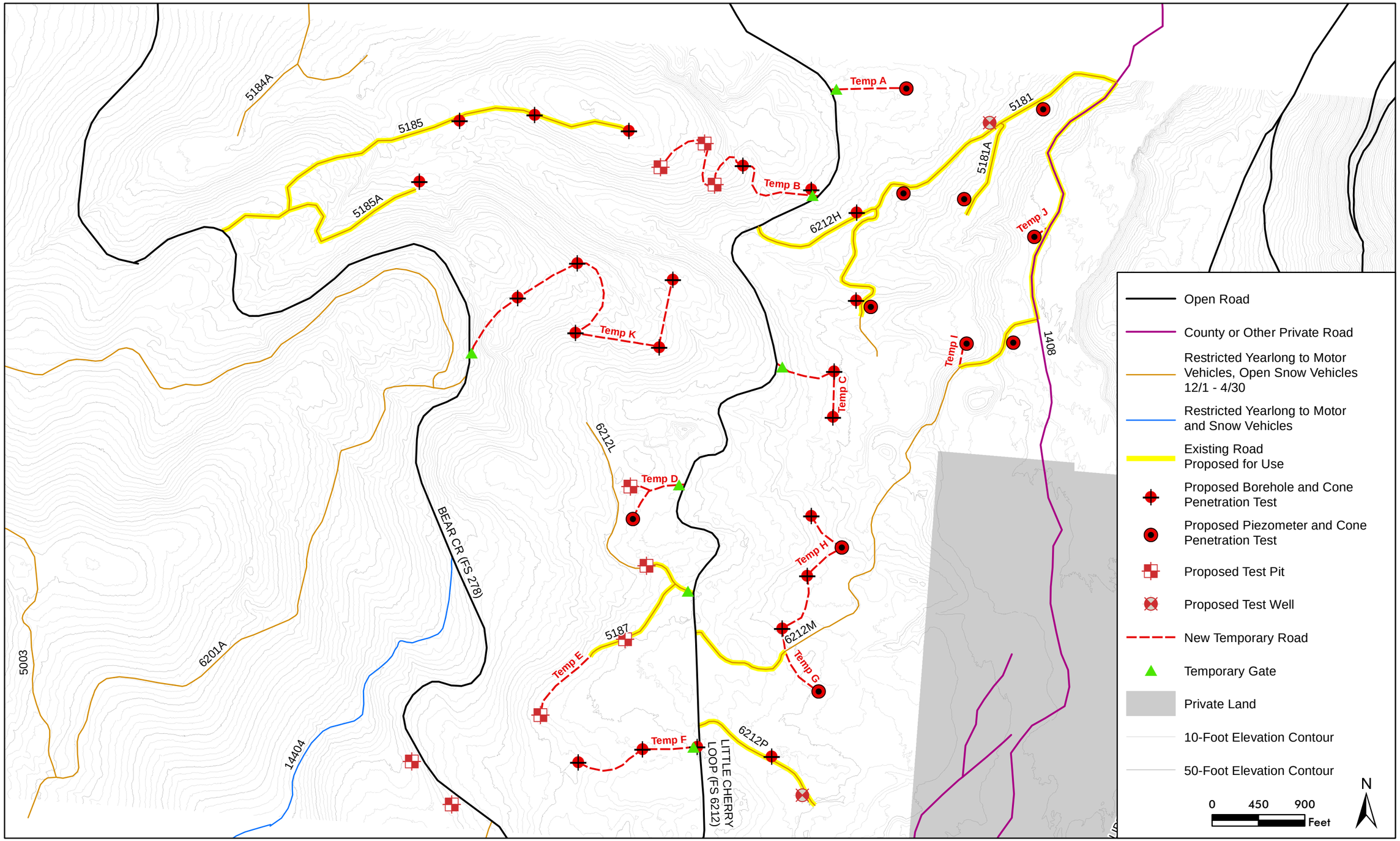

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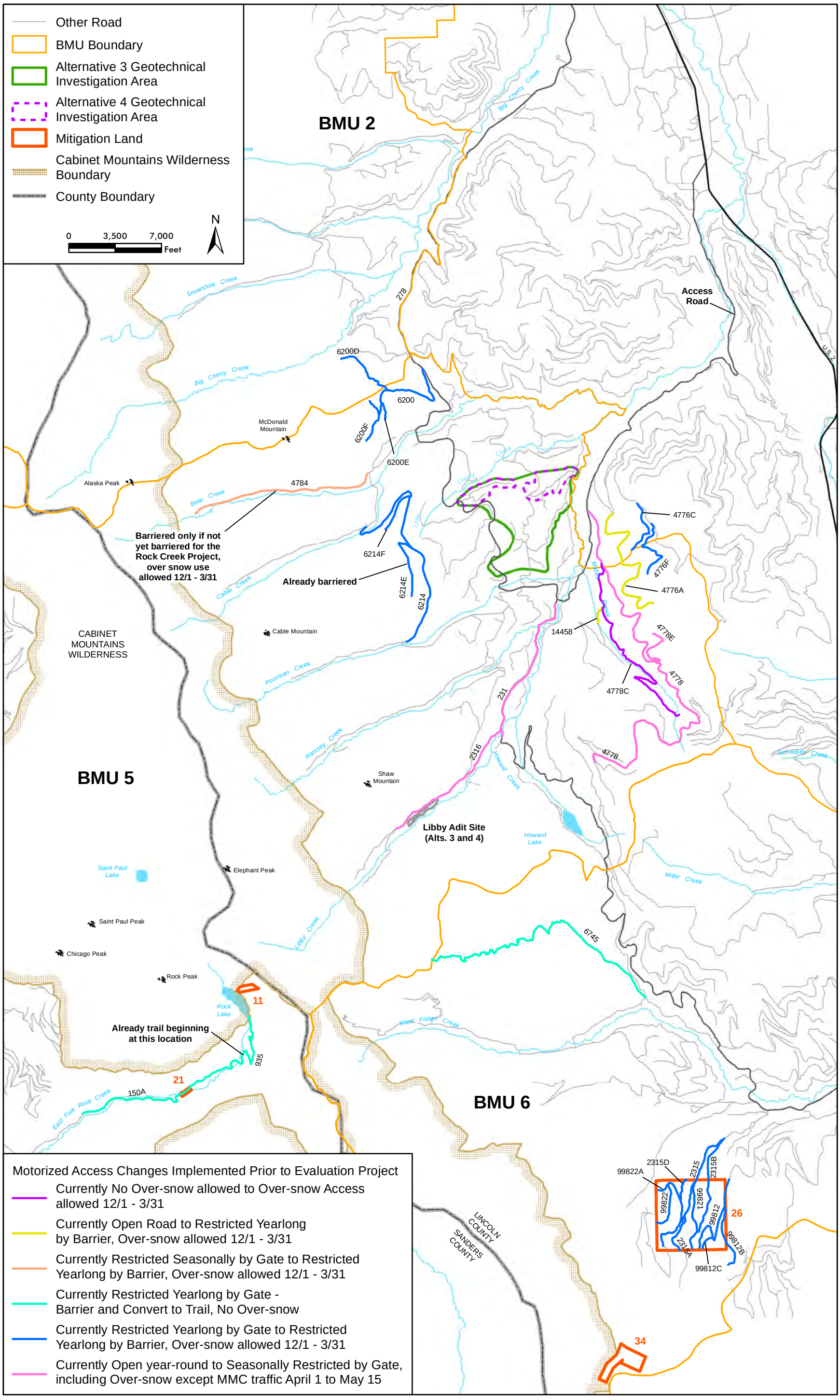

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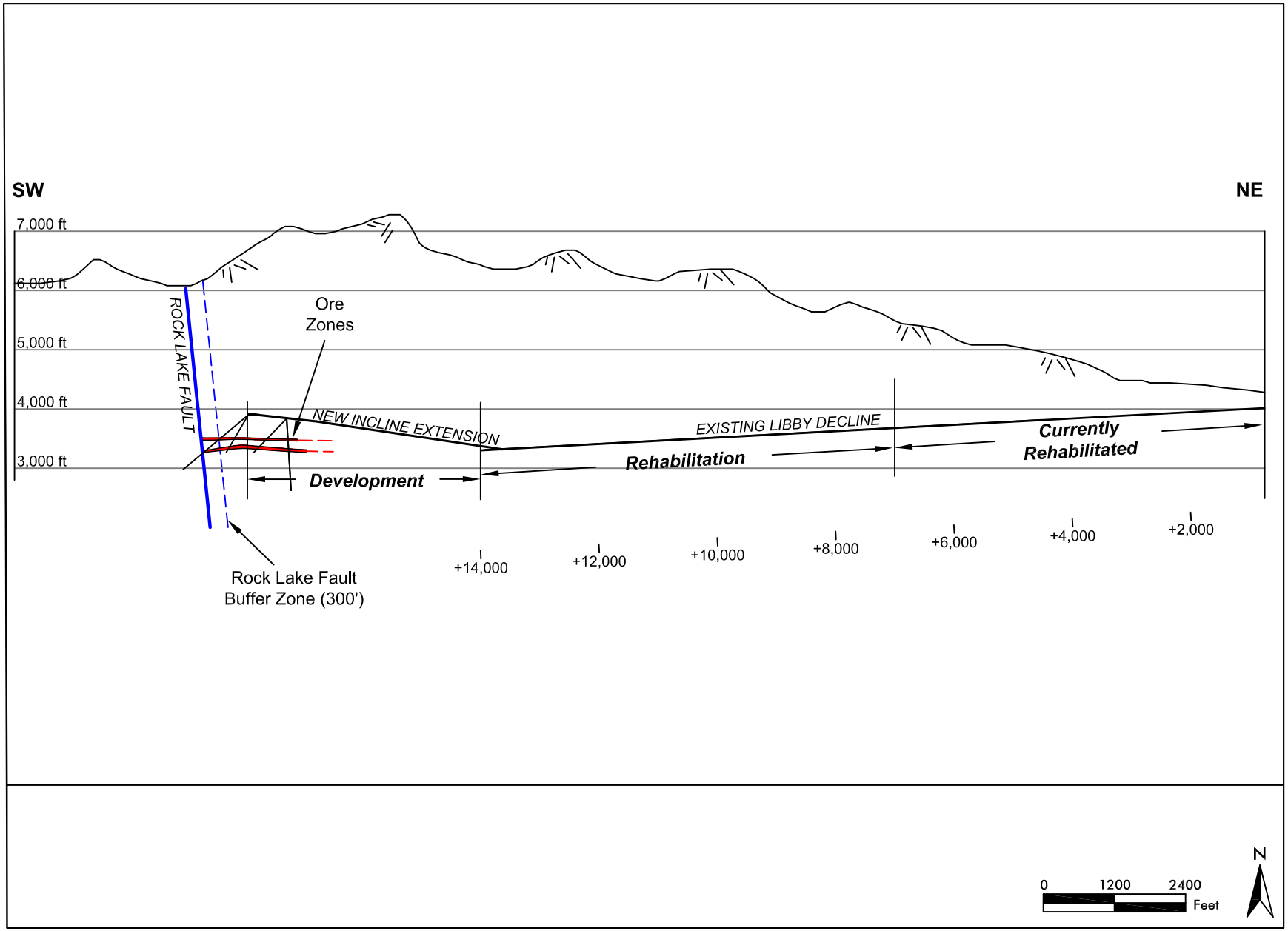

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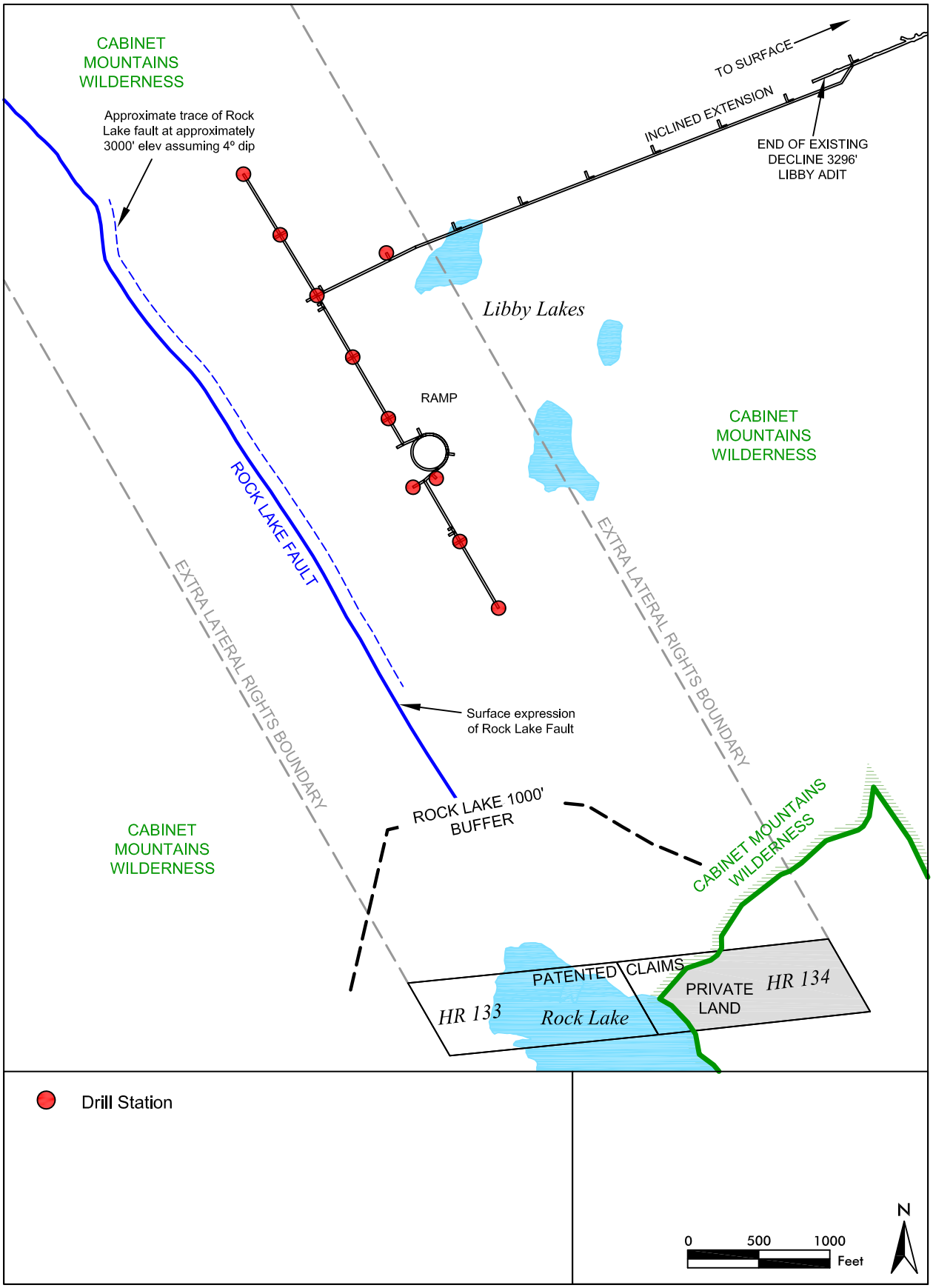

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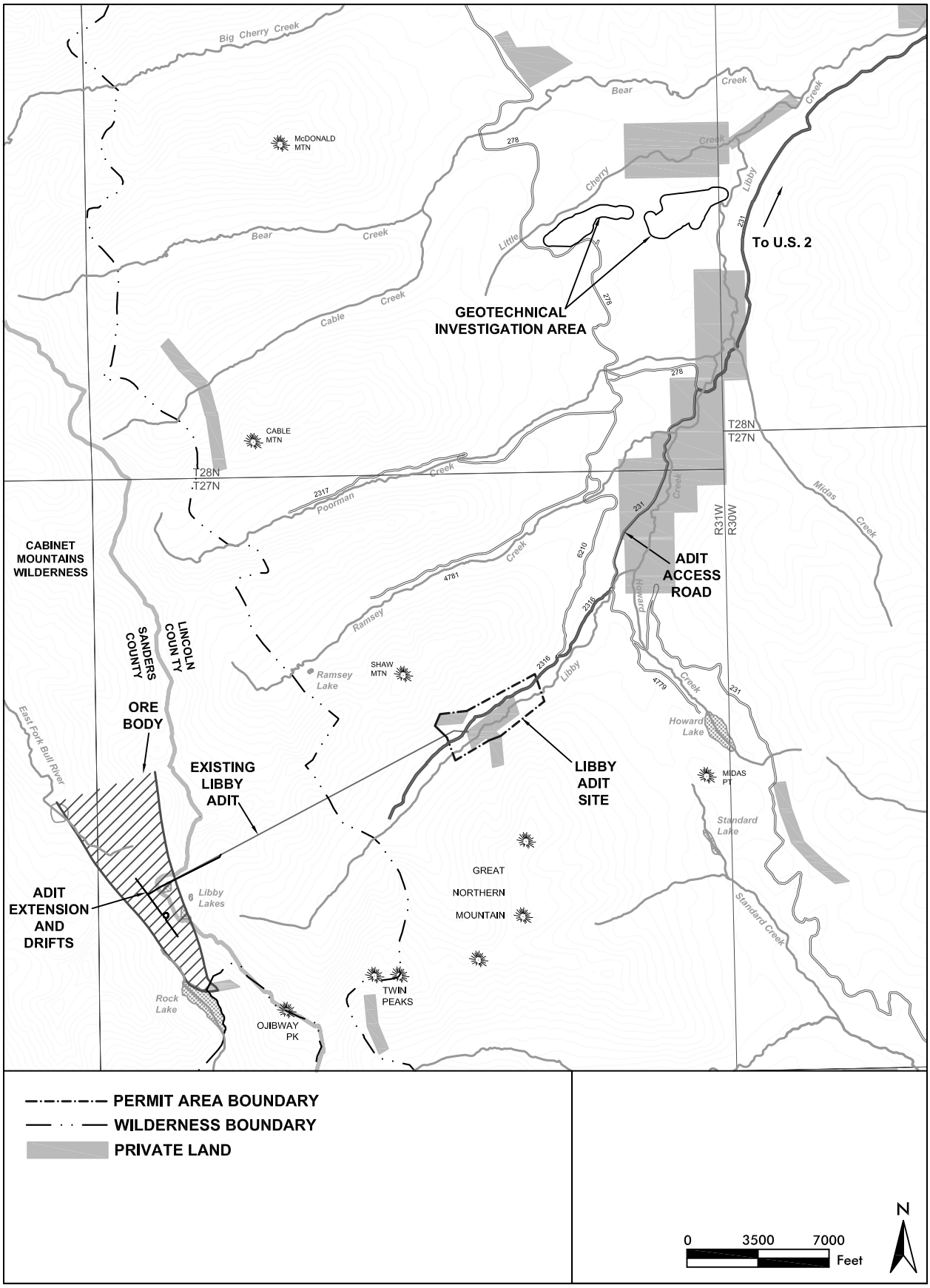

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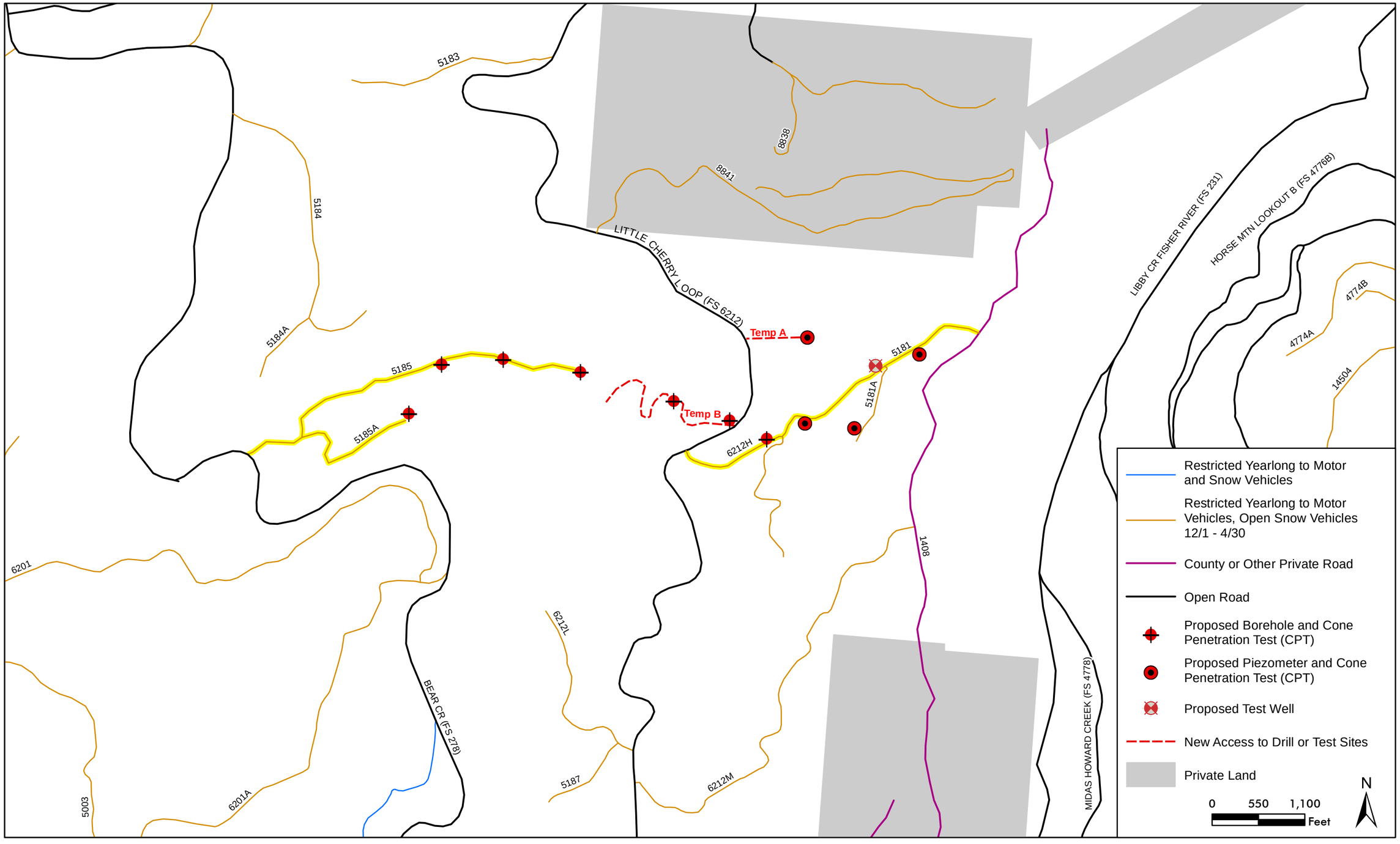

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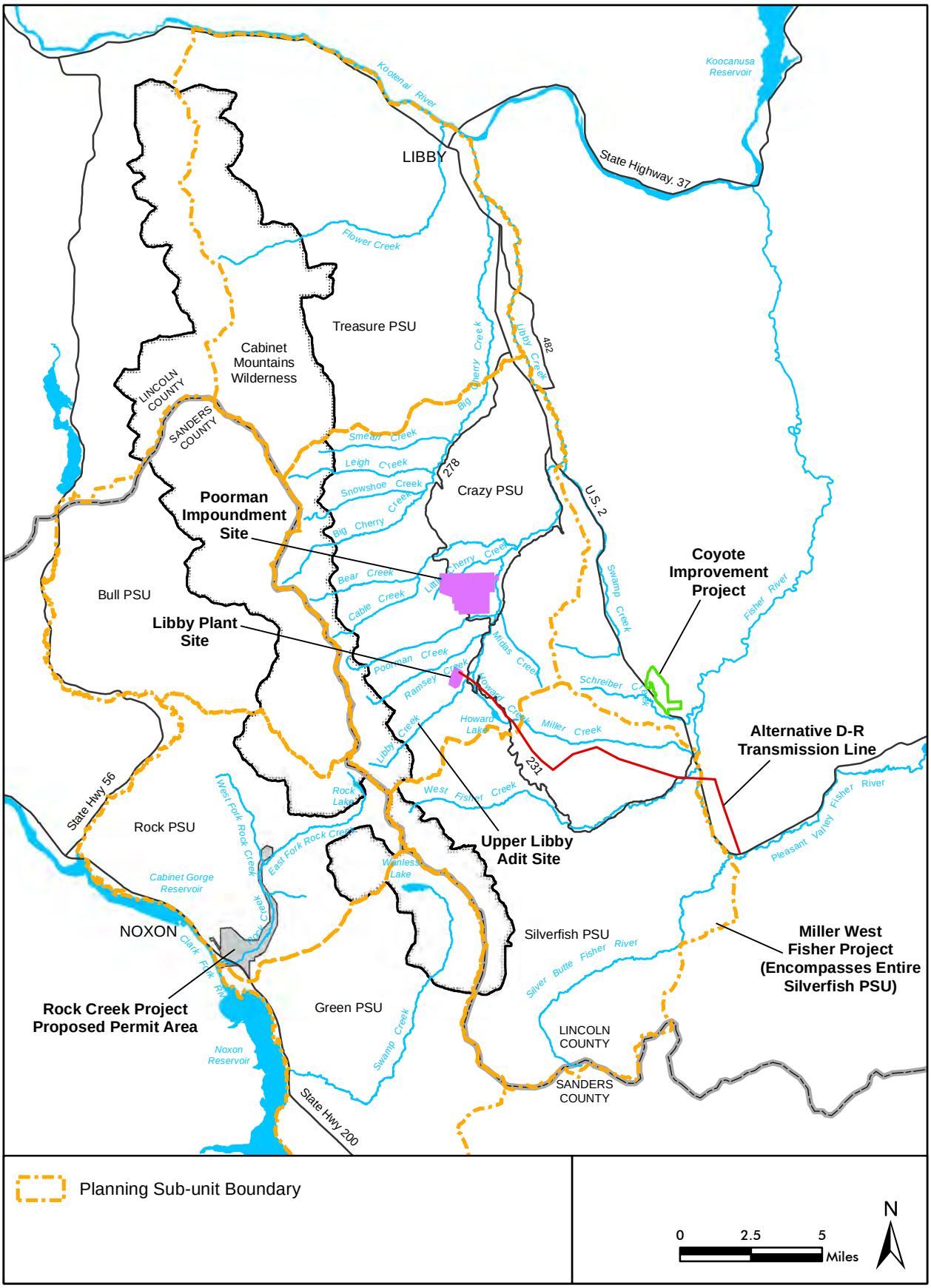

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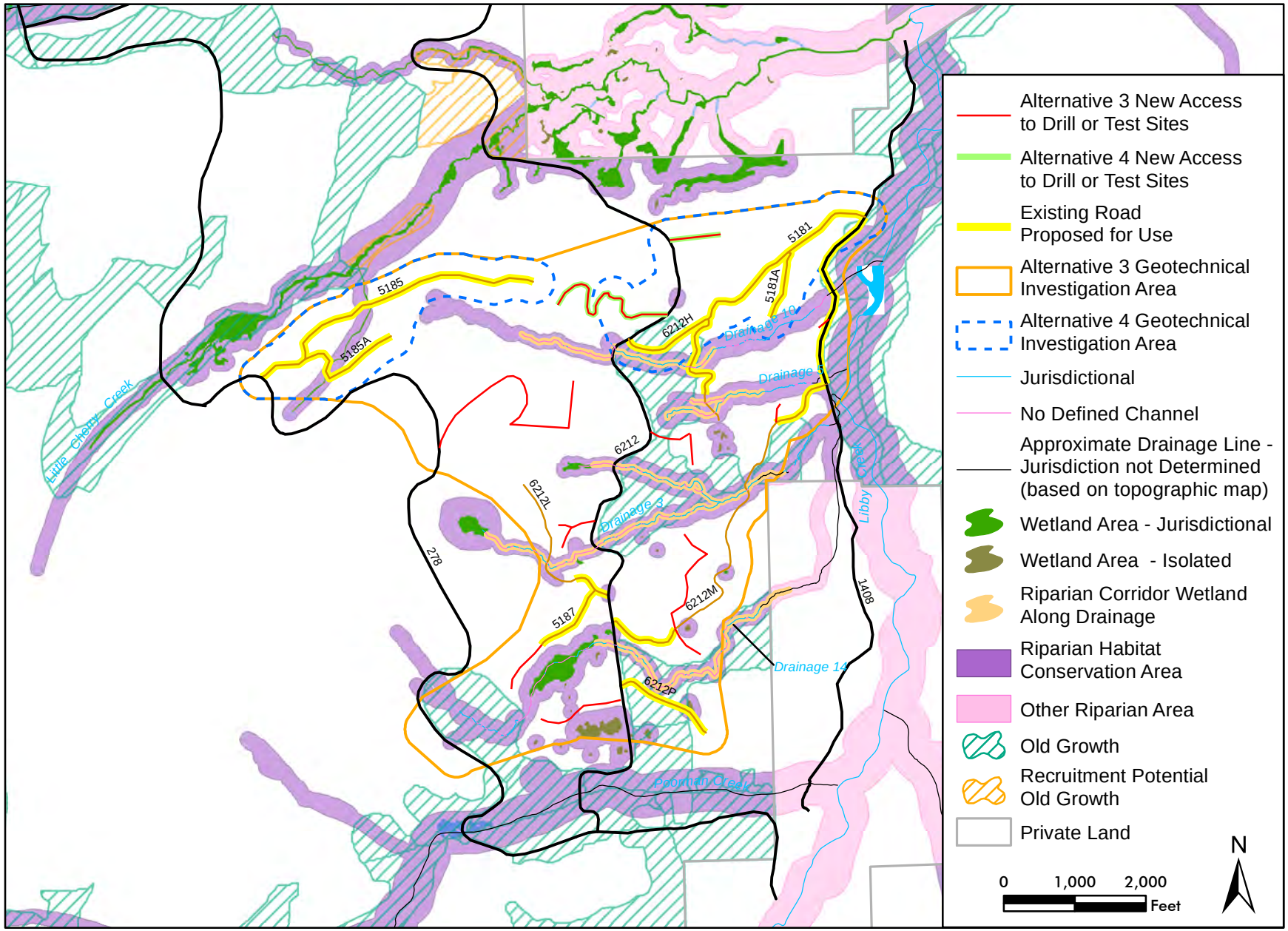

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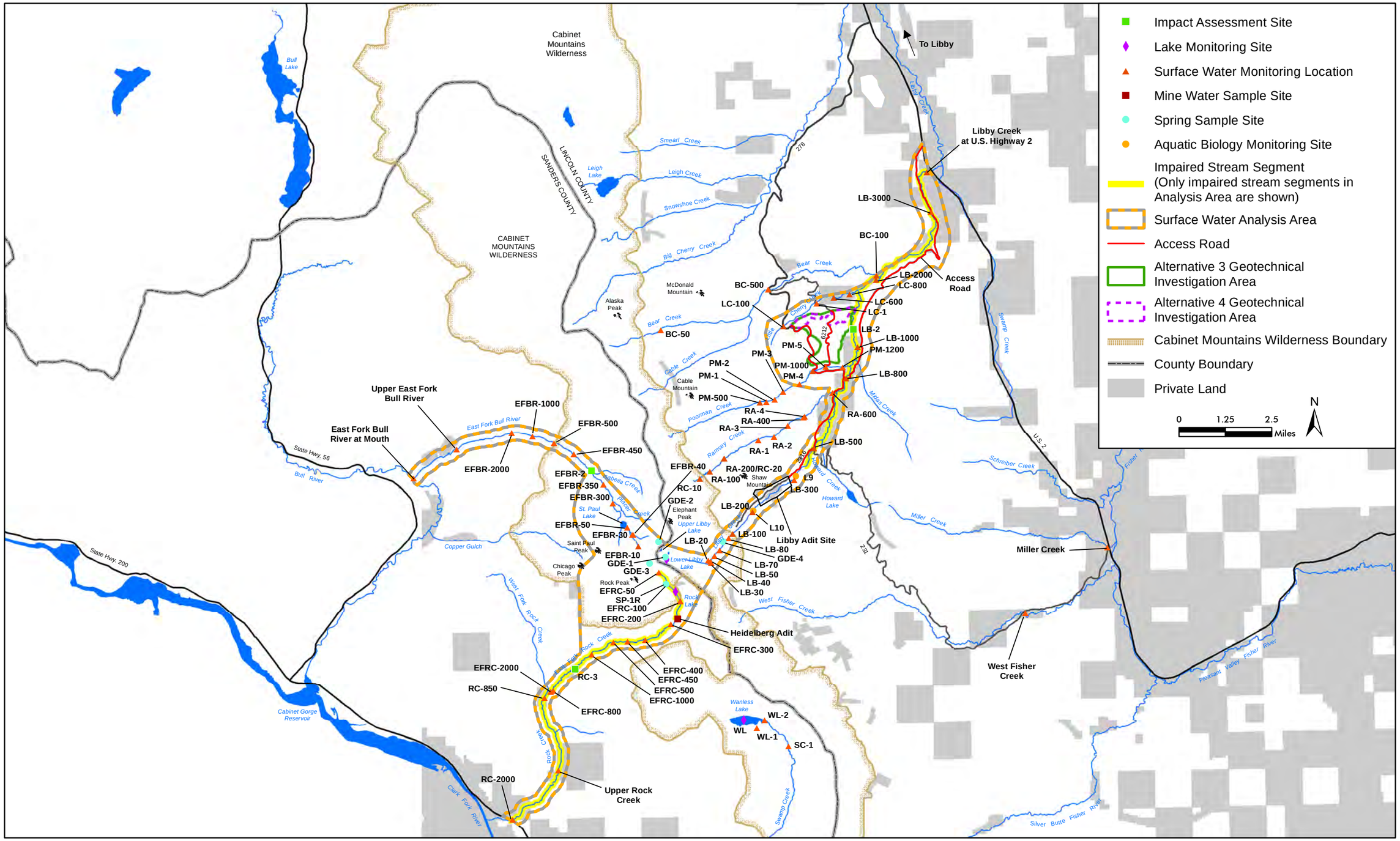

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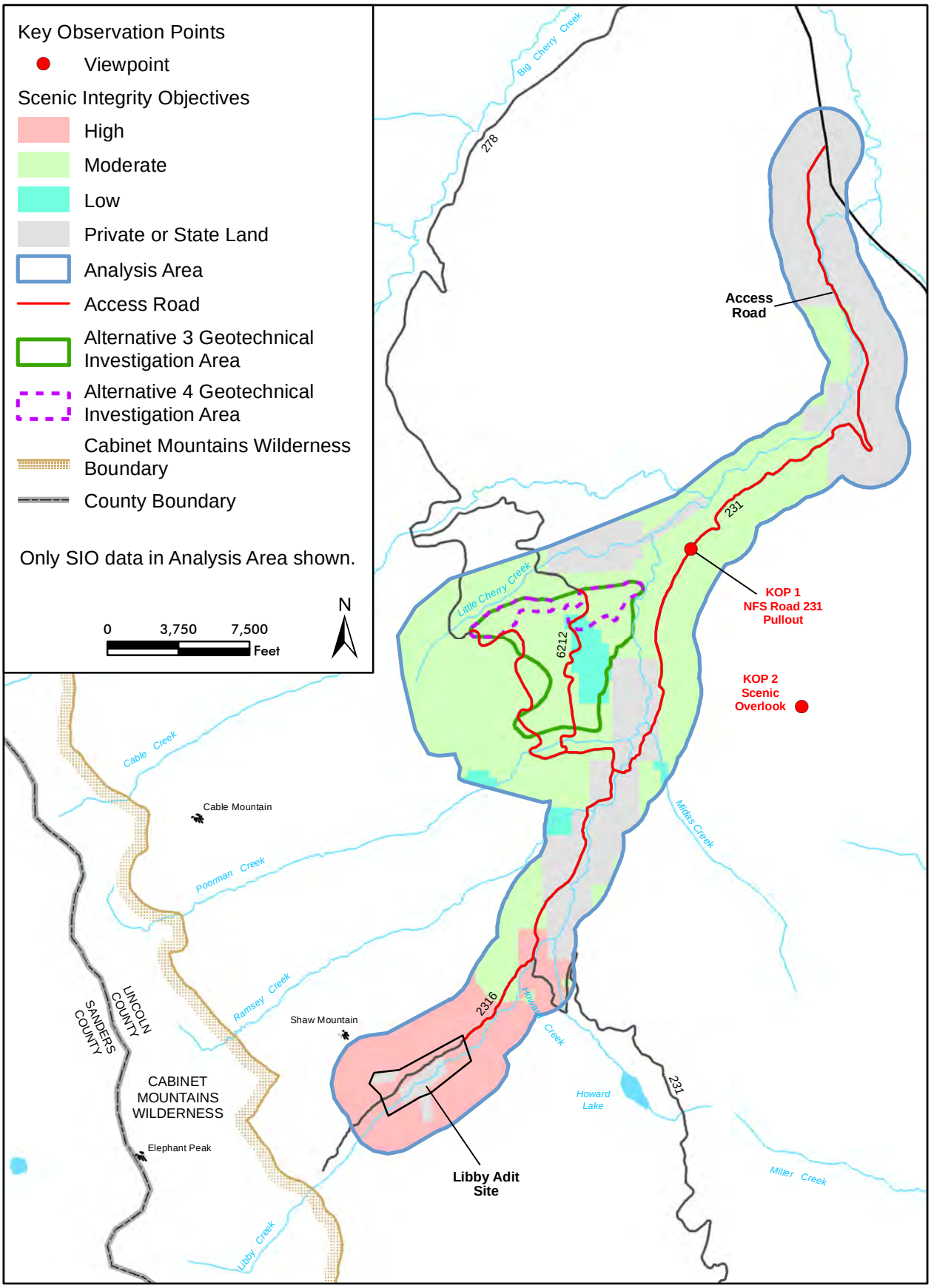

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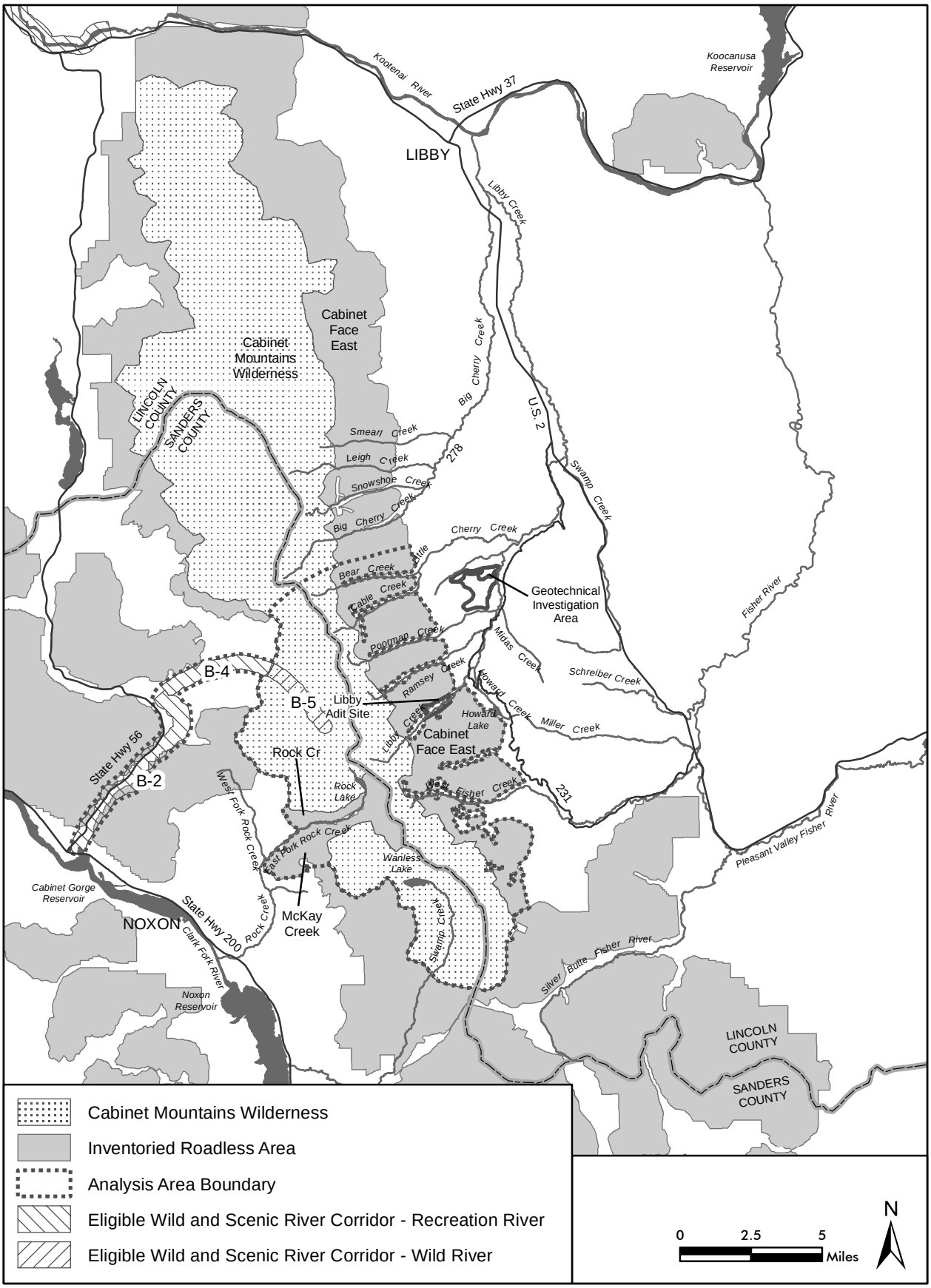

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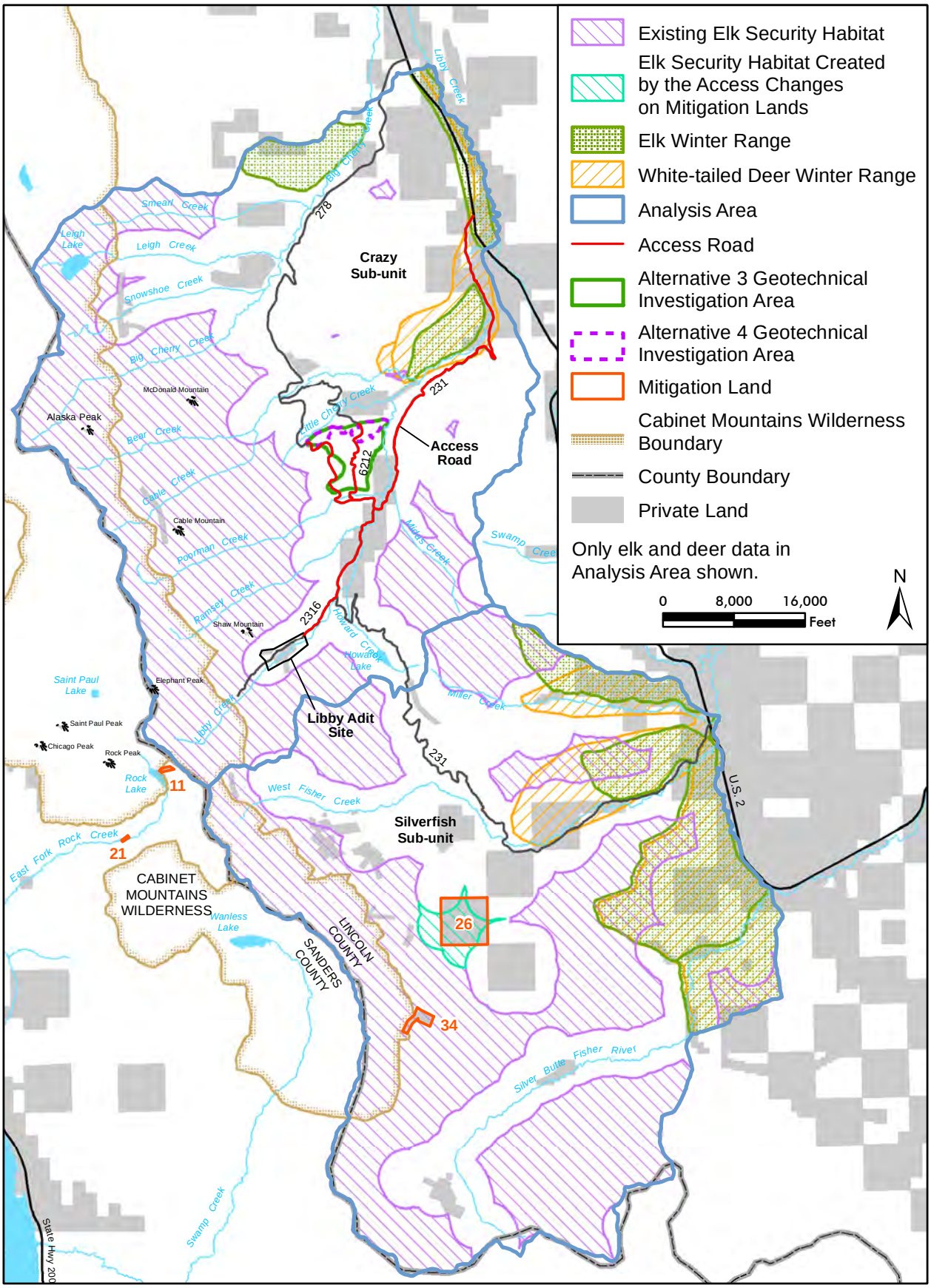

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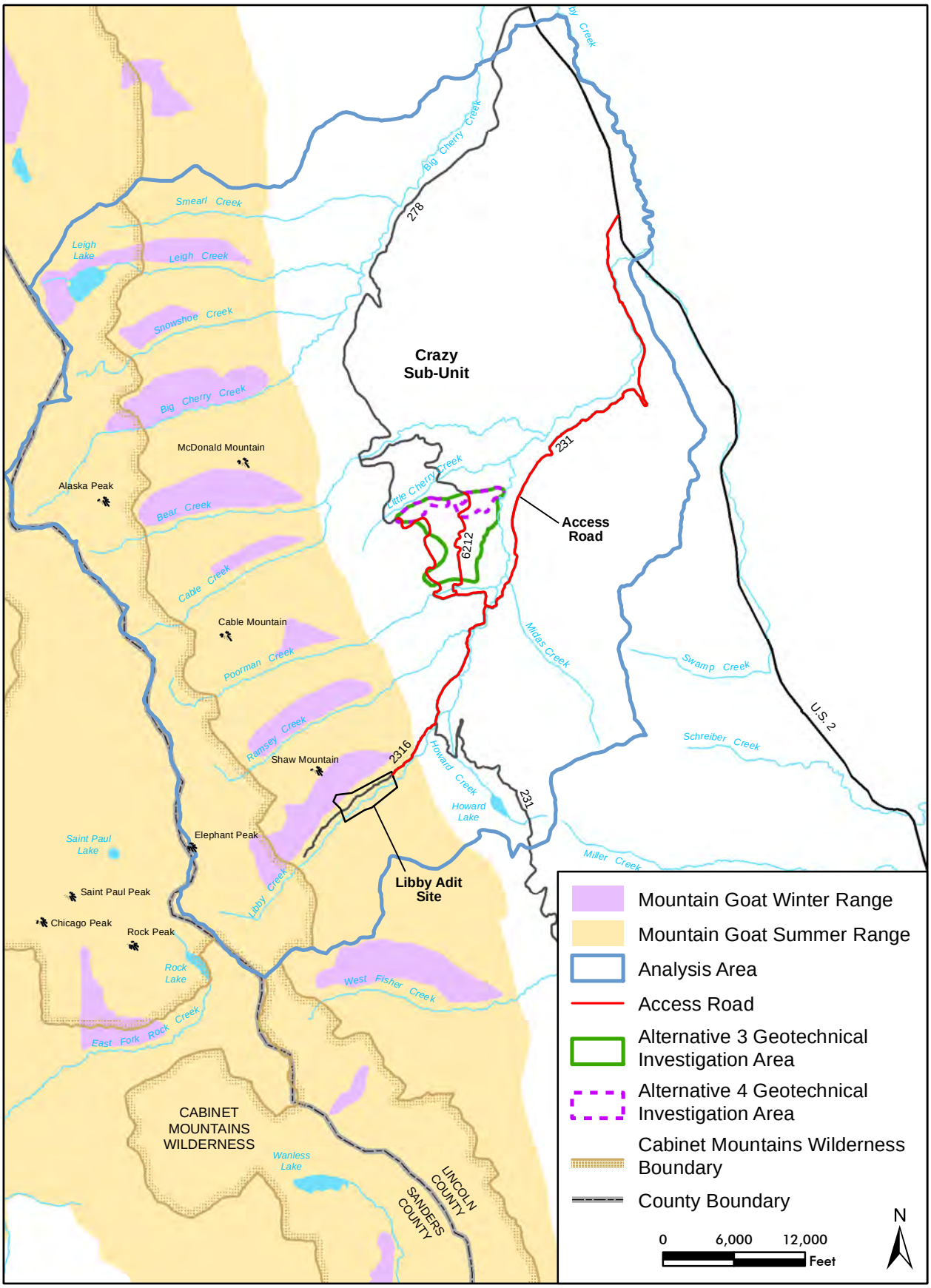

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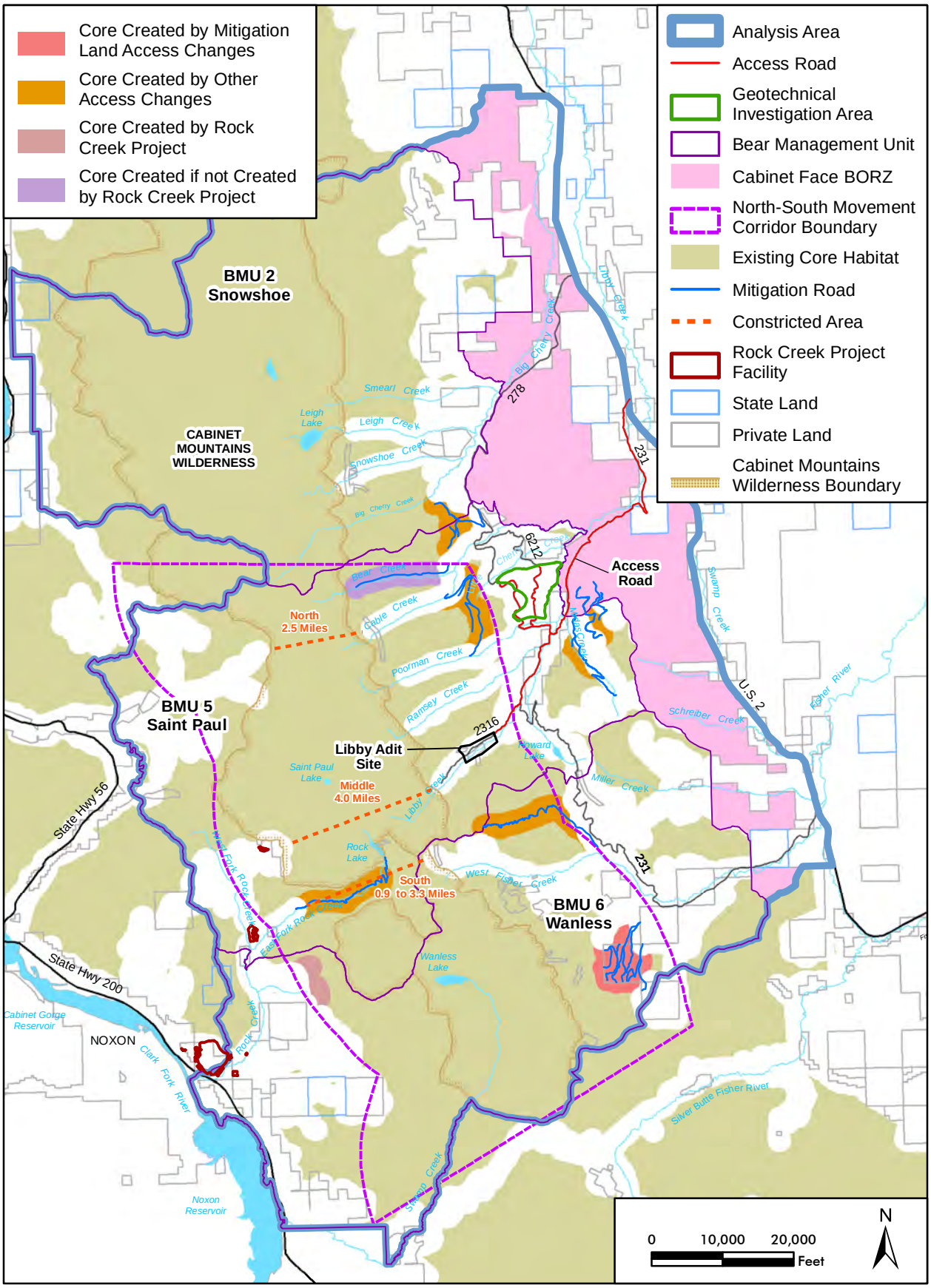

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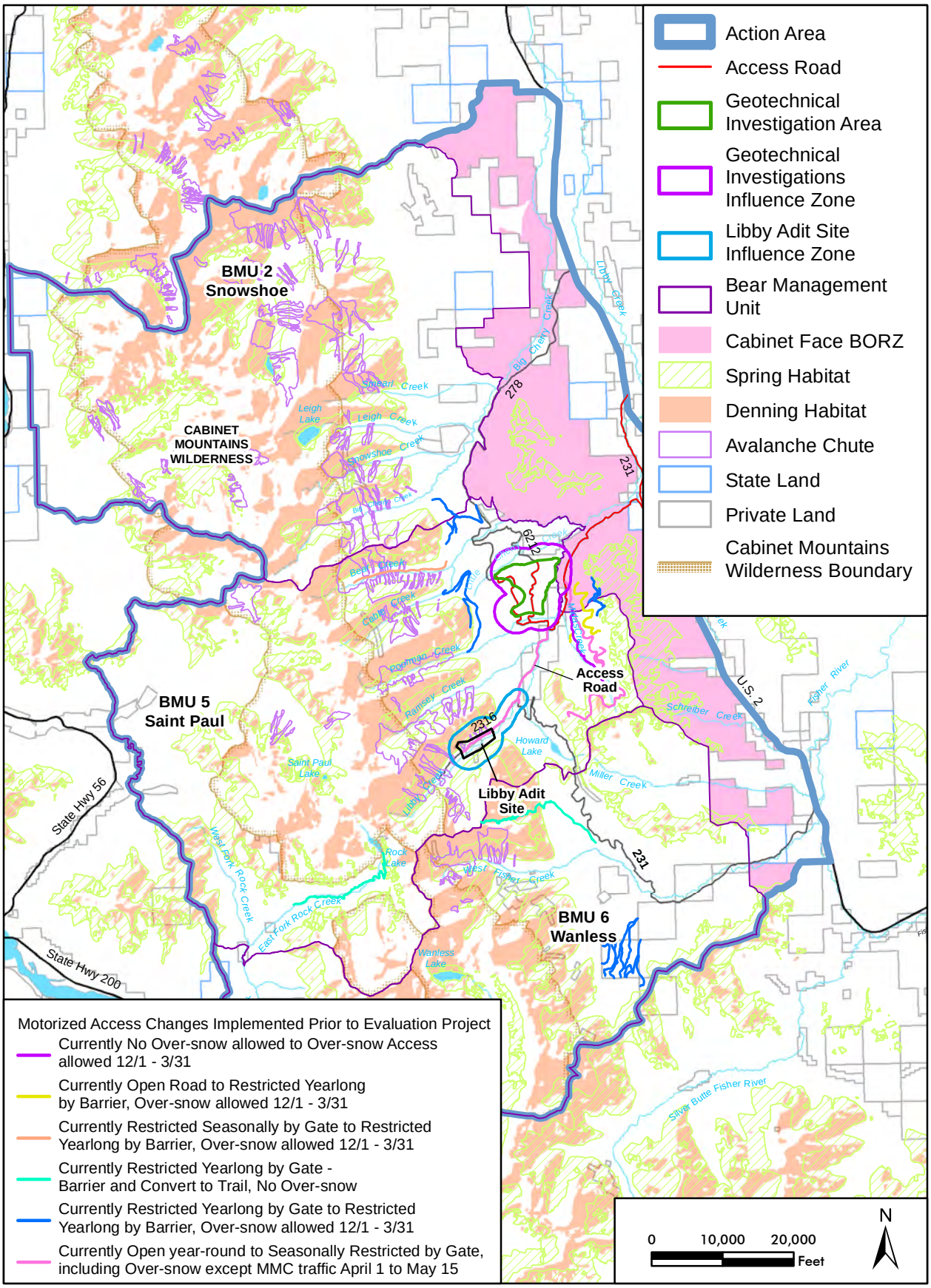

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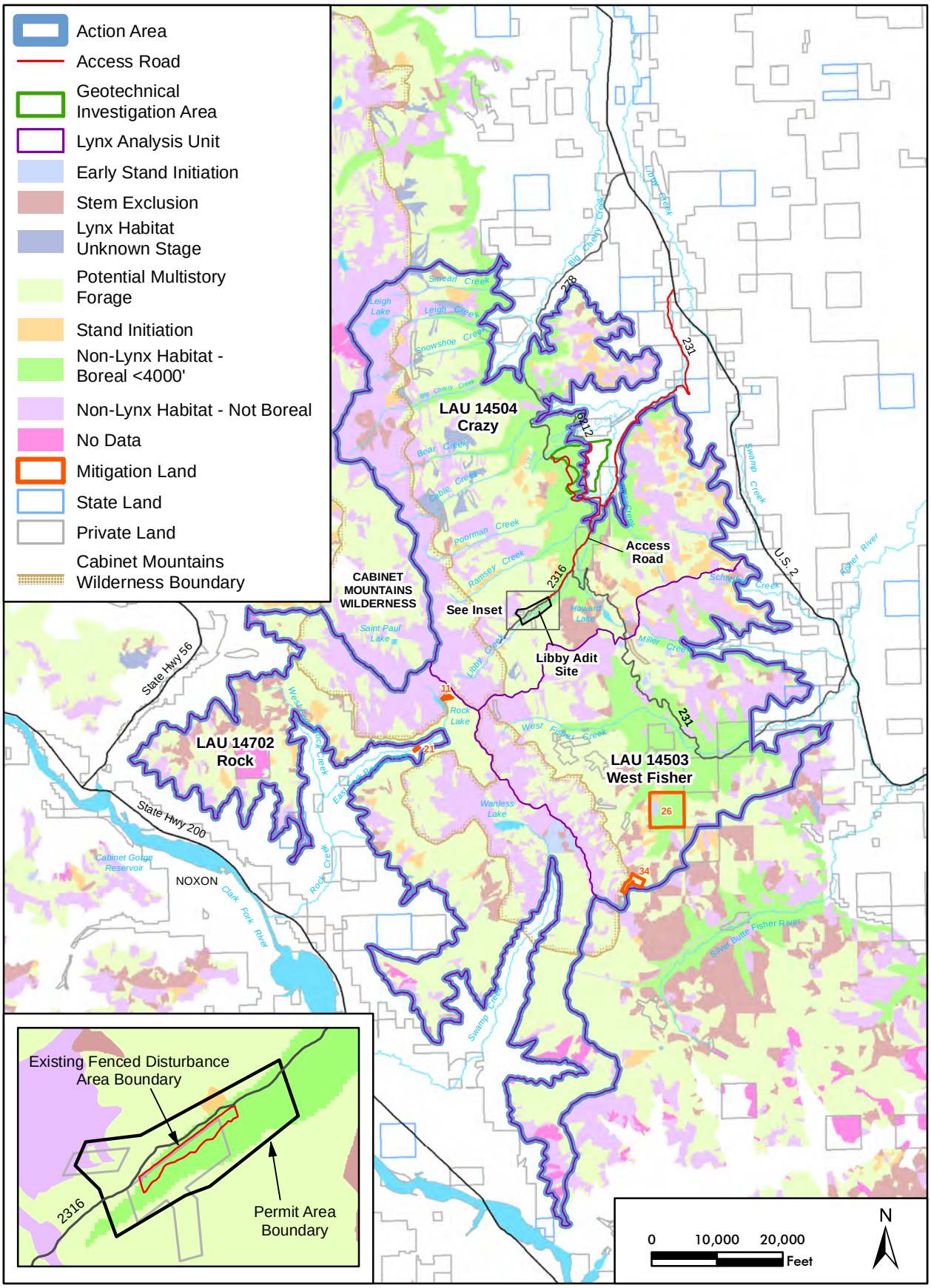

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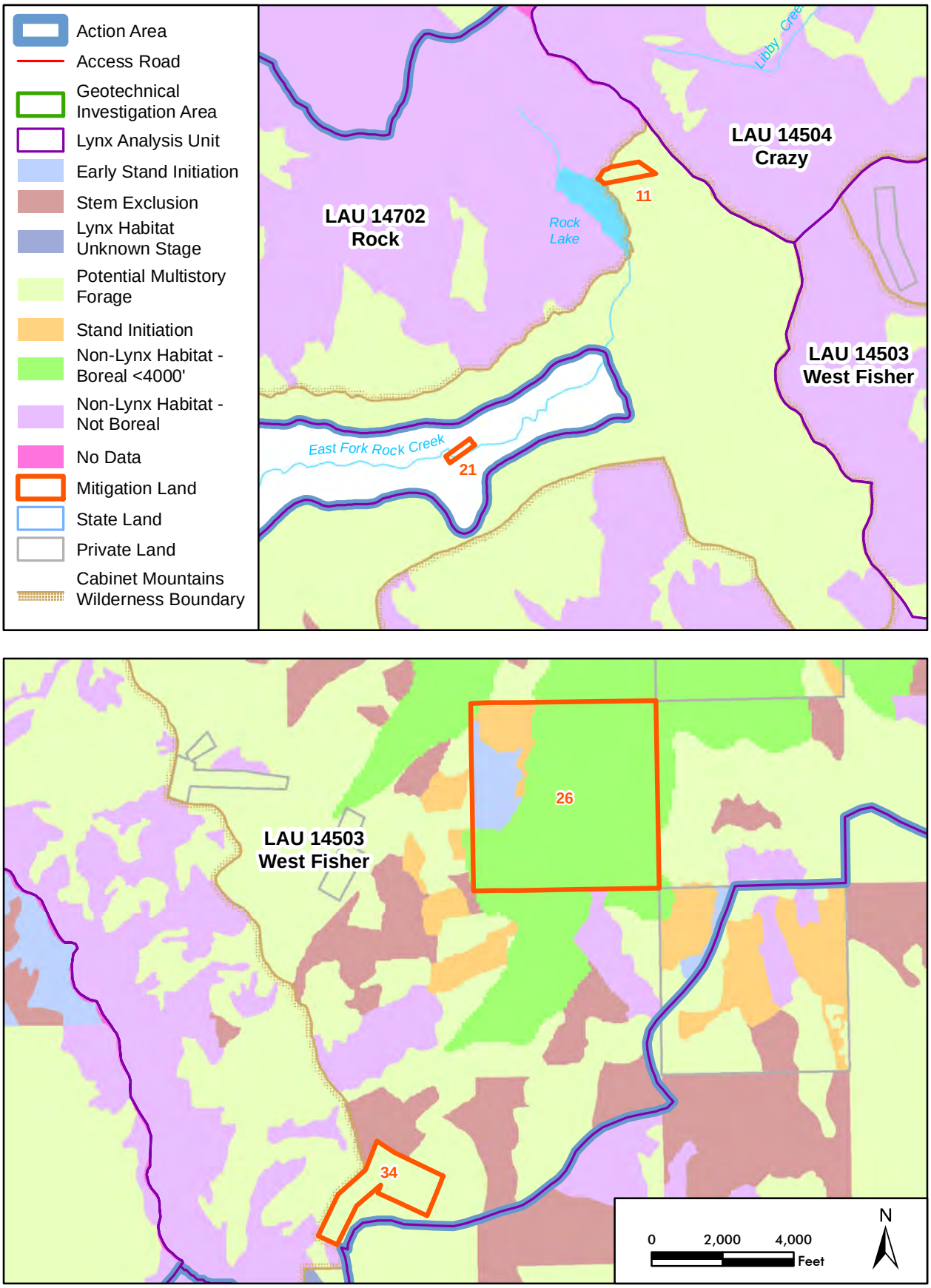

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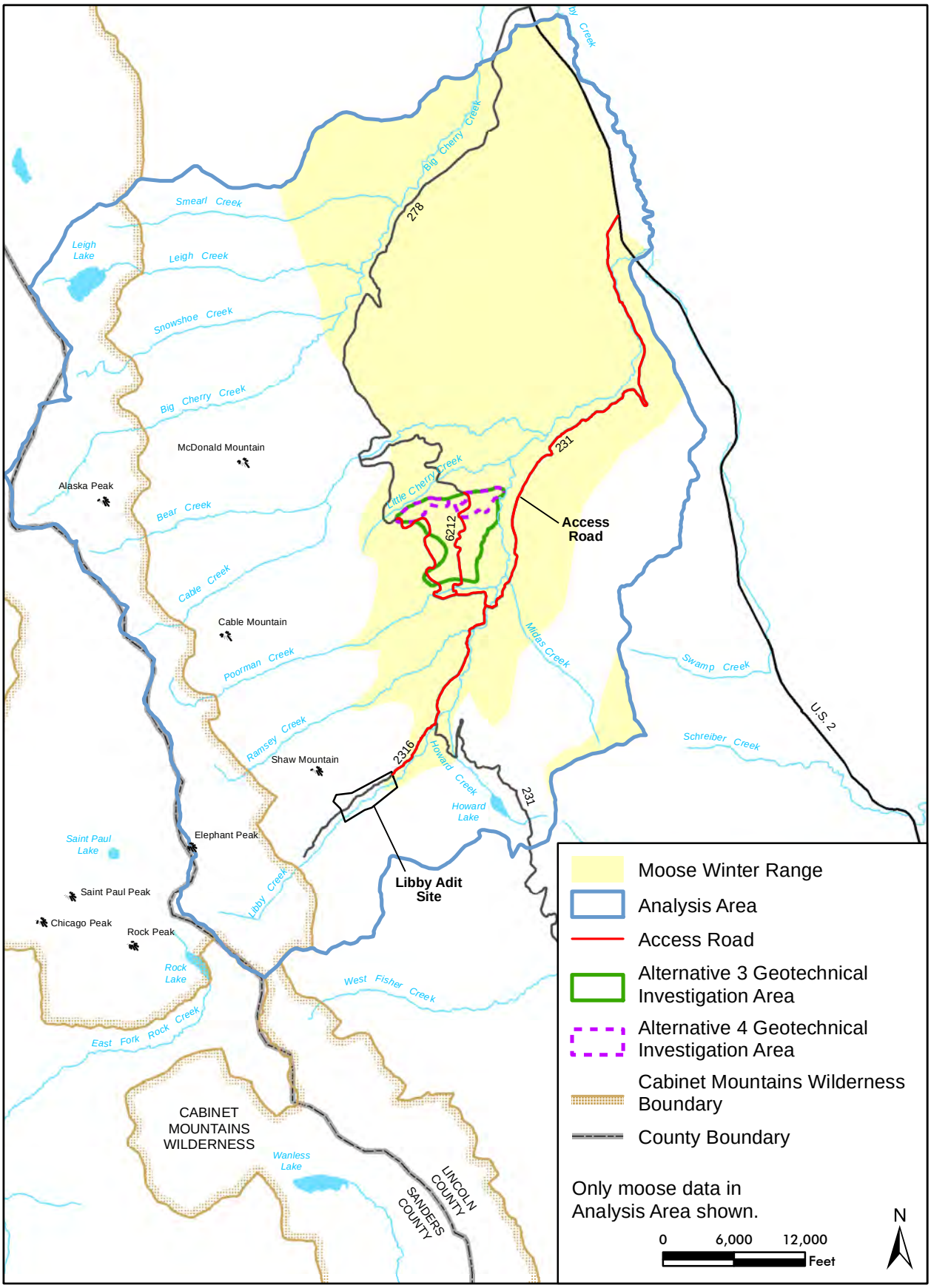

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Appendix C — Conceptual Monitoring Plans

Appendix C. Conceptual Monitoring Plans

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C.1 Introduction

This Appendix describes conceptual Alternative 3 or 4 monitoring plans for the Evaluation Project. MMC would develop final monitoring plans for the KNF's approval. Final monitoring plans would be incorporated as a component of the Plan of Operations. Identification of these plans and the timing for their submittal and approval is discussed in the following sections of this Appendix. Where applicable, plans would include a section on quality assurance measures that would ensure the reliability and accuracy of monitoring information as it was acquired. For example, surface water quality sampling would follow DEQ's *Quality Assurance Project Plan (QAPP), Sampling and Water Quality Assessment of Streams and Rivers in Montana, 2005* (DEQ 2005a). Each plan would describe data quality objectives for sampling, which would include specific methods for analysis and quantification, and criteria for assessment of the data. All plans would identify action levels, which when reached would require MMC to implement a corrective measure.

All monitoring would require an annual report or be included in an annual report, unless otherwise specified. Final reporting requirements would be described in applicable permits or approvals or in MMC's final monitoring plans. The format and requirement needs for reporting would be finalized by the agencies. After submittal of a monitoring report, the agencies may call a meeting with all other relevant agencies to review the monitoring plan and results and to evaluate possible modifications to the plan or permitted operations. MMC would submit as part of its annual report 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.

MMC's monitoring plans would have four overarching objectives: (1) to supplement available information in areas where there is uncertainty, (2) to validate predictions of impacts of Project activities on each resource, (3) to assess if the alternative selected in the KNF's Record of Decision (ROD) is adversely affecting the environment, and (4) to monitor the effectiveness of the mitigation measures described in the SEIS and ROD and any additional mitigation measures implemented by MMC to reduce adverse effects of Project activities. The monitoring plans are expected to change as new data were collected and analyzed. Monitoring data would be used to assess the potential effects of Project activities, determine if additional monitoring was needed, and, if needed, require corrective action by MMC to mitigate adverse effects of the Project on analysis area resources. Monitoring data would be made available for public review.

C.2 Cultural Resources

C.2.1 Objective

Cultural resources would be monitored to ensure protection for resources or human remains not identified during initial surveys from adverse effects during temporary road construction, and to ensure that all cultural resources that were to be avoided were not adversely affected during such construction.

C.2.2 Locations, Parameters, and Frequency

In 2010, the KNF and Montana SHPO entered into a Programmatic Agreement that described certain requirements of the parties to mitigate the unavoidable adverse effects on historic properties and to manage inadvertent discovery of historic properties. In Alternatives 3 and 4

before any ground-disturbing activities, such as geotechnical investigations, MMC would complete an intensive cultural resources survey on all areas proposed for disturbance where such surveys have not been completed previously. Surveys would meet the requirements of the 36 CFR 800 regulations, following the guidelines in the 2012 KNF Site Inventory Strategy (KNF 2012). Eligibility assessments for historic properties within the selected alternatives would be completed and formally resolved through the SHPO or the Keeper of the National Register pursuant to 36 CFR 800, before Project impacts on properties occurred. MMC would prepare a mitigation plan for all NRHP-eligible properties determined through a formal determination of effect to be adversely affected by the Project. The mitigation plan would be submitted for approval by the KNF if on National Forest System lands in consultation with the SHPO and the Advisory Council on Historic Preservation. The survey, eligibility assessment, and mitigation planning would be completed by a qualified archaeologist meeting the Secretary's Standards and Guidelines for Archeology and Historic Preservation (48 *Federal Register* 44716).

If previously unrecorded cultural properties, human remains, or funerary objects are discovered during any activity by MMC, MMC would immediately:

- Cease the activity in the area of the discovery and secure the area with a 100-foot (30-meter) buffer by attaching temporary fencing to trees. No disturbance would occur in securing the site.
- Notify the KNF Forest Archaeologist if the discovery was on National Forest System lands or the SHPO Archaeologist if the discovery was on lands other than National Forest System lands.
- If the discovery was human remains or funerary objects, notify the county coroner and the KNF Forest Archaeologist if the discovery was on National Forest System lands or the county coroner and the SHPO Archaeologist if the discovery was on lands other than National Forest System lands.

After notification, the KNF would:

- Determine appropriate mitigation measures for the discovery of cultural properties following Native American Graves Protection and Repatriation Act procedures outlined in 43 CFR 10, if on National Forest System lands, or the Montana Human Skeletal Remains and Burial Site Protection Act procedures outlined in 22-3-801, MCA, if on lands other than National Forest System lands.
- Consult with the Montana SHPO on the proposed mitigation measures and, if the properties were prehistoric, consult with the Tribes on the proposed mitigation measures.
- Follow procedures for submitting mitigation measures outlined in the Montana Human Skeletal Remains and Burial Site Protection Act in the event that the Native American remains or funerary objects were discovered on state or private lands.
- Oversee the implementation of any agreed-upon mitigation measures.

C.2.3 Reporting

As part of the report submitted annually to the agencies, MMC would provide information on the mitigation implemented during the prior year pursuant to the Agreement. The report also would discuss any previously unidentified cultural resources encountered.

C.3 Wildlife

C.3.1 Objective

The objective of the wildlife monitoring would be to evaluate Project effects and the effectiveness of mitigation measures. If appropriate, mitigation measures may be modified based on results of monitoring.

C.3.2 Locations, Parameters, and Frequency

During the Project, MMC would monitor the number of big game animals killed by vehicle collisions along NFS roads #231 and #2316 for as long as these roads were snowplowed and on NFS roads #278 and #6212 during the geotechnical investigations and would report findings annually. The numbers of animals killed by vehicle collisions would be reviewed by the KNF, in cooperation with FWP, and if necessary, mitigation measures would be developed and implemented to reduce mortality risks. MMC would remove big game animals killed by any vehicle daily from the above roads for the same duration. Road-killed animals would be moved at least 50 feet beyond the road's edge or as far as necessary to be out of sight from the road.

MMC would also monitor and report within 24 hours all grizzly bear, lynx, wolf, and black bear mortalities within the Libby Adit Site permit area and along the above access roads for the same duration. If a T&E species mortality occurred, MMC would be required to haul future road-killed animals to a disposal location approved by FWP (thus modifying the disposal requirement described in the previous paragraph), if deemed necessary by the grizzly bear specialists or law enforcement officer to avoid additional grizzly bear or other T&E species mortality.

In addition, a mandatory reporting system for MMC and KNF employees would be established to immediately report grizzly and black bear incidents, observation, and mortalities to the FWP grizzly bear specialist and FWP law enforcement officer to ensure that preemptive management, hazing, or removal of food attractants would occur to avoid risks of habituation, mortality or displacement of grizzly bears. Both MMC and the KNF would be required to provide an annual summary of all sanitation incidents and corrective measures taken in the previous year, which would inform development of adaptive management strategies to reduce mortalities.

Before the Project, MMC would implement or fund access changes on numerous roads for grizzly bear mitigation. For the life of the Project, MMC would implement or fund monitoring of the effectiveness of the closure devices at least twice annually and would complete any necessary repairs immediately. Should MMC not pursue Montanore Project development, MMC would provide the Forest Service with sufficient funding to monitor the effectiveness of closure devices at least twice annually and complete any necessary repairs for a period of 10 years from closure, minus the length of the Evaluation Project.

C.3.3 Reporting

Reporting requirements are described in the wildlife mitigation plan, discussed in greater detail in the agencies' wildlife mitigation plans for Alternatives 3 and 4 in Chapter 2 of the SEIS.

C.4 Rock Mechanics

C.4.1 Subsidence

MMC would conduct surface surveys over the ore body and collect underground rock mechanics data. Detailed mapping of surficial geology and evaluation adit geology and review of core logs would be done to identify discontinuities such as faults, joints, and fractures and other sudden changes in physical properties such as variations in rock type and bedding thickness that may affect underground stability. Underground geotechnical monitoring would incorporate the geotechnical monitoring procedures and methods specified in DEQ's Operating Permit No. 00150 and the 1993 ROD. During Project activities, MMC would include assessment of discontinuities in geotechnical assessments and annual reporting.

C.4.1.1 Surface Surveys

MMC would complete a pre-Project surficial topographic survey over the ore body using aerial methods (LiDAR, InSAR, or equivalent) approved by the agencies to establish a high-resolution baseline surface elevation contour. This type of technology can measure small deviations over large surface areas that otherwise would be impossible or impractical to measure using standard geodetic surveying techniques. The selection of surveying technique and the schedule for surface monitoring and reporting would be established as part of the underground geotechnical monitoring plan.

MMC would also complete and provide to the agencies a detailed surficial geologic survey of lands overlying the ore body. The survey would map faults, rock joint patterns, and other geologic structures and discontinuities. The aerial topographic survey and the surficial geologic survey could be completed concurrently with other Project activities, such as dewatering the existing Libby Adit or conducting geotechnical investigations. Both must be completed before extending the Libby Adit and underground drift development.

MMC would identify any survey activities (monitoring, equipment, transport) that would occur within the CMW boundary in submitted plans (maps, tables, monitoring locations) as described under Section C.8.3. The KNF would complete Minimum Requirements Decision Guide (MRDG) Step 2, determination of the minimum tool necessary, before approving any survey activities. The MRDG would be completed for final plans and updated as the Project progressed.

C.4.1.2 Underground Geotechnical Monitoring

Ongoing underground geotechnical monitoring would be conducted to collect rock mechanics data and geologic information. The geotechnical monitoring would be an update to geotechnical monitoring procedures and methods specified in DEQ Operating Permit No. 00150. The monitoring would include logging drill holes and mapping the adit and drifts. Rock quality analysis would evaluate discontinuities including sudden changes in physical properties such as variations in rock type and bedding thickness, fracture and fault frequency, orientation, and rock strength properties and would include in situ geomechanical tests. Microseismic monitoring would include installation of sensors equipped with continuous data recorders in the adit and drifts. Data would be compiled, assessed, and reported to DEQ and the KNF in an annual report.

C.4.1.3 Reporting and Third-Party Review

MMC would fund an independent technical advisor to assist the KNF in review of MMC's data collection plan, surface surveys, results of underground geotechnical monitoring, and other underground evaluation activities consistent with an approved Plan of Operations. The technical advisor would be selected and directed by the KNF through an agreement with MMC. MMC would provide the KNF and its representative access to the Libby Adit to observe data collection and evaluation activities. MMC would provide Libby Adit access, logistical support, and all information required by the technical advisor to complete a review of MMC's surface surveys, underground geotechnical monitoring, and other underground evaluation activities consistent with an approved Plan of Operations. The technical advisor would have no financial interest in the Project.

Assessments of the Libby Adit by the technical advisor may occur as frequently as quarterly, with the results of the inspections compiled into an annual assessment report. This annual report from the technical advisor would incorporate data collected as part of the ongoing subsidence monitoring plan and would be in addition to the annual report prepared by MMC.

C.4.2 Underground Buffer and Boundary Monitoring

MMC would fund a third-party mine surveyor to assist the KNF with underground oversight. The mine surveyor would verify the following: (1) that MMC was not conducting evaluation activities outside of its extralateral rights and (2) that MMC was maintaining the 300-foot buffer from the Rock Lake Fault and 1,000-foot buffer from Rock Lake. MMC would fund and facilitate biannual surveys of the underground adit and drifts that would be completed by an independent qualified mine surveyor. The surveyor would be selected and directed by the KNF through an agreement with MMC. The surveyor would have no financial interest in the Project. The KNF may also require more frequent surveys or as-built drawings if discrepancies arose. MMC would provide access, logistical support, and all information required by the surveyor to complete independent inspections and resulting documentation for the identified tasks. Provided information would include all company-conducted surveys of the underground adit and drifts. After completing the monitoring survey, the independent surveyor would submit maps of the adit and drifts to the KNF and would report any underground disturbances that crossed the established extralateral rights boundary, entered into designated buffer zones, or deviated from MMC's approved Plan of Operations.

C.5 Geochemistry

C.5.1 Introduction

The purpose of geochemical characterization and monitoring of water flow and quality in the Libby Adit would be to help manage the risk to water quantity and quality during the project. Additional material needed for testing would be accessible during the Project. MMC would develop a final Sampling and Analysis Plan (SAP) for the agencies' approval. The goal of the SAP is to ensure adequate characterization of acid generation and metal release potential.

C.5.2 Sampling and Analysis

This section describes sampling and analyses needed to address uncertainties in existing geochemical data and to delineate a plan for applying those data, together with water quality data,

to rock management in a timely manner. Confirmation sampling is needed for Revett ore, Prichard waste rock, and Burke waste rock zones that are already exposed. The lower Revett altered waste and barren lead zones also require further evaluation. The fundamental approach relies on a combination of available in situ water quality and geochemical data from all Revett copper-silver deposits, together with Project data, to reduce risk through adaptive waste rock management.

C.5.2.1 Sample Type

As part of geochemical characterization, MMC would collect rock samples and have them analyzed to describe the acid generation potential (using static and kinetic methods), metal/metalloid release potential, and nitrate release potential for ore and waste rock. Waste rock would be exposed in underground adit and drifts or stockpiled at the Libby Adit Site. There are multiple waste lithologies, which include the Prichard, Burke, and several altered waste zones within the Revett Formation. These materials would be exposed to changing weathering conditions throughout Project life. Underground rock and stockpiled rock would be exposed to oxygen. After closure, when underground adit and drifts would be flooded, oxygen exposure and related oxidation would be greatly reduced. Materials requiring geochemical characterization are summarized based on lithology, grade, geochemical conditions, and placement in Table C-1.

C.5.2.2 Sample Number

The number and type of geochemical tests are shown in Table C-2. Number of samples to be collected is based on minimum requirements for a simple, normally distributed data set and would be modified in the context of observed lithological and mineralogical variability. Sampling density would also consider results of preliminary geochemistry analyses and in situ monitoring data. During characterization, sampling would focus on covering the range of variability in mineralization, rather than on spatial or volumetric coverage, which would be the focus during operational validation. Determination of adequate sampling would be an iterative process, involving review of known information with new data to determine whether the number of samples is sufficient to describe the observed variability, such as suggested in the Global Acid Rock Drainage Guide (International Network for Acid Prevention 2014). Appropriate statistical tests of initial data, such as t-test/ANOVA or Keyser-Meyer-Olkin tests, would be used to determine sampling adequacy.

The SAP would be reviewed and, if appropriate, modified by the geochemist charged with implementing this plan, in consultation with the agencies. The intensity of future sampling and method of analyses would be determined by geological observation and review of available data. A thorough geological description by a qualified person, to obtain data describing lithology, mineralogy, and alteration data as a foundation for all subsequent sample collection and analysis, would be required. The need for more comprehensive analytical mineralogy would be determined based on initial geological description as well as results of geochemical test work.

Table C-1. Summary of Rock Types to be Encountered during the Project.

Location	Weathering Condition	Material Type	Lithology
Underground	Partially saturated, aerobic, during dewatering and evaluation activities	Ore	Revett—ore
		Waste	Revett—barren lead
			Revett—chalcopyrite
			Revett—pyrite
			Revett—sphalerite
Rock exposed in adits	Saturated, anaerobic, post-dewatering and after groundwater rebound		Burke
			Prichard
Surface Rock stockpiled at adit on liner	Variably saturated, aerobic	Waste	Burke
			Prichard
		Ore	Revett—ore
Tailings impoundment should the Montanore Project be developed	Saturated, anaerobic under active placement conditions Unsaturated tailings post-dewatering	Simulated tailings	Processed Revett ore

Table C-2. Geochemical Testing Requirements.

Test	Prichard		Burke		Revett Waste (Non-lead)		Revett Barren Lead		Revett Ore	Simulated Bench-Scale Tailings	Total #
	#	Note	#	Note	#	Note	#	Note	#	#	#
ABA	8	1	8	1	24	1	8		8	5	61
Whole rock	8	1	8	1	24	1	8		8	5	61
Kinetic (acid)	1	2,3,4			3	1,2,3,4	2	2,3,4			6
Particle size	1	2			3	1,2,3	2	2,3,4			6
SPLP (non-acid)	8	1	1	1					2	5	16
Mineralogy	4	5	1	5	3	5	2	5	2	5	17
In situ monitoring	Libby Adit inflow quality; waste rock stockpile										
In situ parameters	pH, metals, nutrients										

[1]Or more as appropriate, per geological description
[2]Composite
[3]Unsaturated kinetic columns
[4]Saturated kinetic columns
[5]As appropriate

C.5.3 Sample Collection and Analysis

C.5.3.1 Collection

Sampling is focused on addressing specific gaps in existing knowledge. Sampling would specifically follow the guidelines provided in the SAP, as approved by the agencies, and would be focused on collecting samples across the range of observed mineralization and geological conditions. Sampling would proceed as follows:

- Sites would be located on a map and photographed.
- Geological description, including lithology, structure, mineralogy, and evidence of sulfide, carbonate, and iron oxide, would be completed at each site.
- A representative sample of at least 2 kilograms, allowing sufficient mass for preparation of splits suitable for completion of baseline static acid-base accounting (ABA), whole rock, and metal mobility tests with enough material archived for composite development or mineralogy, would be collected.
- The number of samples would follow the guidelines provided in Table C-2 but may vary to accommodate the range of observed mineralogical variation.
- Material would be dried and bagged in plastic to prevent oxidation for shipment to a lab.
- Sample would be crushed to passing 3/8″ sieve and then randomly split using established protocol to obtain subsamples for relevant analyses.
- Care would be taken to document elements of sampling and analytical uncertainty.

C.5.3.2 Analytical Methods

Samples would be analyzed using the following methods or comparable methods approved by the agencies:

- Whole rock metal content—EPA method 3050B, http://www.epa.gov/wastes/hazard/testmethods/sw846/pdfs/3050b.pdf, or ALS Chemex method MEMS41 aqua regia digestion followed by ICP, contact www.alsglobal.com
- ABA—modified Sobek Method, after Lawrence and Wang, 1997, http://technology.infomine.com/enviromine/ard/Acid-Base%20Accounting/acidbase.htm#Lawrence Sobek
- Synthetic Precipitation Leachability Procedure (SPLP)—EPA Method 1312, http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/1312.pdf
- Analyses of effluent from short- and long-term leach testing (e.g., SPLP, humidity cells, and in situ monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection

C.5.4 Data Analysis

Collected data would be summarized in an accessible spreadsheet or database format and would be evaluated statistically to evaluate sampling adequacy and modify sampling goals as appropriate. Specifically, the distribution of values would be plotted, and standard descriptive statistics would be calculated. The relative adequacy of sampling would be calculated so that the

need for additional sampling could be considered. Generally, greater characterization would be needed for material posing more risk to water quality.

Criteria to be used for evaluation of individual sample results include comparison of whole rock analyses with standard crustal abundance for elements of concern and comparison of metal mobility results with water quality standards. Metal concentrations in whole rock cannot be directly correlated with metal mobility due to solubility constraints imposed by the minerals that host the metals.

ABA results would be evaluated using the following criteria. Rock that is potentially acid generating has a net neutralization potential (NNP; calculated as neutralization potential [NP] minus acid production potential [AP], in units Ton$CaCO_3$/kTon) less than 20, or an NP/AP ratio of less than 1. Rock that is non–acid generating has an NNP greater than 20 or an NP/AP ratio greater than 3. Values that lie between these values are uncertain and require kinetic testing.

Kinetic tests using ASTM standard method D5744-96 would be conducted for a minimum of 20 weeks and terminated only with regulatory approval. For interpretation of the results, guidance is provided in the Global Acid Rock Drainage Guide (International Network for Acid Prevention 2014) or Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Price 2009) for prediction of acid generation and metals mobility potential.

C.6 Water Resources

C.6.1 Introduction and Objectives

The objective of water resources monitoring would be to monitor the potential effects of dewatering the Libby Adit and drifts, storing waste rock and ore at the Libby Adit Site, and discharging treated water from the Water Treatment Plant. The activities associated with the Project are described in Section 2.5.2 of this SEIS. An overview of the hydrology and aquatic biology monitoring locations for Alternative 3 is shown in Figure C-1. Monitoring of discharges of treated wastewater effluent and stormwater required by MPDES permit MT0030279 are not discussed in this plan.

C.6.2 Funding

The Montana Board of Health and Environmental Sciences (the Board of Environmental Review's predecessor) approved a "Petition for Change in Quality of Ambient Waters" to increase the concentration of select constituents in surface water and groundwater above ambient water quality (Montanore Project JFEIS, Appendix A [KNF and DEQ 2015]) (Order). The Order remains in effect, and MMC would be responsible for ensuring compliance with the Order's provisions. One provision of the Order was the requirement that Noranda (now MMC) provide funding to the DHES (now DEQ) so that DEQ could perform sufficient independent monitoring to verify monitoring performed by Noranda (now MMC). The funding would not exceed the actual cost of the agencies' independent monitoring or $35,000 annually, whichever was less (in 1992 dollars). The monitoring may include independent collection or analysis of surface water, groundwater, or aquatic life samples; independent interpretation of monitoring data; or other activities the agencies deemed necessary to verify MMC's monitoring. Beginning in the year in which additional dewatering and extension of the Libby Adit began, MMC would provide $62,100 annually to DEQ; $35,000 in 1992 dollars is $62,100 in 2018 dollars, using the Consumer Price Index as the inflation factor (https://www.bls.gov/data/inflation_calculator.htm).

Any funding exceeding DEQ's actual cost would be returned to MMC annually or rolled over for the following year. The funding would increase annually in accordance with the Consumer Price Index. The funding would continue throughout the life of the Project until final bond release or the agencies' approval to cease monitoring.

C.6.3 Pre-Project Monitoring

C.6.3.1 Objectives

MMC is maintaining groundwater levels in the Libby Adit at 7,200 feet from the adit portal. Water from the adit is pumped to the surface, treated at the Water Treatment Plant, and then discharged under a MPDES permit (MT0030279) at Outfall 001 at the site. The pre-Project monitoring would cover monitoring up to when MMC began additional dewatering of the Libby Adit. The objectives of data collection and monitoring are to:

- Monitor groundwater conditions overlying portions of the Libby Adit
- Monitor groundwater quality flowing into the Libby Adit
- Monitor groundwater-dependent ecosystems (GDEs) in the upper Libby Creek, upper East Fork Rock Creek, and East Fork Bull River drainages
- Monitor streamflow and water quality in upper East Fork Rock Creek and the East Fork Bull River
- Monitor water levels, water supply, and water quality of Rock Lake
- Monitor flow and water quality of benchmark streams near but outside the range of influence of groundwater changes (such as Bear Creek east of the divide and Swamp Creek west of the divide)
- Monitor flow and water quality of benchmark springs near but outside the range of influence of groundwater changes
- Monitor changes in water levels and water quality in benchmark lakes near but outside of the range of influence of groundwater changes (such as Wanless Lake)
- Assess effects of discharge of treated water on surface water and groundwater adjacent to the Libby Adit

Requirements for pre-Montanore Project monitoring for GDE and surface and groundwater resources were outlined in Attachment 3, Section C.10.3 of the KNF's 2016 ROD for the Montanore Project. MMC completed much but not all of the pre-Project monitoring described in the KNF's 2016 ROD. Additional pre-Evaluation Project monitoring required before additional Libby Adit dewatering is described in the following sections.

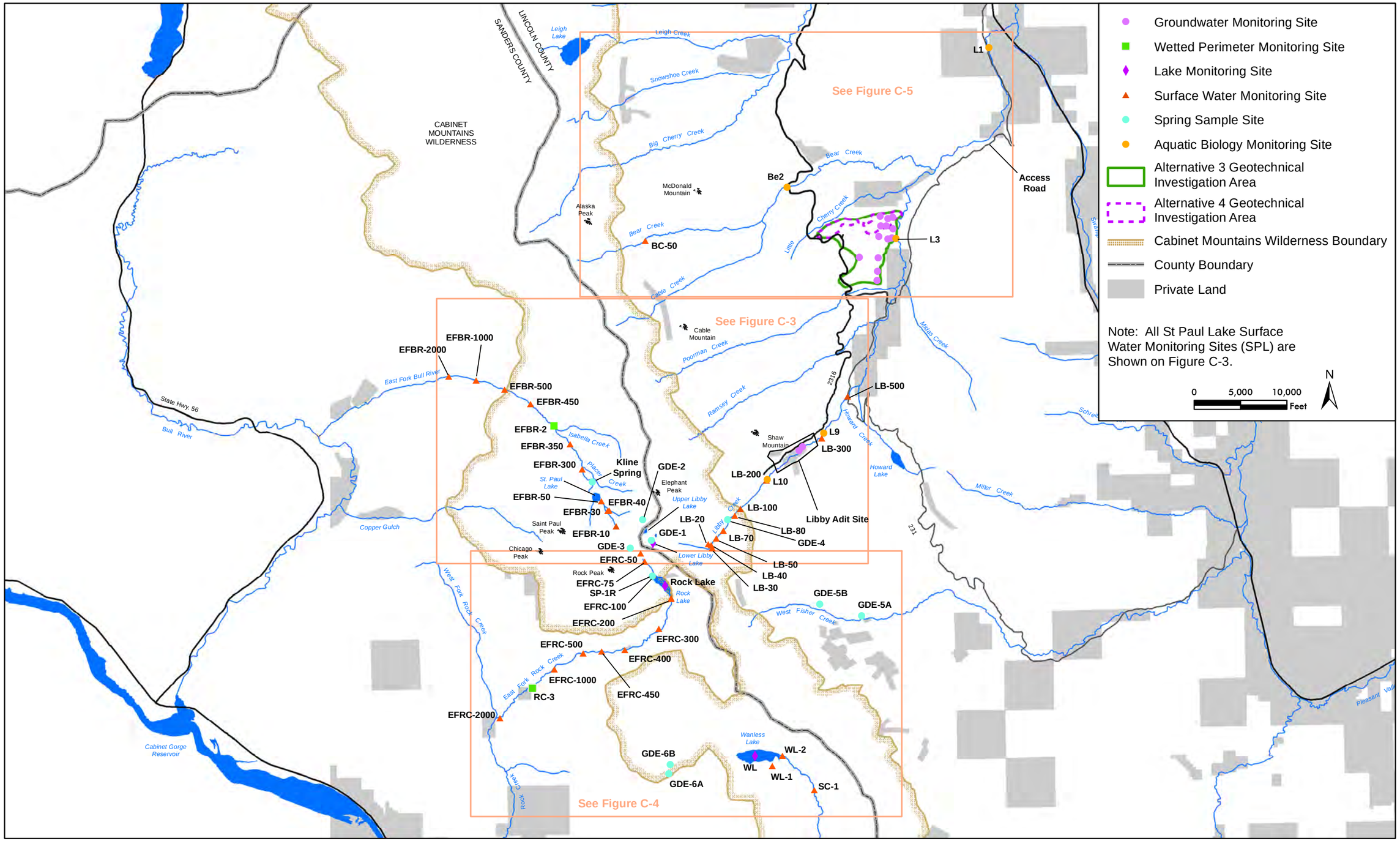

Figure C-1. Overview—Proposed Hydrology and Aquatic Biology Monitoring Sites

C.6.3.2 Groundwater-Dependent Ecosystem Monitoring

MMC has completed the pre-Project inventories for GDEs. In 2013, MMC inventoried and characterized four areas for GDEs: upper Libby Creek drainage and Libby Lakes basin; upper Ramsey Creek drainage and Ramsey Lake; upper East Fork Bull River drainage and St. Paul Lake; and upper East Fork Rock Creek drainage and Rock Lake (Figure C-2). Specific areas inspected on foot were selected based on a review of aerial photography and LiDAR maps and on previous GDE field inspections (MMC 2014a). The work involved identifying additional GDEs in the four areas, measuring spring and stream flows, installing continuous streamflow monitors at selected locations, and sampling streams and springs for characterization. The results of the inventory were described briefly in the Montanore Project JFEIS (KNF and DEQ 2015) and in more detail in the 2013 GDE inventory report (MMC 2014a). MMC continues to monitor flow, water quality, and plant composition at four GDE sites (GDE-1 through GDE-4) (Klepfer Mining Services 2017; MMC and Klepfer Mining Services 2018). Monitoring at GDE-4 began in 2009 and at GDE-1 through GDE-3 in 2013.

C.6.3.2.1 Springs

MMC would continue the spring and seep monitoring described in the 2016 and 2017 GDE reports (Klepfer Mining Services 2017; MMC and Klepfer Mining Services 2018) with the following additions:

- Field parameter measurements at SP-1R
- Isotope sampling and analysis of springs and seeps at GDE-1 through GDE-3 and benchmark spring locations in Upper West Fisher Creek and near Engle Lake
- Water quality monitoring at benchmark spring locations in Upper West Fisher Creek and near Engle Lake
- Spring monitoring of a spring in the East Fork Bull River, 2,100 feet upstream of the confluence with Placer Creek, identified by Kline (Kline Environmental Research 2017)

In 2013, MMC collected samples from selected springs in the GDE area and analyzed them for the stable isotopes of hydrogen (deuterium or ^{2}H) and oxygen (oxygen-18 or ^{18}O) and the radioactive isotope of tritium (^{3}H). Gurrieri (2015) summarized and interpreted available isotope data. Samples from GDE-3 were not sampled for tritium. MMC would sample the seeps at GDE-3 as well as flow at EFRC-50 and analyze them for the three isotopes.

In addition to continued monitoring of springs in the GDE area, MMC inventoried benchmark springs outside of the area potentially affected by dewatering or other activities in 2017 (MMC and Klepfer Mining Services 2018). Based on location (west side of the Cabinets and east side of the Cabinets), altitude, and hydrogeologic setting, MMC recommended three benchmark springs for water quality monitoring to further determine if the springs proposed would provide viable options as benchmark springs. The flow of each spring would also need to be measured between mid-August and mid-September during a time of little or no precipitation to determine their variability.

In mid-September 2017, Kline observed a spring in the East Fork Bull River, 2,100 feet upstream of the confluence with Placer Creek. Water was observed in the East Fork Bull River below the spring but not above it (Kline Environmental Research 2017). This spring was not identified in MMC's inventory. It is not known if this spring is subsurface flow from St. Paul Lake. Before

Libby Adit dewatering began, MMC would characterize this spring in mid- to late September by measuring flow and field parameters and analyzing a sample for the three isotopes.

C.6.3.2.2 Wetland and Riparian Vegetation

MMC would continue the vegetation monitoring described in the 2016 and 2017 GDE reports (Klepfer Mining Services 2017; MMC and Klepfer Mining Services 2018) with the following changes. MMC conducted a vegetation survey of the GDE sites in 2016 using the Forest Service GDE Level II Protocol (USDA Forest Service 2012a). The wetland indicator status of each identified species was determined, and a prevalence index, which is used by the Corps as an indicator of wetland vegetation (Corps 2010), was calculated. The Corps maintains a National Wetland Plant List, which is updated periodically. The most recent update was in 2016 (Lichvar et al. 2016). Past GDE reports (Klepfer Mining Services 2017; MMC and Klepfer Mining Services 2018) considered some species not on the National Wetland Plant List, such as *Athyrium filix-femina*, *Plagiochila asplenioides*, and *Tiarella unifoliate*, as wetland species. Many of the unlisted species may be listed under a different scientific name. For example, *Athyrium filix-femina*, which was on the 2012 list, is now listed as *Athyrium cyclosorum* on the 2016 list. MMC would use the species nomenclature and indicator status in the current list to calculate the index for any future vegetation monitoring.

C.6.3.3 Surface Water Monitoring

MMC continues to collect streamflow data in accordance with the following permits: the 2006 MPDES permit (MT0030279), the 2017 renewal MPDES permit when it superseded the 2006 MPDES permit, and Operating Permit No. 00150. Monitoring data are available in MMC's annual reports (MMC 2014b, 2015, 2016, 2017, 2018), available from the KNF.

Locations, frequency of monitoring, and the purpose of surface water monitoring locations are listed in Table C-3 and shown on Figure C-3, Figure C-4, and Figure C-5. Flow and field parameters shown in Table C-4 would be measured at monitoring locations in the upper part of various drainages. Parameters to be sampled for and analyzed at each surface monitoring location where quality was the focus are provided in Table C-5. Continuous temperature recording would follow DEQ's temperature data logger protocols (DEQ 2005b).

MMC would continue the surface water monitoring with the following additions and changes:

- Resolving minor issues identified during past monitoring
- Continued monitoring at EFRC-50
- Redesignating the site location for data collected in 2017 from EFRC-50 to EFRC-75
- Monitoring at EFBR-10
- Reporting synoptic flows longitudinally by sample date
- Finalizing the wetted width monitoring protocol
- Sampling at LB-100 for water quality parameters (Table C-5)

MMC installed a data logger at BC-50. In the 2017 report, MMC reported the rating curve did not correlate to measured flows as well as at the other sites. MMC indicated the poor correlation may be due to the PVC pipe being plugged with sediment or the flow measurements being influenced because of bank undercutting condition. Other minor issues also were identified in the 2017 report. To the extent possible, MMC would resolve these issues before Libby Adit dewatering began.

In 2013, MMC installed a data logger at EFRC-50; the data logger washed out the first year it was installed. In 2017 another attempt was made to install a data logger at the site (MMC and Klepfer Mining Services 2018). Based on the 2017 attempt, MMC determined site conditions were not ideal to install a continuous monitoring site at the previous location. A new site, also named EFRC-50, was installed 1,000 feet below the original location, and data collection started on August 20, 2017 (MMC and Klepfer Mining Services 2018). The EFRC-50 site at 5,600 feet was the highest-elevation site on East Fork Rock Creek that was monitored for streamflow. NewFields (2013) reported that perennial flow in East Fork Rock Creek seems to generally extend to an elevation of about 5,600 feet. Moving the EFRC-50 site 1,000 feet below the original location would not achieve the same objective as the original EFRC-50 site. For future monitoring, MMC would:

- Redesignate the site location for data collected in 2017 from EFRC-50 to EFRC-75
- Continue to collect continuous streamflow data at EFRC-75 in East Fork Rock Creek
- Measure streamflow in East Fork Rock Creek at EFRC-50 twice monthly in August and September
- Record the elevation where streamflow in East Fork Rock Creek becomes perennial monthly August through October

EFBR-10 was established in mid-August 2013 as the uppermost point of observed surface water flow in the drainage extending from Saint Paul Pass to St. Paul Lake. This site was upstream of EFBR-50 at an elevation of about 5,400 feet. Flow was estimated and field quality parameters measured at EFBR-10 in August 2013 (MMC 2014). MMC was required to collect additional data at EFBR-10 as part of the KNF's requirements for pre-Project monitoring (KNF 2016). Additional data at EFBR-10 have not been reported.

Synoptic streamflow measurements were begun in 2011 and continued through 2017 at LB-20, LB-30, LB-40, LB-60, LB-70, LB-80, LB-100, LB-200, LB-300, and LB-500 on Libby Creek (MMC and Klepfer Mining Services 2018). Synoptic flow monitoring was initiated in 2017 on East Fork Rock Creek at EFRC-50 (redesignated as EFRC-75), EFRC-100, EFRC-200, EFRC-300, EFRC-400, EFRC-450, EFRC-500, EFRC-1000, EFRC-2000, and RC-3. Synoptic flow monitoring was also initiated in 2017 on East Fork Bull River at EFBR-2, EFBR-30, EFBR-40, EFBR-50, EFBR-300, EFBR-350, EFBR-400, EFBR-450, EFBR-500, EFBR-1000, and EFBR-2000. Synoptic flow measurements were conducted twice a month from July through October (MMC and Klepfer Mining Services 2018). Past installations of continuous flow instruments by MMC have highlighted the difficulty in maintaining these instruments over the winter months. For ongoing monitoring, MMC would consider modifications to the method to address the current limitations by adapting different techniques to measure flows. Any changes to the monitoring location or method would require the KNF's approval.

Past reporting of the synoptic streamflow measurements includes graphs with the sample date being the independent variable (x-axis) and flow the dependent variable (y-axis). It is difficult to detect small flow variations between sites when the independent variable is sample date. Future reporting of synoptic streamflow measurements would graph the synoptic data with the independent variable as the distance downstream of the stream's headwaters and the dependent variable as streamflow. The SEIS contains a graph of the Libby Creek synoptic flow measurements over several sample dates.

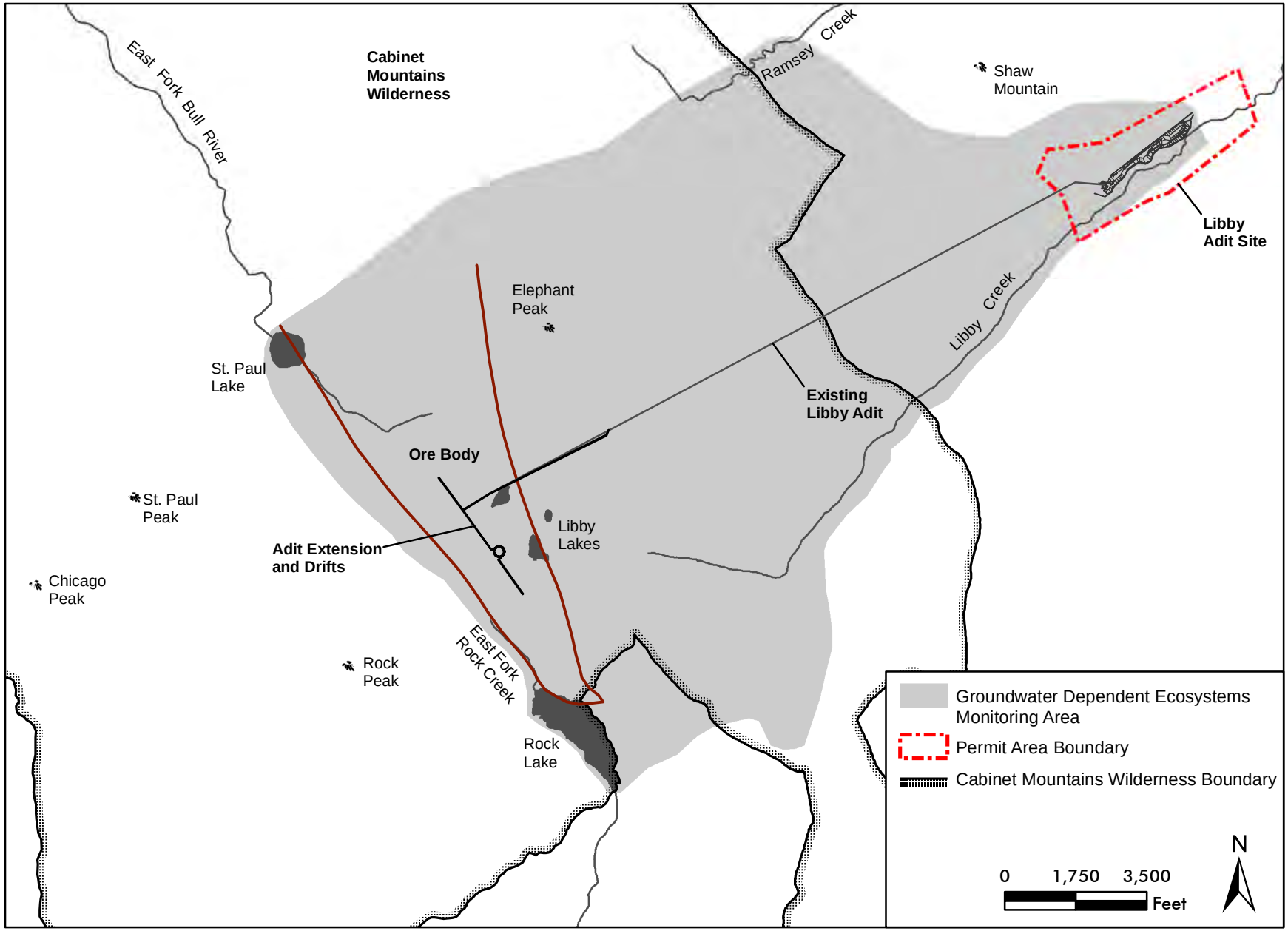

Figure C-2. Groundwater Dependent Ecosystem Monitoring Area

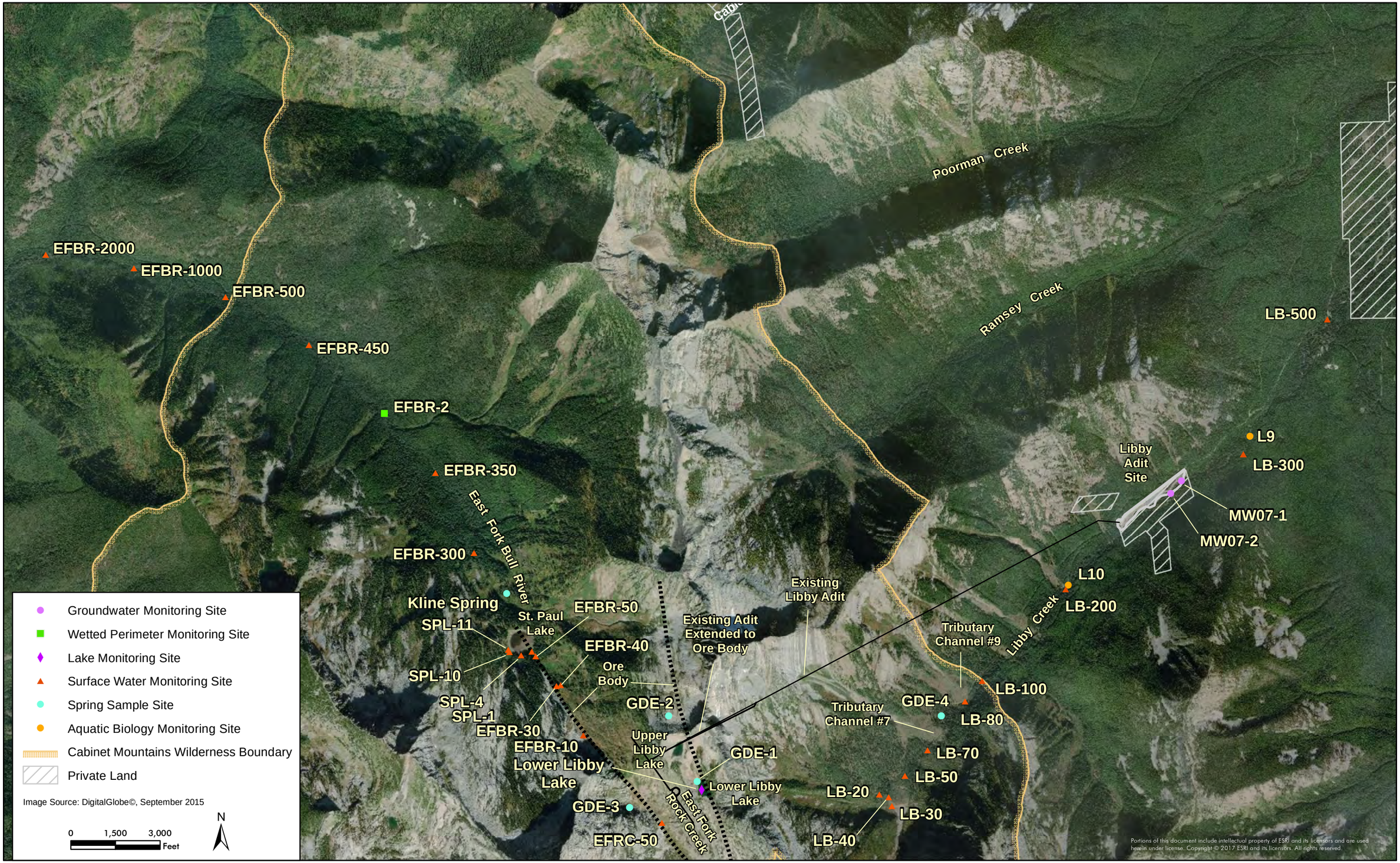

Figure C-3. Proposed Hydrology and Aquatic Biology Monitoring Sites in Upper Libby Creek and East Fork Bull River Areas

Figure C-4. Proposed Hydrology Monitoring Sites in East Fork Rock Creek and Swamp Creek Areas

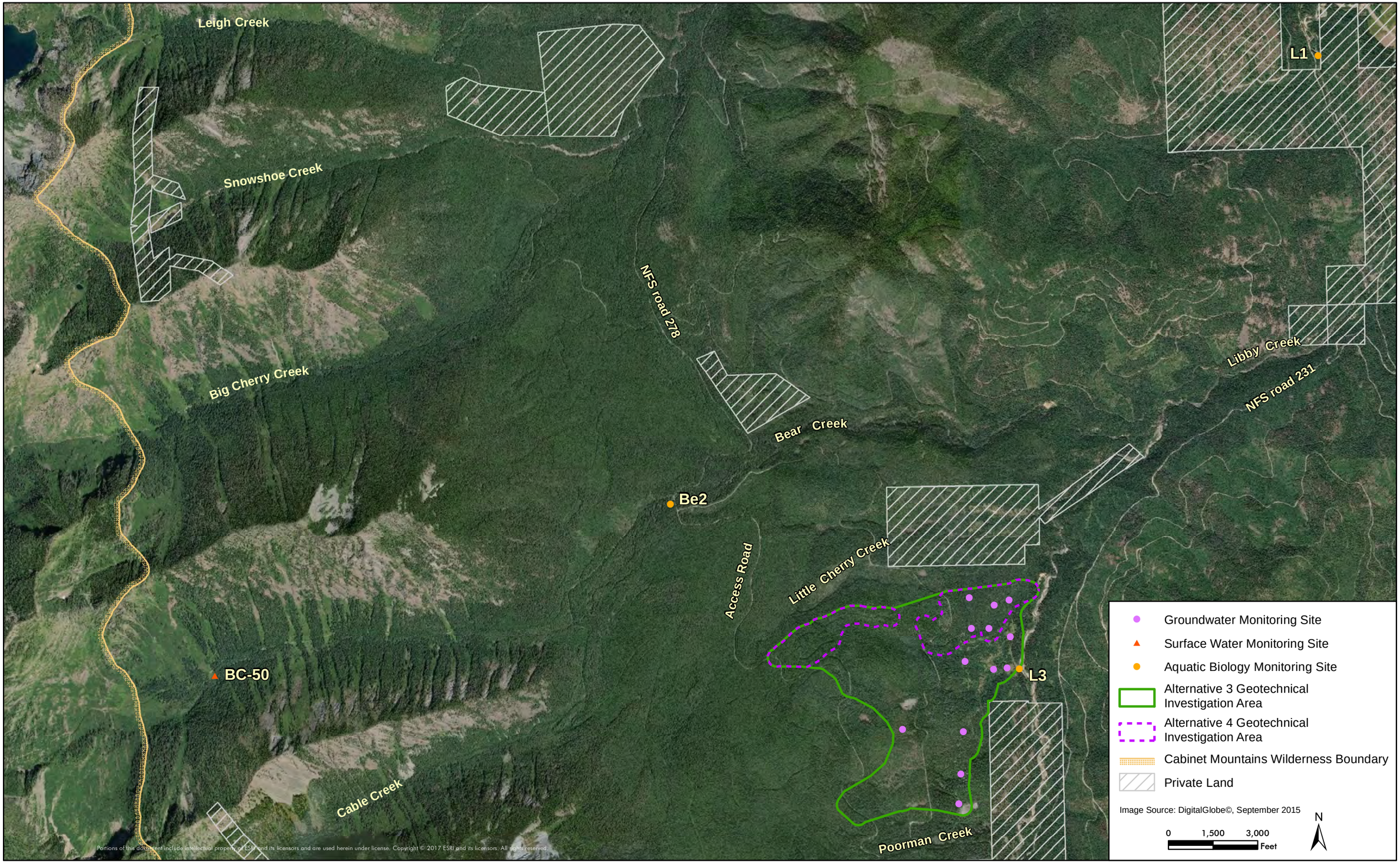

Figure C-5. Proposed Hydrology and Aquatic Biology Monitoring Sites in Geotechnical Investigation Area

Table C-3. Surface Water Monitoring Sites.

Site	Location[1]	Parameters	Frequency	Purpose
East Fork Rock Creek Drainage				
GDE-3	Within the CMW above EFRC-50	Level 2 GDE vegetation protocol	Annually	Monitor dewatering
EFRC-50	Within the CMW	Flow and field parameters (Table C-4); elevation of perennial flow if not EFRC-50	Synoptic flow twice monthly between August and October	Monitor dewatering
EFRC-75	Within the CMW	Stage/flow	Continuous electronic recording if technically feasible; synoptic flow twice monthly between August and October if not	Monitor dewatering
		Field parameters (Table C-4)	Twice monthly between August and October	Monitor dewatering
EFRC-100	Within the CMW at the inflow to Rock Lake	Stage/flow	Continuous electronic recording	Monitor dewatering
		Quality (Table C-5)	Twice monthly between August and October	
SP-1R	Within the CMW above Rock Lake	Flow and field parameters (Table C-4)	Twice monthly between August and October	Monitor dewatering
Rock Lake	Within the CMW near south end of lake Vertical profile sampling at center of lake	Lake stage	Continuous electronic recording	Monitor dewatering
		Quality (Table C-5 except metals)	Monthly between July and October	
EFRC-200	Within the CMW below Rock Lake	Flow and field parameters (Table C-4)	Synoptic flow twice monthly between August and October	Monitor dewatering
		Quality (Table C-5)	Monthly between August and October	
EFRC-300, EFRC-400, EFRC-450, EFRC-500, EFRC-1000, EFRC-2000	Outside the CMW	Flow and field parameters (Table C-4)	Monthly between August and October	Monitor dewatering
RC-3	Outside the CMW and upstream of confluence with West Fork Rock Creek	Flow (Table C-4), channel cross-section measurements	Flow monthly between August and October, and flow/cross-section measurements at least 4 times/year during mid-August to mid-October	Monitor dewatering

Site	Location[1]	Parameters	Frequency	Purpose
East Fork Bull River Drainage				
EFBR-10, EFBR-30, EFBR-40	Within the CMW above St. Paul Lake	Flow and field parameters (Table C-4); elevation of perennial flow if not EFBR-10	Synoptic flow twice monthly between August and October	Monitor dewatering
GDE-2	Within the CMW above St. Paul Lake	Level 2 GDE vegetation protocol	Annually	Monitor dewatering
EFBR-50	Within the CMW above St. Paul Lake	Stage/flow	Continuous electronic recording if technically feasible; synoptic flow twice monthly between August and October if not	Monitor dewatering
		Field parameters (Table C-4)	Twice monthly between August and October	Monitor dewatering
EFBR-300, EFBR-350, EFBR-450	Within the CMW below St. Paul Lake	Flow and field parameters (Table C-4)	Synoptic flow twice monthly between August and October	Monitor dewatering
GDE-2	Within the CMW above St. Paul Lake	Level 2 GDE vegetation protocol	Annually	Monitor dewatering
EFBR-2	Within the CMW just downstream of Isabella Creek confluence	Flow (Table C-4), channel cross-section measurements	Flow monthly between July and October, and flow/cross-section measurements at least 4 times/year during mid-August to mid-October	Monitor dewatering
		Quality (Table C-5)	Mid-September	
EFBR-500, EFBR-1000, EFBR-2000	Outside the CMW	Flow and field parameters (Table C-4)	Synoptic flow monthly between August and October	Monitor dewatering

Site	Location[1]	Parameters	Frequency	Purpose
Libby Creek Drainage				
GDE-1	Within the CMW near Lower Libby Lake	Level 2 GDE vegetation protocol	Annually	Monitor dewatering
Lower Libby Lake	Within the CMW near outlet	Lake stage	Continuous electronic recording	Monitor dewatering
LB-20, LB-30, LB-40, LB-50, LB-70 LB-80	Within the CMW	Flow and field parameters (Table C-4)	Synoptic flow twice monthly between August and October	Monitor dewatering
LB-100	Outside the CMW and upstream of the Libby Adit Site	Flow and field parameters (Table C-4)	Synoptic flow twice monthly between August and October	Monitor dewatering
GDE 4	Within the CMW	Level 2 GDE vegetation protocol	Annually	Monitor dewatering
		Water levels	Monthly between July and October	
LB-200	Outside the CMW and upstream of the Libby Adit Site	Stage/flow/ temperature	Continuous electronic recording	Monitor dewatering
		Quality (Table C-5) or as specified by MPDES permit (MT0030279)	Monthly	
LB-300	Outside the CMW and downstream of the Libby Adit Site	Stage/flow/ temperature	Continuous electronic recording	Monitor Libby Adit Site and Water Treatment Plant discharges
		Quality (Table C-5)	Monthly	
LB-500	Outside the CMW and downstream of Howard Creek confluence	Quality (Table C-5) except for TSS TSS	Monthly Bimonthly	Monitor Libby Adit Site and Water Treatment Plant discharges

Site	Location[1]	Parameters	Frequency	Purpose
Benchmark Sites (Outside of Project Influence)				
SC-1	Within the CMW; Swamp Creek downstream of Wanless Lake	Flow (Table C-4)	Monthly between July and October	Monitor natural variability and climate change effects
		Quality (Table C-5)	On or about 9/10	
BC-50	Bear Creek downstream of CMW boundary	Stage/flow Quality (Table C-5)	Continuous electronic recording Monthly between July and October	Monitor natural variability and climate change effects
Wanless Lake	Within the CMW Vertical profile sampling at center of lake	Lake stage	Continuous electronic recording	Monitor natural variability and climate change effects
		Quality (Table C-5 except metals)	Monthly between July and October	
WL-1	Within the CMW; inlet to Wanless Lake	Stage/flow	Continuous electronic recording	Compare to EFRC-100
		Quality (Table C-5)	Monthly between July and October	
WL-2	Within the CMW; outlet from Wanless Lake	Stage/flow	Continuous electronic recording	Compare to EFRC-200
		Quality (Table C-5)	Monthly between July and October	
GDE springs 5A and 5B	West Fisher Creek downstream of CMW boundary	Flow and field parameters (Table C-4)	Monthly between July and October	Monitor natural variability and climate change effects
GDE springs 6A and 6B	Within the CMW	Flow and field parameters (Table C-4)	Monthly between July and October	Monitor natural variability and climate change effects

[1]All site locations are shown on Figure C-1.

Table C-4. Flow and Field Parameters and Required Reporting Values for Surface Water Samples.

Parameter	Current Required Reporting Value
Flow (cfs or gpm)	Within 10% accuracy
pH (s.u.)	0.1
Dissolved oxygen (mg/L)	0.3
Specific conductivity (µS/cm)	1.0
Turbidity (NTU)	1.0
Temperature (°F)	0.1

See note to Table C-5.

Table C-5. Monitoring Parameters and Required Reporting Values for Surface Water Samples.

Parameter	Current Required Reporting Value (mg/L unless otherwise specified)	Parameter	Current Required Reporting Value (mg/L)
Physical Parameters			
Flow (cfs or gpm)	Within 10% accuracy	Temperature	0.1
pH (s.u.)	0.1	Total alkalinity (as $CaCO_3$)	0.26
Dissolved oxygen	0.3	Total hardness (as $CaCO_3$)	5.0
Specific conductivity (µS/cm)	1.0	Turbidity (NTU)	1.0
Oil and grease	5.0		
Inorganic Parameters			
Total dissolved solids	0.4	Total Kjeldahl nitrogen	0.15
Total suspended solids	0.4	Nitrate, as N	0.02
Sodium	0.03	Nitrite, as N	0.01
Calcium	0.08	Nitrate+nitrite, as N	0.02
Magnesium	0.02	Ammonia, as N	0.07
Potassium	0.05	Total inorganic nitrogen, as N	0.01
Bicarbonate	1.0	Total nitrogen, as N	0.01
Chloride	0.1	Total phosphorus, as P	0.001
Sulfate	0.2	Ortho-phosphate	0.001
Silica	0.4		
Metals			
Aluminum, dissolved (0.45 µm filter)	0.009	Lead	0.0003
Antimony	0.0005	Manganese	0.050
Arsenic	0.001	Mercury	0.000005
Beryllium	0.0008	Nickel	0.002
Cadmium	0.00003	Selenium	0.001
Chromium	0.005	Silver	0.0002
Copper	0.002	Thallium	0.0002
Iron	0.020	Zinc	0.008

Note: Metals are total recoverable unless otherwise specified. For parameters without a Circular DEQ-7 (DEQ 2017) required reporting value, the achievable reporting limits shown are from USDA Forest Service (2012b, Table 3-1). Required reporting values may differ from MPDES permit reporting levels. Any reporting values in Table C-4 or Table C-5 lower than MPDES permit reporting levels would meet USDA Forest Service requirements.

In 2016 and 2017, MMC conducted wetted perimeter monitoring on East Fork Rock Creek at site RC-3 and East Fork Bull River at site EFBR-2 (Klepfer Mining Services 2017; MMC and Klepfer Mining Services 2018). The intent of the monitoring was to establish a relationship between streamflow and wetted perimeter. The steep gradient acerbated the challenge of establishing a water level during low flows. Both sites have a cobbly to boulder substrate, which is not ideal for establishing a consistent cross-sectional area for each transect. Water elevations vary because the larger cobbles separate the flow into individual channels within the transect. Under these conditions, the relationship between flow and wetted perimeter does not satisfy the assumptions of the flow measurement method used. Further, ongoing sampling has shown that significant substrate movement occurs between sampling events. For ongoing monitoring, MMC would consider modifications to the method to address the current limitations by relocating the sites or adapting different techniques to measure flows and wetted perimeter. Any changes to the wetted perimeter monitoring method would require the KNF's approval.

C.6.3.4 Groundwater Monitoring

MMC would continue the groundwater monitoring required by Permit No. 00150 at MW07-01 and MW07-02, monitoring wells downgradient of the percolation pond. In addition, MMC would measure water levels and temperatures with electronic data recorders in both wells (Table C-6). In each annual report, MMC would complete a multivariant analysis of the factors influencing stream temperatures downstream of the Libby Adit discharges.

Table C-6. Groundwater Monitoring Locations and Requirements.

Well Number	Location	Depth/Screen Interval	Required Data	Monitoring Frequency	Purpose
Libby Creek Drainage					
MW07-1 and MW07-2	Downgradient of adit facilities	Existing wells at Libby Adit	Water levels and temperature Water quality	Continuously (at least twice daily measurements) Quarterly	Assess potential impacts from Water Treatment Plant discharge
Adit and Drift					
Numerous	From within adit and drift; drilled radially in all major directions	100 to 1,000 feet from the adit	Water pressure above transducer	Continuously (at least one measurement per hour)	Monitor changes in groundwater pressure as adit advanced

C.6.4 Project Monitoring

C.6.4.1 Surface Water Monitoring

Project surface water monitoring would be a continuation of pre-Project monitoring, unless the KNF approved changes to the monitoring plan. Monitoring locations on Figure C-5 do not include stormwater monitoring that may be needed for geotechnical, road improvement, or other surface disturbances. DEQ would establish any required stormwater monitoring locations.

C.6.4.2 Groundwater Monitoring

Groundwater monitoring would be required for the purpose of detecting potential water quality impacts. One objective of the data collected would be to refine and validate models or other analyses used to predict environmental impacts. A second objective of the data collection would be to establish baseline groundwater conditions. Although there may be some initial changes in groundwater pressures due to extending and dewatering the Libby Adit before installation of piezometers, pressure data collected would be useful in characterizing groundwater conditions overlying the adit and drifts .

Types of hydrologic data that would be collected to achieve the objectives include:

- Bedrock permeability (hydraulic conductivity): Injection or discharge tests would be conducted in drill holes completed in bedrock within the adit.
- Pressure head: The hydraulic head would be monitored and continuously recorded at various locations in the adit.
- Adit inflows: Detailed records of groundwater inflow to the adit would be maintained.
- Water chemistry: The water chemistry of groundwater inflow to the adit would be characterized as the adit progressed (including samples for isotope analysis).
- Fault zone characterization: Test holes through various fault zones would be completed and instrumented to determine various hydraulic characteristics of fault zones.
- Storativity: Extended discharge tests would be conducted at various locations in the adit to determine bedrock storativity.

C.6.4.2.1 Piezometers

Because the underground adit and drifts would be beneath the CMW, the most efficient means for obtaining groundwater level data would be from within the adit and drifts. Numerous piezometers would be required. MMC would submit a plan for the installation of piezometers to be approved by the agencies.

As soon as possible during the extension and 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. The piezometers would be located to provide statistically representative pressure response data from both fractured and unfractured portions of rock.

C.6.4.2.2 Groundwater Isotope Analysis

During the late-summer/early-fall baseflow period, MMC would use stable isotope chemistry to compare seepages into Libby Adit to samples from GDEs and stream baseflow. Sample sites and frequency would be determined in consultation with the KNF. Isotopes analyzed would include oxygen-18 and deuterium. In addition, analytes such as tritium would be used to establish approximate age of the water. Seepages into the Libby Adit would be used as benchmark chemistry for the deep aquifer. Major constituents (major anions and cations) would be used to determine relative residence time and travel distance in the aquifer when compared with other groundwater discharges from the same aquifer. The evolution of water chemistry would be graphically determined on trilinear plots. MMC would use age dating of groundwater to separate

older groundwater from younger groundwater. Springs discharging older water would be assumed to be supplied by a deeper regional source.

C.6.4.2.3 Libby Adit Site and Geotechnical Investigation Area

The monitoring of the two wells at the Libby Adit Site, MW07-01 and MW07-02, currently being conducted would continue as long as there was a discharge to the MPDES-permitted outfalls to groundwater. MMC would submit a SAP for the new monitoring wells and piezometers installed in the geotechnical investigation area (Figure C-5). Samples would be analyzed for the parameters shown in Table C-7. Laboratory analytical methods would conform to those listed 40 CFR 136. Laboratory reporting limits would comply with the required reporting values found in the most current Montana water quality standards (Circular DEQ-7). For parameters without a Circular DEQ-7 required reporting value, the achievable reporting limits from USDA Forest Service (2012b, Table 3-1) would be used. If data collected under this plan were to be used for compliance purposes for the MPDES permit (MT0030279), the reporting levels specified in the MPDES permit must be achieved.

Table C-7. Monitoring Parameters and Required Reporting Values for Groundwater.

Parameter	Current Required Reporting Value (mg/L unless otherwise designated)	Parameter (Dissolved Metals)	Current Required Reporting Value (mg/L)
pH (s.u.)	0.1	Aluminum	0.009
Dissolved oxygen	0.3	Antimony	0.0005
Specific conductivity (µS/cm)	1.0	Arsenic	0.001
Total dissolved solids	1.0	Cadmium	0.00003
Sodium	0.03	Chromium	0.005
Calcium	0.08	Copper	0.002
Magnesium	0.02	Iron	0.020
Potassium	0.05	Lead	0.0003
Bicarbonate	1.0	Manganese	0.050
Chloride	0.1	Mercury	0.000005
Sulfate	0.2	Silver	0.0002
Nitrate+nitrite, as N	0.02	Thallium	0.0002
Ammonia, as N	0.07	Zinc	0.008
Total Kjeldahl nitrogen	0.15		
Total phosphorus, as P	0.001		
Ortho-phosphate	0.001		
Field temperature	—		
Total alkalinity (as $CaCO_3$)	0.26		
Total hardness (as $CaCO_3$)	5.0		

For parameters without a Circular DEQ-7 (DEQ 2017) required reporting value, the achievable reporting limits shown are from USDA Forest Service (2012b, Table 3-1).

C.6.5 Water Balance

MMC would continue to maintain and report a water balance in accordance with Permit No. 00150 and the MPDES permit. Prior annual reports provided total water pumped in gallons and

the number of days pumped. Each annual report also would report separately the contributions from Water Treatment Plant backwash water and the waste rock sump, in gallons.

C.6.6 Action Levels

This section discusses the agencies' preliminary action levels, or some measurable change in a monitoring parameter that would require MMC action. Final action levels would be described in the final monitoring plan.

C.6.6.1 Surface Water Quality and Quantity

MMC would monitor discharges permitted under the MPDES permit and report any incidents of noncompliance in accordance with the permit. MMC would report any incidents of noncompliance as soon as possible, but no later than 24 hours from the time MMC first became aware of the circumstances.

MMC would monitor flows and water quality in benchmark springs and streams outside of the area potentially affected by dewatering, as well as changes in the level and water quality of the benchmark lake. Based on the monitoring, MMC would establish a relationship between flows or water quality in benchmark springs and streams (described in Section C.6.3) and flows in any monitored spring or stream, as well as changes in the lake level and water quality of Rock Lake. Flows, lake level changes, and water quality in all monitored springs, lakes, and streams would also be evaluated using simple linear regression or other appropriate statistical analyses. MMC would provide the analysis in the annual report. The trend analysis would follow Forest Service protocols (USDA Forest Service 2012b) regarding trend analysis or another method approved by the agencies. If the relationship in quantity and quality between benchmark and monitored springs, lakes, and streams after adit dewatering began was statistically significantly different compared to pre-Project conditions or if the concentration of monitored parameters showed a significantly increasing trend, MMC would flag the flow change, lake level change, or water quality parameter for agency review. If the agencies decided that some action were necessary, they would provide written notification to MMC requesting submittal of a work plan within 30 days. The work plan would contain a detailed assessment of the changes, recommendations for additional monitoring (spatial and/or temporal), development of conceptual mitigation, or other actions to address the situation. The work plan would contain a schedule for implementing the proposed measures. Within 30 days, the agencies would 1) approve the plan, in whole or part; 2) approve the plan with conditions; 3) request clarifying information for the plan or additional review time; or 4) disapprove the plan, in whole or in part, directing that a revised work plan be submitted. If the agencies were to disapprove the plan, an explanation would accompany the disapproval.

C.6.6.2 Groundwater Flow

MMC would monitor flows from the Libby Adit, as well as from individual fractures in the vicinity of the Rock Lake Fault and Rock Lake. If the adit or drift encountered substantial groundwater inflows in the vicinity of the Rock Lake Fault or Rock Lake, MMC would notify the agencies within 5 business days. "Substantial groundwater inflows in the vicinity of the Rock Lake Fault or Rock Lake" means a flow from any individual fracture within 1,000 feet of either the Rock Lake Fault or Rock Lake with total flow greater than an average of 10 gpm over a 24-hour period. The agencies would evaluate the inflow data and direct MMC to take appropriate

actions. MMC would then evaluate the possible effect on Rock Creek and Rock Lake and provide an evaluation report to the agencies within 30 days after initial agency notification.

MMC would monitor the flow in benchmark springs outside of the area potentially affected by dewatering and would establish a relationship between flows in benchmark springs (described in Section C.6.3.2.1) and flows in any monitored springs. Flow in all monitored springs would also be evaluated using simple linear regression or other appropriate statistical analyses. If the relationship in flow between benchmark springs and monitored springs after adit dewatering began was statistically significantly less than pre-Project conditions, MMC would provide the analysis in the annual report. If the agencies decided that additional actions were necessary, the procedures regarding a work plan described for surface water quality would be implemented.

C.6.6.3 Wetland or Riparian Areas

If the prevalence index of any monitored wetland is 50 percent greater than its baseline index (such as 1.5 to 2.3) or is above 3 for 2 consecutive years, MMC would provide the analysis in the annual report. If the agencies decided that additional actions were necessary, the procedures regarding a work plan described for surface water quality would be implemented.

Other monitoring options such as piezometers would be used to facilitate or strengthen monitoring effectiveness. If a change in seep or spring flow, water level, or water quality were noted outside the baseline data for an individual site or set of sites, or a trend were observed that was not observed during pre-Project monitoring, then a reevaluation of those potentially affected habitats would be conducted and documented for comparison against initial survey information. Depending on a combination of biological or physical variables or the severity of plant indicator decline, the agencies may require more rigorous monitoring.

C.6.7 Plan Management

C.6.7.1 Quality Assurance/Quality Control

As part of each plan for environmental monitoring, MMC would develop a SAP and a Quality Assurance Project Plan (QAPP) and submit them to the agencies for approval. Collectively, these procedures would compose a plan that ensures the reliability and accuracy of monitoring information as it was acquired. QA/QC procedures would include both internal and external elements. Internal elements may include procedures for redundant sampling such as random blind splits or other replication schemes, chain of custody documentation, data logging, and error checking.

Written reports to document the implementation of the plan would be an integral part of monitoring reports. Any variances or exceptions to established sampling or data acquisition methods during monitoring would be documented. Documentation would include a discussion of the significance of data omissions or errors, and measures taken to prevent any occurrences. Reports would be submitted to the appropriate agencies with the annual report, unless otherwise requested.

C.6.7.2 Sample Collection and Data Handling

Field procedures would follow DEQ procedures (DEQ 2012a), and collection, storage, and preservation of water samples would follow EPA procedures (EPA 1982). Grab samples would be collected from streams and springs, and groundwater samples would be obtained using low-flow

sampling techniques. Samples would be cooled immediately after collection. Metals in water samples would be preserved by adding nitric acid in the field to lower the pH to less than 2.0 or as appropriate to meet standard industry sampling protocols.

Groundwater samples for metal analyses would be field filtered through a 0.45-micron filter to allow measurement of the dissolved constituents. Chemical analysis of water samples would use procedures described in 40 CFR 136, EPA-600/4-79-020, or methods shown to be equivalent. All field procedures would follow standard sampling protocols as demonstrated through the QA/QC documentation.

MMC would use a sample control plan, which includes sample identification protocol, the use of standardized field forms to record all field data and activities, protocol for collecting field water quality parameters, and the use of chain-of-custody, sample tracking, and analysis request forms. MMC would develop a master file of all field forms and laboratory correspondence. MMC would meet the laboratory method–required holding time for each constituent being analyzed.

MMC would ensure representativeness of samples collected by providing quality control samples and analyses. Quality control samples would include blind field standards, field cross-contamination blanks, and replicate samples. Quality control samples would be at a minimum frequency of 1 in 10. In addition, MMC would use EPA-approved laboratories. If revised sampling methods or QA/QC protocols change, MMC would incorporate those changes as directed by the agencies.

C.6.7.3 Data Reporting

Any reporting required in the MPDES permit would continue as long as there was discharge of any drainage to a MPDES-permitted outfall. MMC would submit water quality and flow measurement data to the KNF and DEQ in an electronic format acceptable to the agencies within 10 working days after receipt of final laboratory results. All submitted analytical data would comply with DEQ's minimum reporting requirements for analytical data (DEQ 2009). MMC would develop and maintain an agency-accessible, password-protected website that hosted electronic data. MMC would prepare a report briefly summarizing hydrologic information, sample analysis, and QA/QC procedures after each sample interval. The report would be posted on MMC's website within 4 weeks after receipt of final laboratory results.

The annual report, summarizing data over the year, would include data tabulations, maps, cross sections, and diagrams needed to describe hydrological conditions. Raw lab reports and field and lab quality results also would be reported. 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, to determine if differences exist:

- Between sampling sites
- Between an upstream benchmark site and the corresponding downstream site
- Between sampling times (monthly, growing season/non-growing season)
- Between streamflows at the time of sampling (for example, low flow during the fall compared to low flow during the winter)
- Between sampling years

Trend analyses would be included where applicable and quantifiable. For Libby Adit discharges, MMC would complete a multivariant analysis of the factors influencing stream temperatures downstream of the discharges.

The annual report would be posted on MMC's website within 90 days after receipt of the final laboratory results for the final quarter of the year. A formal review meeting would be arranged within 2 weeks of MMC submitting the monitoring report to the agencies. The formal review meeting would involve representatives from the reviewing agencies and MMC. The review could result in various outcomes:

- Determine that no change in the monitoring plans was needed
- Require modifications to the monitoring plans
- Require new treatment or mitigation measures to be implemented as part of the Project
- Require MMC to implement necessary measures to ensure compliance with applicable laws and regulations

C.7 Aquatic Biology

C.7.1 General Requirements

MMC would continue to conduct aquatic biological monitoring at stream stations that are downstream of the Libby Adit and at a benchmark station upstream of potential influence of Project activities. At replicate sample locations within each station, multiple parameters that are likely to display small-scale variability and likely to be correlated would be assessed. Replicated sample locations would be selected to be as similar as possible across stations. This sampling design would allow analysis of data using a before-after/control-impact approach. This sampling design is intended to identify natural variability and isolate the influence of Project activities on stream biota and habitat.

MMC would collect surface water quality samples at each aquatic biological monitoring station during each monitoring period to assist in interpretation of the data. MMC would also conduct salmonid population surveys and salmonid tissue chemistry surveys to provide additional information to assess the influence of Project activities on stream biota.

C.7.2 Monitoring Locations and Times

MMC would conduct aquatic biological monitoring at five stations. All tasks would not be conducted at all stations (Table C-8; Figure C-3 and Figure C-5). Stream reach length would vary depending on the monitoring task and station.

Monitoring frequency would vary depending on the monitoring task and station (Table C-9). Some tasks would be conducted three times annually: before runoff from the higher elevations in the spring (typically April or May), during summer (typically early August to September), and before ice formation (typically October). Other tasks would be conducted annually during the summer period, or at other frequencies as described below.

C.7.3 Substrate and Fine Sediments

During the summer monitoring period, percent surface fines would be quantified using a grid sampling device as described in the DEQ methodology (DEQ 2013) at each quantitative macroinvertebrate sample (Surber sample) location. Embeddedness would also be quantified at each Surber sample location by tallying each stone within the Surber sampler frame that is less than 50 percent embedded. Substrate size would be quantified by measuring the narrow dimension of these same stones. Conducting these tasks at the Surber sample locations would yield data that provide quantitative measures of substrate at all stations in similar habitat and under similar depth and flow conditions and would improve the ability to isolate the influence of water quality and fine sediments on benthic macroinvertebrates (see Section C.7.6). Samples would be collected within the shortest reach available that meets the macroinvertebrate sample location criteria (see Section C.7.6).

Table C-8. Aquatic Biology Monitoring Stations.

Nearest Upstream Activities	Station ID (Surface Water ID)	Station Comments	All Non-fish Monitoring	Fish Population and Habitat	Fish Tissue Metals	Nuisance Algae
Bear Creek						
None	Be2 (BC-500)	Upstream benchmark	X	X	X	
Libby Creek						
Dewatering	L10 (LB-200)	Upstream of Libby Adit	X			
Treatment Plant Discharges	L9 (LB-300)	Impact assessment	X	X		X
	L3 (LB-1000)	Impact assessment				X
	L1 (LB-3000)	Impact assessment	X	X	X	

Also, during the summer period, in the fish monitoring reaches (L1, L9, and Be2; see Section C.7.8), the substrate monitoring methods described above would be supplemented with the McNeil core substrate sampling method. Ten representative core samples would be collected from potential spawning locations in scour pool tail crests and low-gradient riffles within the salmonid population survey reach at each of the three stations. Fewer core samples would be collected if 10 suitable locations are not located within the survey reach.

MMC would follow DEQ methods for assessing sediment impairment (DEQ 2013) at four monitoring stations during each monitoring period. These methods would include Wolman pebble counts, grid tosses, measurement of residual pool depth, and pool counts (DEQ 2013). Reach lengths for this monitoring component would be 20 times the bankfull width in the sampling area.

Table C-9. Aquatic Biology Monitoring Requirements.

Task Category	Task	Timing			Number of Stations	Method	Replication per Station and Within-Station Locations
		Spring	Summer	Fall			
Benthic biota	Macroinvertebrates, quantitative		X		4	Surber samples for lab taxonomy	5 sites with most similar microhabitat near station
	Macroinvertebrates, qualitative		X		4	Kicknet sample for lab taxonomy	1 sample from all habitats in reach that include Surber sample locations
	Periphyton, quantitative		3X/season X		2 All	Samples from rock surface for chlorophyll-a determination (DEQ 2011b)	11 samples from each transect location if $\geq$50 mg/m^2 chlorophyll-a
	Periphyton, qualitative		3X/season X		2 All	Picking and scraping all varieties for lab taxonomy (DEQ 2011a)	1 sample comprising a composite of 11 transect samples from each site
Habitat	Canopy cover		X		4	Densiometer	At each of the 5 Surber locations
	Water velocity		X		4	Flow meter at 0.6 m depth	At each of the 5 Surber locations
	Stream discharge	X	X	X	All	Velocity-area principle / 0.6 m depth	1 transect at station
	Fish habitat survey		X		3	R1/R4	Same 100 yd reach as salmonid survey
Substrate	Embeddedness		X		4	Tally <50% embedded stones	At each of the 5 Surber locations
	Substrate size distribution		X		4	Measure <50% embedded stones	At each of the 5 Surber locations
	Surface fines		X		4	49 point grid	At each of the 5 Surber locations
	Spawning gravel		X		3	McNeil cores for lab analysis and field settling cone	Maximum obtainable up to 10 samples within 100 yd salmonid survey reach
	Sediment impairment	X	X	X	4	DEQ 2013 SOP	20 bankfull widths
Water quality	Conductivity	X	X	X	All	Meter	1 measurement at station
	pH	X	X	X	All	Meter	1 measurement at station
	Water temperature	X	X	X	All	Meter	1 measurement at station
	Water chemistry sample	X	X	X	All	Grab sample for comprehensive lab analysis	1 sample at station
Fish	Salmonid population survey		X		3	Multiple-pass electrofishing or snorkel	Extending from station to 100 yd upstream
	Salmonid tissue metals samples		X		2	*Oncorhynchus* sp. whole-fish Cu, Cd, Hg, Pb, Zn	5 fish per survey reach

C.7.4 Habitat

Habitat surveys would be conducted annually in the summer in the fish monitoring reaches (L1, L9, and Be2; see Section C.7.8). Instream habitat data collection would generally follow the R1/R4 methods developed by the Forest Service (Overton et al. 1997). Habitat types within the stream reaches would be identified and measured individually. Measurements at recognized units within each habitat type would include length, wetted width, bank width, average depth, maximum depth, substrate type, type of bank vegetation, percent undercut bank, and percent eroded bank. These habitat measurements are consistent with the Inland Native Fish Strategy (INFS) goals. Additionally, other measurements, such as pool frequency, number of pieces of large woody debris, and lower bank angle, would be recorded to document attainment of the riparian management objectives set by the INFS (USDA Forest Service 2015).

C.7.5 Routine Physical/Chemical Features

MMC would measure the following routine physical and chemical parameters at all aquatic biological monitoring stations during all monitoring periods: stream discharge, air and water temperature, pH, total alkalinity, specific conductance, sulfate, and the metals listed in Table C-5. EPA-approved methods or other acceptable methods specified in the monitoring plan would be used.

C.7.6 Benthic Macroinvertebrates

MMC would collect five quantitative samples and one qualitative sample of benthic macroinvertebrates from four aquatic biological monitoring stations during the summer period. Methods would generally follow the guidelines described in DEQ's macroinvertebrate sampling protocol (2012b) for the collection of quantitative Hess samples and semi-quantitative jab samples. Quantitative samples would be collected using a 500-micrometer mesh Surber sampler rather than a Hess net because Surber samplers have been used by FWP in Libby Creek beginning in 2000 (Dunnigan et al. 2004) and since for Project monitoring. The continued use of the Surber sampler would allow for better comparisons with past data. Quantitative samples would be collected from the riffle/run habitats in the stream. Specific sampling locations at each station would be standardized, to the extent possible, for depths between 0.5 and 1.0 feet and flow velocities of less than 1.5 feet per second. MMC would collect the qualitative jab sample with a 500-micrometer mesh net in all microhabitats not sampled during the collection of the quantitative samples, such as aquatic vegetation, snags, and bank margins. Benthic macroinvertebrates collected with the net would be used to provide supplemental information on species composition at the sites and to determine the relative abundance of the taxa inhabiting aquatic habitats at the sampling station.

Parameters analyzed would include density; number of taxa; number of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa; number of Ephemeroptera taxa; number of Plecoptera taxa; percent non-insects; percent predators; percent burrower taxa;; percent EPT individuals; Shannon-Weaver diversity index; Simpson diversity index; and MT Hilsenhoff Biotic Index (HBI). Several of these parameters are among the metrics calculated by DEQ as part of its data analysis (DEQ 2012b). The use of other metrics such as evenness and the biotic condition index (BCI) has been recommended by Forest Service personnel to allow for comparisons with previously collected data within this region (Steve Wegner, pers. comm. 2006). To summarize these data, four common statistical measures would be used (mean, standard deviation,

coefficient of variation, and standard error of the mean), plus other appropriate measures (EPA 1990).

Quality assurance for macroinvertebrate data would follow DEQ guidelines (DEQ 2005a, 2012b) and would be conducted randomly on 10 percent of the samples, with 95 percent agreement for taxonomic and count precision required. MMC also would maintain a permanent taxonomic reference collection that contains all benthic species collected from Project area streams. Taxa identification in this collection would be documented and confirmed by a qualified, independent macroinvertebrate taxonomist (DEQ 2012b). This reference collection would be maintained by MMC through the period of post-Project monitoring. After this period, the collection would be transferred to a depository selected by the agencies for permanent scientific reference.

C.7.7 Periphyton and Benthic Chlorophyll-a

MMC would sample periphyton and benthic chlorophyll-a at all aquatic biological monitoring stations concurrent with the proposed benthic macroinvertebrate population sampling during the summer period. Qualitative periphyton would be collected following DEQ's standard operation procedure using the appropriate method for the stream type to be sampled (DEQ 2011a). At stream locations with flowing water present at the time of sampling, the modified PERI-1 method would be used, which designates a specific longitudinal length of stream to be sampled at each site. The sampled stream length would be either 40 times the average wetted width at the midpoint of the stream reach or a minimum of 150 meters, whichever was greater. Eleven transects would be established throughout each site reach and would be located equidistant from one another (shown on Figure 1.0 in DEQ 2011a). Algal material would be collected from each of the 11 transect locations, with all material composited into a single sample per site (DEQ 2011a). Collection methods would include using a toothbrush or knife to collect material from hard substrates and a turkey baster or spoon for soft substrates.

Quantitative benthic chlorophyll-a samples would be collected from each of the PERI-1 method transects at a station following DEQ's standard operation procedure (DEQ 2011b) if benthic algal chlorophyll-a appears to be $\geq$50 mg/m^2 at any of the transects at the station. The samples collected at each transect would be kept separate rather than combining them into one composite sample as was recommended for the periphyton samples. The collection method used at each transect would be based on the substrate and conditions at each location. For example, the hoop method would be used for transects dominated by the presence of filamentous algae, regardless of stream substrate. If heavy filamentous algal growth was not observed, the template sampling method would be used at transects dominated by small boulders, cobble, and gravel, while the core method would be used at those transects dominated by silt-clay substrate. The collection tools used for each method differ, but they all result in a quantifiable area of the stream substrate being sampled at each transect (DEQ 2011b). If field personnel visually assessed the site and decided that benthic algal chlorophyll-a was <50 mg/m^2 at all transects of a stream site, photographs of the stream substrate at all 11 transects would be taken in accordance with Section 7 of DEQ's standard operation procedure (2011b) rather than taking chlorophyll-a samples.

Based on these methods, 1 composite periphyton sample and possibly 11 chlorophyll-a samples would be collected at each site from the reach that included the Surber sample locations before collecting macroinvertebrates (see Section C.7.6; Table C-9).

All methods described above would be conducted at stations L9 (LB-300) and L3 (LB-1000) three times per year to assess if nuisance algae was present. These sampling events would be scheduled approximately 1 month apart and within the first 2 weeks of July, August, and September. The summer survey of all sites would suffice for one of the three sampling events at L9 and L3.

C.7.8 Salmonid Populations

To determine possible changes in salmonid populations associated with the Project, MMC would monitor salmonid populations in Libby Creek and Bear Creek annually during the summer period. FWP would complete the monitoring if they were conducting surveys at the approximate locations described below during summer. MMC would conduct the monitoring if FWP was not already doing so and if the required permits were granted to MMC. If the required permits were not granted for some or all of the salmonid population monitoring, relative fish abundance by species and size class would be determined using the direct enumeration snorkeling technique (Thurow 1994, cited in Overton et al. 1997). Night snorkel surveys would be conducted in an upstream direction using a dive light. Fish species and lengths would be documented to the extent practical without capturing fish. Fish counts, species identifications, and length determinations would be tallied for each macrohabitat type in each reach. If portions of reaches were too shallow for snorkeling, they would be surveyed from the banks. Bank surveys would also be conducted to tally young-of-the-year fish.

MMC would monitor salmonid populations in Libby Creek in two stream reaches (L1 and L9) and in Bear Creek (Be2) using the following procedures. If electrofishing, the stream reach would be blocked by netting at its upstream and downstream limits to prevent fish movement into or out of the sample reach during the sampling. Sampling procedures would include multiple-pass depletion electroshocking to collect salmonids from a 300-yard (or 300-meter) reach of stream. All salmonids would be identified, measured for length, and released. Population densities of each salmonid species captured during the study would be estimated, where adequate sample sizes permit, using a maximum-likelihood model (e.g., Seber and Le Cren 1967; MicroFish 3.0). The condition of all captured salmonids would be recorded after an examination for overt signs of disease, parasites, or other indications of surface damage. Length-frequency data would be analyzed to determine whether species were naturally reproducing in or near the stream reaches. These methods may be modified if FWP conducted the monitoring or if snorkeling is used. A monitoring report would be submitted annually to the KNF, FWP, and DEQ.

C.7.9 Bioaccumulation of Metals in Fish Tissue

MMC would conduct monitoring studies that measure background concentrations of copper, cadmium, mercury, lead, and zinc in the fish in Libby Creek to provide a basis for comparison in order to document any potential changes in the concentrations of these metals due to Project activities. Fish tissue monitoring would be conducted if the required permits were granted to MMC. If the required permits were not granted for some or all of the fish tissue monitoring, MMC would report the most relevant data that are available for the Project area.

C.7.10 Sampling Trip and Annual Reporting

Within 1 week of completing biological sampling, MMC would submit a brief report to appropriate review personnel at DEQ, the KNF, and FWP. This report would include brief statements about stream conditions observed at each monitoring station and would alert the

review personnel to any marked changes in monitoring data relative to the cumulative monitoring record.

On or before March 1 of each year, MMC would submit an annual aquatic monitoring report that contains summaries of all aquatic monitoring data collected during the previous year. Each report also would discuss trends in population patterns and evaluate changes in stream habitat quality, based on all data collected to date for the Project. Reference to appropriate scientific literature would be included. Recommendations in these reports can include modifications to increase monitoring efficiency or to provide additional data needs.

C.7.11 Annual Review and Possible Revision of the Monitoring Plan

Within 1 month after MMC submits the annual report, an annual meeting would be held to review the aquatics monitoring plan and results and to evaluate possible modifications to the plan. This meeting would include personnel from DEQ, the KNF, FWP, MMC, and other interested parties.

C.8 Wilderness

All surface disturbances for the Project would be outside of the CMW boundary; some activities such as monitoring would occur within the CMW boundary. A summary of the types of monitoring activities that would occur in the wilderness are described in SEIS Section 3.24.1.4.3. A description of wilderness character monitoring is below.

C.8.1 Objective

The objective of monitoring for wilderness is to determine if Project activities approved within the CMW boundary, such as the agencies' required monitoring described in this appendix (see Sections C.3, *Wildlife*; C.4, *Rock Mechanics*; and C.6, *Water Resources*), are in conformance with mitigation and special provisions and if management is minimizing impacts on wilderness values.

C.8.2 Locations, Parameters, and Frequency

C.8.2.1 MRDG Process and Approval of Final Monitoring Plans

A Minimum Requirements Analysis is required when prohibited uses are being considered in an administrative action (Wilderness Act, Section 4.c). Prohibited uses in the CMW include motorized equipment, motorized or mechanized transportation, and permanent installations. Motorized equipment is defined as any machine activated by a nonliving power source except small battery-powered, hand-carried devices such as flashlights, GPS, cameras, or cell phones (36 CFR 261.2). Small battery-powered equipment left on-site for a period of time would be considered motorized equipment.

The MRDG is a tool to complete a Minimum Requirements Analysis (Arthur Carhart National Wilderness Training Center 2014). The MRDG has two parts: (1) determine if an administrative action is necessary, and if necessary, (2) determine the minimum activity necessary. As part of the Project record, the KNF completed a 2017 MRDG for the conceptual monitoring plan through Step 1 (determination of whether an administrative action is necessary in the CMW). The determination made was that administrative action is necessary in the CMW due to existing rights and special provisions and as a requirement of other statutes or regulations. Step 2, which is the determination of the minimum activity necessary, would be used to evaluate final plans as they were submitted to the agencies by MMC.

MMC would identify any activities (monitoring, equipment, transport) that would occur within the CMW boundary in submitted plans (maps, tables, monitoring locations). The KNF would complete MRDG Step 2, determination of the minimum tool necessary, before approving any monitoring activities. The MRDG would be completed for final plans and updated as the Project progressed.

C.8.2.2 Wilderness Stewardship Performance

The KNF used the National Wilderness Stewardship Performance Guidebook (USDA Forest Service 2017) to provide specific instructions and associated resources to support Wilderness Stewardship Performance. Three elements that apply to the Project are described below.

Other Special Provisions—Includes management plan and monitoring of the special provisions for the protection of wilderness values for the Project. Special Provisions of the Wilderness Act Section 4(d)(3) allow for the following: "Mineral leases, permits, and licenses covering lands within national forest wilderness areas designated by this Act shall contain such reasonable stipulations as may be prescribed by the Secretary of Agriculture for the protection of the wilderness character of the land consistent with the use of the land for the purposes for which they are leased, permitted, or licensed."

The KNF would develop a Special Provision Monitoring Plan covering both management and monitoring within the CMW boundary. The final monitoring plan (see Section C.8.3, *Reporting Requirements*) would be used as a basis for the KNF Special Provision Monitoring Plan. The Special Provision Monitoring Plan would be interactive and collaborative with MMC in determining priority management issues. If monitoring of the Special Provisions indicates resources are not in conformance with the plan, corrective actions would be taken.

Wilderness Character Baseline—The Forest Service developed a National Minimum Protocol for Monitoring Outstanding Opportunities for Solitude (USDA Forest Service 2014). The KNF implemented solitude monitoring in 2017 to establish baseline information for the Project and to provide a foundation for evaluating trends in wilderness character (KNF 2018). The 2017 monitoring focused on areas identified with possible "increased visibility of mine disturbances as well as increased noise from mining facilities" from specific locations including the following: viewpoint at Elephant Peak, between Elephant Peak and Bald Eagle Peak, CMW locations west of the facilities, and the proposed Rock Lake Ventilation Adit. The KNF developed a wilderness character narrative, selected measures for each indicator, and gathered data to establish a baseline. Results from that monitoring are described under *Wilderness* in Section 3.24.1.3.

CMW Wilderness Stewardship Performance Monitoring—Monitoring would be funded, in part, by MMC and conducted every 5 years at the sites used in the 2017 baseline monitoring and listed in SEIS Section 3.24.1.2.2, *CMW Baseline Solitude Monitoring*. These sites and others may also be surveyed annually as opportunities arise (KNF 2018). Trends in each measure would be reported at 5-year intervals. If MMC decided not to pursue Montanore Project development, MMC's funding for monitoring in the CMW would cease.

C.8.3 Reporting Requirements

MMC would submit all activities (monitoring, equipment, transport) that occurred within the CMW annually to the KNF using the Administrative and Special Provisions Authorization form by October 1 of every year. This form tracks motorized equipment and mechanical transport use

authorizations to facilitate post-season data entry into Infra-WILD, which is part of the Natural Resource Manager, a system of database tools used by the Forest Service for managing agency data.

The KNF would complete a Special Provisions Monitoring Plan report annually (starting the year the final monitoring plan was approved) by October 1 of every year.

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Appendix G — Water Quality Mass Balance Calculations

Effluent Limits (mg/L)

Parameter	Interim MDL	Interim AML	Final MDL	Final AML
TSS	30	20	30	20
TDS			172	86
Ammonia			0.0025	0.0012
Nitrate			0.00274	0.00137
Total Nitrogen	1.5	1.5		1.5
TIN	0.0025	0.0025	0.00137	0.00137
Antimony			0.00138	0.00069
Cadmium	0.0012	0.0008	0.000025	0.000012
Chromium	0.020	0.013	0.00958	0.00478
Copper	0.010	0.007	0.00379	0.00189
Iron	0.38	0.25	0.233	0.116
Lead	0.0009	0.0006	0.00013	0.00007
Manganese	0.150	0.110	0.123	0.061
Mercury	0.000015	0.00001	0.000013	0.000007
Zinc	0.15	0.1	0.037	0.018

Estimated Total Nitrogen WTP Calculations

MPDES effluent limit calculated @ 500 gpm	lb/day	9.3
Conversion	lb/sec	0.0001076
Conversion factor	mg/lb	453592
Conversion	mg/sec	48.82
Discharge rate used in mass balance	gpm	500
Conversion factor	gpm to l/sec	0.06
Discharge rate used in mass balance	l/sec	31.55
TN concentration @ 500 gpm	mg/l	1.5

LIBBY CREEK at LB 300

Calculated Maximum Daily Concentration before 2020

	Receiving Water Quality		Interim Effluent Limit[1]		Receiving Water Quality	
Parameter	Conc. (mg/l)	Flow[2] (gpm)	Conc. (mg/l)	Flow (gpm)	Conc. (mg/l)	Flow (gpm)
Total Inorganic Nitrogen	0.2	1,472	2.5	500	0.78	1,972
Total Nitrogen	0.465	1,472	1.5	500	0.73	1,972
Total Phosphorus[4]	0.01	1,472	0.02	500	0.013	1,972
Cadmium	0.00050	1,661	0.0012	500	0.00066	2,161
Chromium	0.004	1,661	0.020	500	0.0077	2,161
Copper	0.002	1,661	0.004	500	0.0025	2,161
Iron	0.050	1,661	0.38	500	0.13	2,161
Lead	0.001	1,661	0.0009	500	0.0010	2,161
Manganese	0.020	1,661	0.150	500	0.050	2,161
Mercury	0.0002	1,661	0.000015	500	0.00016	2,161
Zinc	0.020	1,661	0.15	500	0.050	2,161

Calculated Maximum Daily Concentration after March 2020

	Receiving Water Quality		Final Effluent Limit[1]		Receiving Water Quality	
Parameter	Conc. (mg/l)	Flow[2] (gpm)	Conc. (mg/l)	Flow (gpm)	Conc. (mg/l)	Flow (gpm)
Total Dissolved Solids	91.9	1,661	172	500	110	2,161
Ammonia	0.1	1,472	2.5	500	0.71	1,972
Nitrate+nitrite	0.2	1,472	2.74	500	0.84	1,972
Total Inorganic Nitrogen	0.2	1,472	1.37	500	0.50	1,972
Total Nitrogen[3]	0.465	1,472	1.5	500	0.73	1,972
Total Phosphorus[4]	0.01	1,472	0.02	500	0.013	1,972
Antimony	0.003	1,661	0.00138	500	0.0026	2,161
Cadmium	0.00050	1,661	0.000025	500	0.00039	2,161
Chromium	0.004	1,661	0.00958	500	0.0053	2,161
Copper	0.002	1,661	0.00379	500	0.0024	2,161
Iron	0.050	1,661	0.233	500	0.092	2,161
Lead	0.001	1,661	0.00013	500	0.00080	2,161
Manganese	0.020	1,661	0.123	500	0.044	2,161
Mercury	0.0002	1,661	0.000013	500	0.00016	2,161
Zinc	0.020	1,661	0.037	500	0.024	2,161

Notes:

[1]Effluent limits are maximum daily, except for total inorganic nitrogen and total nitrogen, which are average monthly.

[2]Except for nutrients, flow is the sum of the 7Q10 flow (1,360 gpm) and the ground water flux (361 gpm), For nutrients, flow is the seasonal 14Q5 flow, which is the lowest average 14 consecutive day low flow, occurring from July through October, with an average recurrence frequency of once in 5 years.

[3]The total nitrogen effluent limit of 1.5 mg/L is based on the interim effluent limit because the final effluent does not become effective until 2034

[4]DEQ did not set an effluent limit for total phosphorus. The total phosphorus effluent concentration of 0.02 mg/L is based on the maximum daily value in the effluent.