Forest Service
U.S. DEPARTMENT OF AGRICULTURE

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Draft Environmental Assessment for the Terms and Conditions for McKinley Lake Dam Decommissioning and Restoration Project

Lolo National Forest

Cover photo: McKinley Lake Dam and Spillway in the Rattlesnake Wilderness Area

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Chapter 1 - Purpose and Need for the Proposal

The USDA Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA), the Forest Plan, and other relevant federal and state laws and regulations. The purpose of an Environmental Assessment is to furnish enough site-specific information related to the environmental effects of the proposed action so that the Responsible Official can determine whether there are significant environmental impacts and if an Environmental Impact Statement is necessary. The NEPA process enables the Responsible Official to make decisions with an understanding of the proposal's environmental consequences and allows the USDA Forest Service to disclose to the public, the nature and potential consequences of proposed actions.

1.1 Document Structure

The Environmental Assessment is organized into five parts:

Purpose and Need for this Project: Chapter 1 includes information on the background and history of the project proposal. Chapter 1 also presents the purpose and need for the project and provides a description of the project area location. This section also details how the USDA Forest Service informed the public of the proposal and how the public responded.

Comparison of Alternatives, including the Proposed Action: Chapter 2 provides a detailed description of the proposed action, as well as a no-action (no terms and conditions) alternative for comparison purposes. Chapter 2 provides a description of the authorization and the terms and conditions that would be applied to this project that will be undertaken by the City of Missoula.

Environmental Consequences: Chapter 3 describes the environmental effects of implementing the proposed action. This analysis is focused on the issues and concerns identified through the public comment period and scoping, as well as requirements of other laws and policies. This document was developed using a resource-based analysis. A resource-based analysis contains only those resources which either could be affected from the proposed action or are required by law or regulation to evaluate. Issues are defined as cause-and-effect relationships, which link actions to environmental effects (Forest Service Handbook, 1909.15, Section 12.41). During the scoping portion of this project, no significant issues were identified by the Responsible Official. Therefore, there was not a need to develop an additional action alternative. Chapter 3 contains a discussion on the resource effects analysis including a short discussion on the affected environment of each resource.

Agencies and Persons Consulted: Chapter 4 provides a list of preparers and staff consulted during the development of this EA. Chapter 4 also provides a list of other agencies and tribal organizations that were involved in the scoping process.

Appendices: The appendices include project maps as well as a literature cited section to support the analyses presented in the EA, and the minimum requirements analysis framework (MRAF).

A reduction of paper as specified by 40 Code of Federal Regulations (CFR) 1500.4 has been an important consideration in the preparation of this EA. Additional documentation is in the project record (e.g., a compilation of documents prepared for this project), which can be reviewed upon request. This document, as well as the scoping letter and other information, are also available on the Lolo National Forest web page at Forest Service (usda.gov)https://www.fs.usda.gov/project/?project=63564.

1.2 Background and History

The McKinley Lake Dam was constructed in 1923 by private water companies as part of the Rattlesnake Creek water supply and drinking water for the City of Missoula. The City of Missoula now owns and operates this embankment dam under an easement established prior to the land being acquired by the Forest Service. In 1980, the Rattlesnake drainage became designated as a National Recreation Area and Wilderness. The Rattlesnake Wilderness Act expressly granted the holder of water rights in the area continued motorized access over existing roads and trails for the maintenance and operation of water facilities. The City of Missoula stopped using the water from the Rattlesnake drainage as a municipal supply in 1983. McKinley Lake Dam is experiencing considerable erosive headcutting along the spillway channel. See Figure 1. If left unmitigated, the Forest Service and City of Missoula engineers are concerned about the eventuality of this headcutting to migrate up the spillway to the dam, thereby threatening the overall stability of the structure. The Forest Service has determined the dam represents a significant hazard. Failure of the dam threatens downstream water quality, fisheries, and wilderness character. The outlet works have been left open and the dam is not impounding water, except for the snowmelt period associated with spring run-off. Water is also seeping from the toe of the dam. The City of Missoula, working in coordination with Trout Unlimited, is planning to breach the dam to stop the erosion and to bring the dam into compliance with dam safety standards in the summer and fall of 2024.

The headcutting of the spillway just southeast of the dam creates a potential hazard to the public and downstream resources. Because of the deteriorated condition of the dam, it requires breaching and restoration to eliminate the unnecessary hazard and restore natural resources in and around the spillway.

1.3 Overview of Project Area

McKinley Lake is located at an elevation of 6860 feet in the Rattlesnake Wilderness on the Missoula Ranger District, within the Lolo National Forest. McKinley Lake is in the Lake Creek Drainage, in T15N R18W Section 31 UTM, within Missoula County, Montana (Figure 1). The size of the lake is 15 acres, and the proposed project area is approximately three acres in size. The project area includes the dam, areas adjacent to the dam, and the associated areas for the workers campsite and a latrine. Maps of the location and project area are in Appendix A – Maps.

1.4 Purpose and Need for Proposal

Under the Montana Environmental Policy Act, the Montana Department of Natural Resources, in cooperation with the City of Missoula, conducted an environmental assessment (EA) of the effects of breaching the McKinley Lake Dam. That EA is incorporated by reference into this document.

The purpose of the decision to be made is to authorize sufficient helicopter and vehicle access to allow for the work to be done safely and efficiently, and to manage the impacts of the McKinley Lake dam breach, through terms and conditions that are reasonable and feasible, to protect the federal estate (including wilderness values) during access to the site and for the plan of operations. Because this is an easement dam, the Forest Service does not have regulatory authority over the operation, maintenance, and/or permanent decommissioning of the dam. Rather, our role is to condition the decommissioning activities, through reasonable measures, to protect and manage federal lands and resources in compliance with our Forest Plan and all other relevant laws, regulations, and policies.

The City of Missoula has existing rights and obligations to maintain or remove McKinley Lake Dam consistent with federal dam safety standards and other pertinent laws and regulations which also govern the City of Missoula's use of their easement and protection of National Forest System lands and wilderness values. They routinely fly a helicopter to the dam annually for maintenance and inspection, as allowed by their easement and the Rattlesnake Wilderness Act. However, the brief but intense use of helicopters and mechanized tools to breach the dam goes beyond normal maintenance and operation of the dam, as well as beyond the customary and usual access, including necessary motorized use of roads and trails by the holder of water rights allowed in the Act designating the Rattlesnake Wilderness (RW, Public Law 96-476). The Chief of the Forest Service may authorize occupancy and use of National Forest land by officers, employees, agencies, or agents for the Federal, State, and county governments to carry out the purposes of the Wilderness Act and will prescribe conditions under which motorized equipment, mechanical transport, aircraft, aircraft landing strips, heliports, helispots, installations, or structures may be used, transported or installed by the Forest Service and its agents and by other Federal, State, or county agencies or their agents, to meet minimum requirements for authorized activities to protect and administer the Wilderness and its resources (36 CFR 293.6(c). Section 5(b) of the Wilderness Act states, "In any case where valid mining claims or other valid occupancies are wholly within a designated national forest wilderness area, the Secretary of Agriculture shall, by reasonable regulations consistent with the preservation of the area as wilderness, permit ingress and egress to such surrounded areas by means which have been or are being customarily enjoyed with respect to other such areas similarly situated." 36 CFR 293.13 describes access to valid occupancies. The McKinley Lake Dam, easement and water right constitute a valid occupancy by the City of Missoula.

There is a need to bring the dam into compliance with Forest Service regulations and objectives in the Forest Plan, and the Montana State Dam Safety standards. Completion of this project would address the safety concerns and natural resource concerns that are a potential consequence of an unstable structure. This would also ensure that the City of Missoula and the Forest Service meet the requirements of the State Engineer in a timely manner.

The terms and conditions will address the objectives of the Lolo's Land and Resource Management Plan (Forest Plan). Party size in the RW is limited to a maximum of 10 horses and 10 people (p. III-53). This objective is in place to assure safety to the public and provide protection of natural resources.

Figure 1. Eroded spillway at McKinley Lake

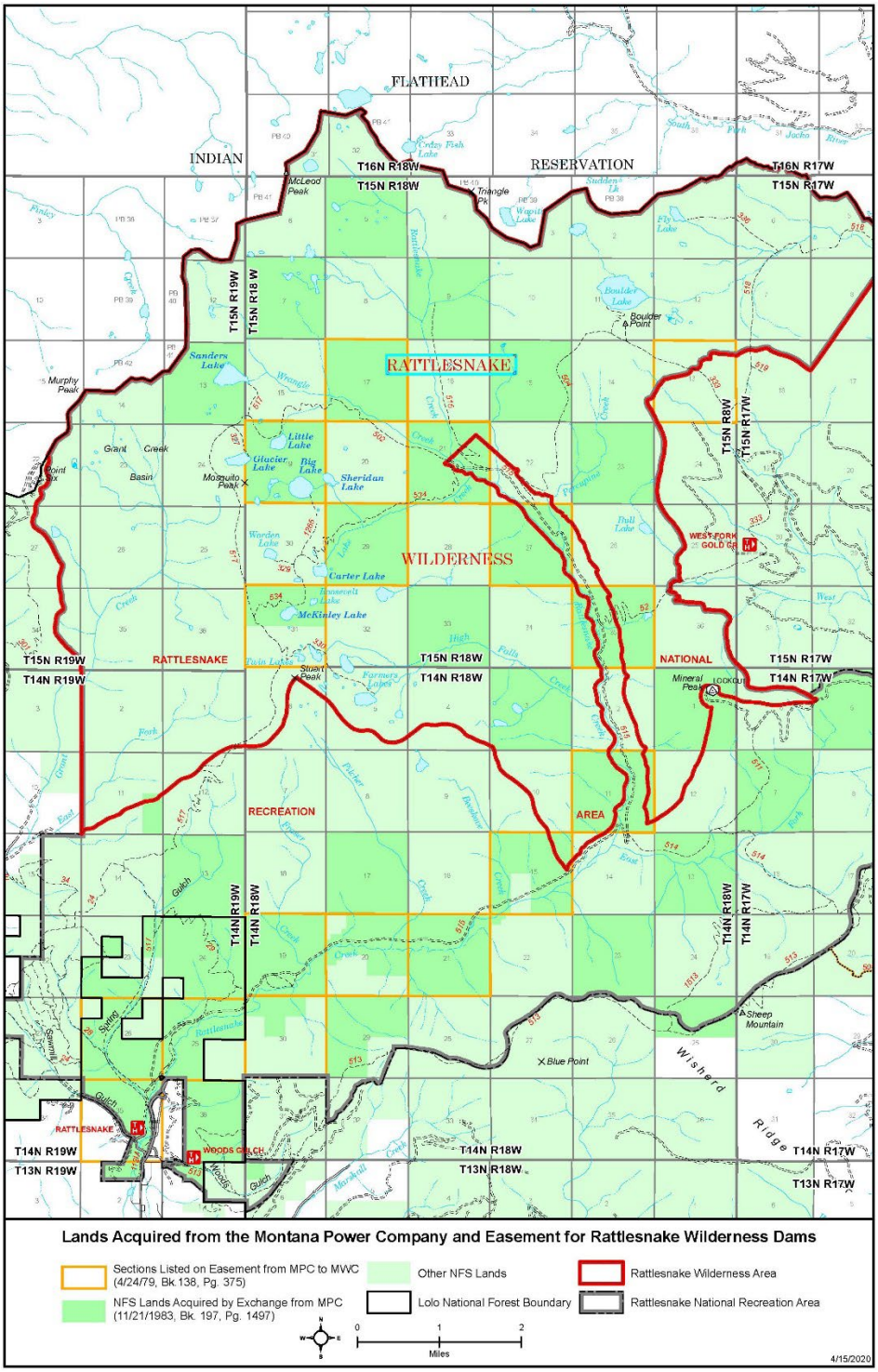

Figure 2. McKinley Lake and Project Vicinity Map

Finally, the safety of the dam is in question if it is not stabilized by constructing a breach. Even with the outlet gate locked open, the dam may still be at risk of failure especially during high flow events such as spring runoff because of the growing erosion of the spillway area. If failure were to occur, this could cause considerable downstream resource damage and public safety concerns. There is a need to complete the project in one field season to avoid accidental stormwater discharge and negative effects to bull trout habitat downstream, which is possible if the site had to overwinter before completion.

The City of Missoula and Montana Department of Natural Resources have conducted an environmental assessment considering the alternatives of no action, repairing the dam, or decommissioning it. They have decided to breach the dam and decommission it. The City and the Forest Service considered alternatives of how to safely breach the dam and also comply with the Wilderness Act (36 CFR 293.6(c). The minimum requirements analysis framework led to the final plan to breach the rock dam by removing a portion of the structure near the center of the dam using carefully placed explosives, limited and brief use of motorized equipment (auger and pump), hand tools and a crew of ten laborers. The motorized equipment would be flown in and out by medium-sized helicopter.

Crews would be working at the site for an estimated thirteen weeks. Needed equipment and supplies would be transported to the site via helicopter during one day at the beginning of the work period and flown out during one day at its completion. The workers would camp near the work site in approved campsite locations. Additional food and supplies would be transported via vehicle to the stock camp (in the National Recreation Area). When a pack string is used to deliver supplies intermittently, it will not stay on site.

Solely primitive and traditional methods were considered, using pack stock, a mule team and hand tools only. Subject matter experts were consulted. This would take two operating seasons, creating the need to stabilize the breach site over winter and risking uncontrolled sediment discharges. Failure at the site between work seasons would release an unknown volume of water and sediment into the stream channel below the dam and eventually reach Lake Creek and Rattlesnake Creek. Impacts including soil erosion and scouring of the creek channel would occur within the riparian corridor and floodplain, potentially affecting the bull trout population in Rattlesnake Creek With an estimated 24 pack stock trips each year using a purely traditional approach, the environmental impacts to the trails and construction area would be severe. Using a horse or mule team to assist in breaching the dam would result in extreme soil disturbance in the littoral zone of the lake. The topography and vegetation environment at McKinley Lake precludes a stock corral or a pasture. A labor camp in the area for such an extended period would pose sanitation issues unbefitting a wilderness. While the dam was constructed using hand labor, it can be assumed they used wheelbarrows and/or wheeled carts to move rock. Also, the dam was constructed on dry ground. The area of the dam to be breached is only dry for a few weeks in late September, otherwise the work area is inundated by water. This is not enough time to complete the work and creates a different operating environment than when the dam was constructed in 1923. See the Minimum Requirements Analysis Framework in Appendix C.

1.5 Scope of the Proposal

The City of Missoula has requested authorization for helicopter access to their easement at McKinley Lake Dam, increased vehicle use over their easement, and the limited use of motorized tools. These include a small pump to create a dry area at the breach site within which to work and a power auger to drill holes for the blasting charges. The pump would only be used briefly to start the siphon and

possibly other times if the siphon is not functioning properly. The power auger would be used for a brief period, i.e., a few hours on one or two days. Mechanized equipment in the form of wheeled carts will allow laborers to move rock more efficiently than by hand. The City requests this authorization so they may perform work necessary to breach the dam before spillway stability deficiencies cause dam failure that could potentially negatively affect public safety and the environment, consistent with their responsibilities under dam safety laws and regulations and their existing rights and responsibilities under their easement, and to complete the work in one field season.

This Forest Service proposal is limited to authorizing adequate modes and routes of access necessary for the City of Missoula to perform their specified work and issuing reasonable conditions of access and operations necessary to protect the National Forest and wilderness values. The Forest Service proposes to authorize the limited use of motorized and mechanized tools for safety and in the interest of completing the work in one field season. See Appendix C for further descriptions of their proposed work.

Requiring primitive/traditional methods only from an entity with motorized easement access rights recognized in the Rattlesnake Wilderness Act of 1980 is not reasonable. Solely primitive/traditional methods are not feasible due to lack of space for stock corrals and the unacceptable damage over 48 stock trips would do to the trail. Yearly helicopter access is an established use by the City for dam maintenance and inspection of their multiple dams in the Rattlesnake Wilderness. Further, overwintering the work area creates an unacceptable risk of sediment discharges.

The Forest Service cannot decide for, or direct, the City of Missoula to permanently breach the McKinley Lake Dam (see Appendix C). That decision lies solely with the City of Missoula, as that decision affects their basic rights under their easement. Similarly, as described earlier, the Forest Service cannot deny the City of Missoula reasonable access to their facilities as defined by existing law.

1.6 Proposed Action

- To achieve the purpose and need listed above, the following proposed action includes:
- Authorizing access by helicopter to McKinley Lake for transport of equipment and supplies.
- Authorizing increased use of roads and trails beyond normal rights granted in Rattlesnake Wilderness Act.
- Authorizing the use of mechanized and motorized equipment to meet the minimum requirements for authorized activities to protect an administer the wilderness and its resources.
- Terms and Conditions to protect wilderness values and natural resources while implementing the decommissioning/breaching and restoration work.

The terms and conditions are detailed in Chapter 2.

1.7 Process and Decision Framework

This EA has been developed in response to the imminent need to alleviate the erosion the dam is creating. This project was initiated in February 2023 and uses an interdisciplinary approach that integrates historical, physical, biological, and other science resource areas to analyze the project area and identify any areas that have potential resource concerns.

An Interdisciplinary Team of resource specialists has assessed the potential effects and consequences of implementing the proposed action for the project area. The team has reviewed the Montana

Environmental Policy Act (MEPA) environmental assessment (EA) and finding of no significant impact conducted by MT Dept. of Natural Resources (DNRC) and the City of Missoula. This EA by the Forest Service documents the analyses that relate to the Forest Service proposed action, relative to the specific resources within the project area, considering the implementation as a connected action. The proposed action is designed to protect and maintain the natural resources within the project area and adhere to the standards set forth in the Forest Plan. A Minimum Requirements Analysis Framework was completed for the action to be undertaken by the City of Missoula in compliance with 36 CFR 293.6.

The Interdisciplinary Team and Responsible Official have considered Forest Plan goals, objectives, standards, guidelines, and management practices, together with public concerns. The ID Team evaluated the affected area, developed the proposed action which includes a list of terms and conditions, evaluated environmental consequences, and analyzed the proposed action through a resource-based environmental analysis, which is documented in this environmental assessment, and its associated project record. From this analysis and the supporting Project Record, the Responsible Official will determine:

- Whether the proposed terms and conditions will be applied to the City of Missoula's action.
- Whether an Environmental Impact Statement is necessary.

In making this decision, the Responsible Official will consider such questions as the following:

- How well does the alternative meet the purpose and need described in this EA?
- How well does the alternative meet the intent of the Wilderness Act?
- Does the alternative mitigate potential adverse effects as needed to support a finding of non-significant impacts (FONSI)?

1.8 Tribal and Public Involvement

Public participation helps identify concerns and issues with a proposal released during the scoping period. This input is essential for the Forest Service to refine a proposed action, which meets the purpose and need for the project, and is responsive to the concerns of the public. This information enables the Responsible Official to make decisions with an understanding of the environmental consequences. The public participation process also allows the Forest Service to disclose the nature and potential consequences of the proposed activities on National Forest System lands.

Scoping Process

A scoping letter explaining the purpose and need for action, as well as the location and description of the proposed action, was sent to 200 interested and affected parties both in hard copy format and electronically on March 13, 2023. The scoping documents were also posted on the Lolo's internet web page and listed in the Forest's Schedule of Proposed Actions (SOPA).

A public meeting hosted by the City of Missoula and the Forest Service was held in Missoula on March 15, 2023, and was attended by about 20 members of the public. The City provided the background about the dam, the purpose and need, and a description of their proposed activities.

Over 1000 comment letters were received. Most of the letters were form letters from a campaign launched by Wilderness Watch.

Public comment ran the expected spectrum of wilderness purists who wanted all work to be done by

hand and horse or mule only, with no mechanized or motorized equipment, regardless of how long it would take, to pragmatists who wanted the work done as quickly and efficiently as possible to minimize the time of disturbance to wilderness visitors and wildlife, recognizing the existing rights of the City to motorized access. As determined by agency and City engineers, breaching the dam solely with hand tools would take two summer seasons, requiring stabilizing the dam opening over winter. Wilderness compatible methods of breaching the dam would entail humans moving buckets of rock for several weeks. (Wheelbarrows and carts are normally not allowed in wilderness unless authorized under the Minimum Requirements Analysis Framework (MRAF) as a minimum required tool.) Group size is limited to 10 persons in the Rattlesnake Wilderness; therefore, the work crew must be relatively small. A "man camp" on site for extended periods of time two summers in a row would take a toll on any site, and particularly one in a wilderness area. Extensive use of horses and mules on trails and at the work area is not harmless, and there is no area at McKinley Lake where the stock could be corralled or provided with pasture.

Dewatering the work area by hand would also add weeks of work and can be unreliable. Heavy helicopters and large heavy equipment may be fastest but would have greater impacts on wilderness values. The City of Missoula and the Forest Service are seeking to balance the need to get the work done effectively and efficiently while protecting wilderness values to the most practical extent. Based on the MRAF, the City of Missoula has proposed a work crew of 10 people, motorized/mechanized tools (e.g., pump, auger and wheeled carts) and mobilization supplies flown in by medium helicopter, and vehicle transport on the existing easement access road at the wilderness boundary for two miles up Lake Creek to where the road ends near Carter Lake. It is an approximately 1.5 mile walk along Trail 534 from there to McKinley Lake. This approach will allow the work to be completed in a single season and maintain a lighter impact on wilderness values. Occasional resupply by stock animals is expected. While many people were concerned with the precedent the breaching of McKinley Dam will set for the other dams in the Rattlesnake Wilderness, each case is different and will have to be considered based on the individual characteristics of the dams and sites. Other dams in the Rattlesnake system may have timber cribbing, involving a different approach.

Tribal Input:

The Forest Service shares in the United States' legal responsibility and treaty obligations to work with federally recognized Tribes on a government-to-government basis to protect the Tribes' ceded territory rights on lands administered by the Forest Service. As such, the policies of the Forest Service toward federally recognized tribes are intended to strengthen relationships and further tribal sovereignty through fulfilling mandated responsibilities.

The scoping documentation was sent to tribal representatives. No comments were received from the tribes during the scoping period.

Other Agencies:

The scoping documentation was sent to local government agencies. These included City of Missoula Public Works, Missoula County Commissioners; the Missoula County Public Lands Specialist; the Montana State Historic Preservation Office; the Montana Department of Natural Resources; and the Montana Department of Environmental Quality.

Public Notice and Comment Periods

As described in the cover letter accompanying this EA, there is an opportunity to provide input during a 30-day comment period on the proposed action for authorizing limited helicopter access, vehicle access, and the terms and conditions. The cover letter attachment also provides information on how to provide comment. To gain standing to object to this project, interest or comment must be received during an established comment period. This EA comment period will begin upon release of a legal notice published in the *Missoulian* newspaper.

1.9 Forest Plan Consistency and Regulatory Framework

The development of this EA is based on direction contained in the Forest Plan, the National Forest Management Act (NFMA) and its implementing regulations (36 CFR 219), the National Environmental Policy Act (NEPA) and its regulations (40 CFR 1500-1508 2022 version), the Wilderness Act of 1964 and the Rattlesnake National Recreation and Wilderness Act of 1980. The EA is tiered to the Lolo's Forest Plan, its Final Environmental Impact Statement, and Record of Decision. This EA is tiered to these documents as permitted by NEPA (40 CFR 1501.11). These documents are available upon request and also located on the internet at Forest Service (usda.gov).

The Forest Plan has a wide variety of goals and objectives to achieve a balanced use of the Lolo National Forest. The action alternative discussed in this EA is consistent with the Forest Plan.

Management direction for the Lolo National Forest is contained in the Forest Plan. The Forest is divided into Management Areas (MAs), which have specific standards and guidelines for managing resources. The McKinley Lake Dam Decommissioning and Restoration project area being analyzed is in management area (MA) 12 – Rattlesnake Wilderness. The management prescription for MA 12 is under the direction of the Rattlesnake National Recreation Area and Wilderness Act of 1980. The Forest Plan allows for a maximum party size of 10 horses and 10 persons in MA 12.

Large-scale issues of management direction established in the Forest Plan are outside the scope of this analysis and will not be addressed in this EA.

The Rattlesnake National Recreation Area and Wilderness Act of 1980 P.L. 96-476

28,000-acre National Recreation Area, 33,000-acre Wilderness

Special Provision Language:

> Section 4. "Nothing in this Act shall be construed to permit the Secretary to affect or diminish any water right which is vested under either State or Federal law at the time of enactment of this Act, nor the rights of the owner of such water right to customary and usual access, including necessary motorized use over and along existing roads and trails to any facilities used in connection therewith, and the right to operate and maintain the facilities."

Wilderness Act of 1964

The Chief may authorize occupancy and use to carry out the purposes of the Wilderness Act and will proscribe conditions under which motorized equipment, mechanical transport, aircraft, helispots to meet the minimum requirements for authorized activities to protect and administer the Wilderness and its resources (36 CFR 293.6(c)). Breaching/decommissioning the McKinley Lake Dam is an action to protect and administer resources in the Wilderness. A minimum requirements analysis framework

for this project was used to compare alternative methods of implementing the project, allowing us to determine the minimum tools needed to complete the project in one field season. Traditional tools were considered for feasibility for each task. The MRAF (Appendix C) details this consideration.

Chapter 2 – Alternatives

2.1 Developing Alternatives

Section 102 (e) of NEPA states that all Federal agencies shall, "study, develop, and describe appropriate alternatives to recommend courses of actions in any proposal which involves unresolved conflicts concerning alternative uses of available resources." Two alternatives were developed and analyzed in detail, and include the No Action (i. e., no terms and conditions) alternative (Alternative 1) and the proposed action (Alternative 2). The range of alternatives developed has been deemed reasonable based on information known to date and the range of public comments received during the scoping period. An alternative evaluating the use of primitive methods and tools only is included in the MRAF.

Issues serve to highlight the effects or unintended consequences that may occur from the proposed action, providing opportunities during the analysis to explore alternative ways to meet the purpose and need for the proposal while reducing adverse effects. Issues are used to highlight direct cause and effect relationships between the proposed action and Forest resources.

Concerns are questions raised in public scoping that were determined not to require detailed analysis, because they are either already decided by other laws and regulations, or because impacts that could be caused by the proposed action are not anticipated. In some instances, concerns can be addressed through implementation of Forest Plan direction, project stipulations, or clarification of the project's intent.

The main concern raised during scoping was effects to wilderness character and values if motorized or mechanized means were employed to breach the dam. The City has a statutory right to motorized travel over Trail 534 within the Rattlesnake Wilderness. The segment of the trail they use for access was a road before the area was designated as wilderness. The drivable portion of the trail comes to within 1.5 miles of McKinley Lake, and the remainder of the trail to the lake will be traveled on foot. No road construction or clearing will be done. The City accesses the dam by helicopter at least once annually for maintenance; therefore, use of a helicopter to bring in heavy supplies and tools at the beginning of the project and to remove them by helicopter at the conclusion is not far removed from baseline conditions. Getting the dam decommissioned as quickly as possible was supported by both Trout Unlimited and the Watershed Education Network. A total non-motorized and non-mechanized implementation would take two operating seasons with unacceptable environmental concerns and costs to the City. The minimum requirements analysis framework resulted in the need for the use of specific motorized tools to allow completion of the project within one field season, and to meet safety requirements for blasting. The MRAF also determined that rock and dirt removal could be accomplished by a crew of laborers using wheeled carts, instead of bringing a mini excavator into the wilderness. Specific actions could not be safely or adequately accomplished with primitive means, and these are detailed in the MRAF. Terms and conditions reduce or eliminate effects of the minimum requirements, and there was not a need to develop an additional action alternative.

2.2 Scientific Integrity

The information presented in this EA is based on current and relevant scientific information. An important consideration is that the exact location and amount of any activities could vary upon implementation. Field surveys by project specialists were crucial in calculating and analyzing the data

used in resource evaluations. Calculations are based on skilled interpretations of aerial photos and maps; application of professional judgment from observations and evaluation of data; and information acquired from review of relevant, scientific literature. New information may present itself in the process that would require implementation strategies to be altered. The information in this EA is also based on the relevant and current literature, and on the environmental assessment conducted by the City of Missoula and Montana Department of Natural Resources under the Montana Environmental Policy Act.

2.3 Alternatives Considered

Alternative 1 – No terms and conditions

This alternative was developed in response to NEPA requirements [40 CFR 1502.14(c)]. This alternative serves as a baseline for evaluating and comparing the effects related to the proposed action. Under Alternative 1, no terms and conditions to protect wilderness values would be applied to the action that will be implemented by the City of Missoula to breach the dam. The Forest Service is required by both the Wilderness Act and the Alaska National Interest Lands Conservation Act (ANILCA) to authorize access to valid occupancies such as these easements held by the City of Missoula. The City has a legal obligation to correct the defective condition of the earth embankment dam and instability concerns of the dam, particularly related to seepage and piping under high reservoir levels and earthquake loading conditions, as well as the eroding spillway. Based on inspections and preliminary recommendations from their engineering representatives, the City of Missoula does not have the option of taking no action and ignoring the recommended professional standard of care of their facility.

Without terms and conditions, the City would implement their preferred method of decommissioning the dam using small heavy equipment and multiple helicopter trips. Selecting alternative 1 or denying the City of Missoula adequate access for the purpose of bringing their dam into compliance with current safety standards, is not within Forest Service discretion. No pack stock would be used for resupply; supplies would be delivered via helicopter midway through implementation. This alternative is described in detail as “Alternative 3” in the minimum requirements analysis framework at Appendix C and was the City of Missoula’s preferred alternative from an engineering perspective.

Alternative 2 – Proposed Action

This alternative was developed to address the purpose and need for action. It was developed to authorize adequate access to the City of Missoula and their agents to safely breach the McKinley Lake Dam to stop the erosion at the spillway, and to restore the spillway and lakeshore while limiting effects to wilderness values and other resources.

The Minimum Requirements Analysis Framework (MRAF) was used to develop the appropriate actions that are the minimum necessary for the work to occur in the wilderness, yet accomplish the objective within one field season, and more specifically, the period July through September. The MRAF identifies the number, size and type of equipment needed. This is also “Alternative 2” in the MRAF.

The Lolo National Forest proposes to authorize the City of Missoula limited helicopter access and limited use of mechanized and motorized tools to breach the McKinley Lake Dam. These include wheeled carts to move rock, a power auger to aid in the placement of explosives, and a pump to dewater the work area. The Forest Service would authorize sufficient helicopter access to allow for the work to

be done safely and efficiently beginning in the summer 2024 field season, without the need for overwintering stabilization.

The proposed action includes sufficient helicopter trips (flight time over wilderness is estimated in Appendix C) to accomplish the project in accordance with generally accepted industry standards and the professional standard of care required for McKinley Lake Dam. Both the City of Missoula and their engineering representatives have agreed to use hand tools and the work crews in the proposed action wherever feasible. The City approached the Montana Conservation Corps regarding conducting the work solely using traditional skills and non-mechanized/non-motorized methods. MCC stated this task was beyond the reasonable capabilities of their personnel.

The Forest Service proposed action is responsive to the City of Missoula's intent to use traditional (non-mechanized/non-motorized) skills and means where they are feasible and compatible with public safety and dam safety objectives. The proposed action also authorizes traditional methods of access for transporting camp supplies and personnel via stock or foot travel on Trail #534.

While the City has the right to access the site over existing roads and trails, vehicular traffic for implementing the dam breach and decommissioning exceeds normal and customary use. The Forest proposes to authorize this increased use to drive two miles within the wilderness boundary to drop off work crews. They may not leave vehicles within the wilderness boundary overnight but may park in the National Recreation Area.

In addition, to protect national forest values and resources, the terms, conditions, mitigation measures and monitoring specified in the next section, on pages 15-18, would be required during access and work periods authorized under this alternative.

The work is proposed to occur over a 12–13-week period. There would be up to ten people working at the site to construct the breach and complete any necessary decommissioning including the placement of riprap on the side slopes. The needed tools and supplies would be transported to the site by helicopter during one day of mobilization. Additional food and supplies would be transported to the basecamp/stock camp in the National Recreation Area via vehicle on the access road (Road/Trail #515) midway through implementation, and then transported to the worksite by pack string. The workers would camp near the work site in two-week rotations in approved campsite locations (see Appendix A – Map 1). One day of helicopter use at the completion of the project would be authorized to remove heavy items from the work site.

TERMS AND CONDITIONS, MONITORING REQUIREMENTS AND PERMITS REQUIRED FOR THE PROPOSED ACTION.

Terms and conditions are controls or guidelines that reduce or eliminate adverse effects of management activities. Monitoring is the gathering of information and observation of management activities to provide a basis for confirming that work is accomplished as designed and that measures in the terms and conditions are effective. The environmental impacts of the proposed action discussion are based on implementation of the listed Terms and Conditions. Additionally, mitigation and monitoring items will be required of the City of Missoula.

The terms and conditions and mitigation measures required for the proposed action alternative are displayed on the following Table 1 and Table 2.

The following items are the City of Missoula's responsibility:

Table 1. Terms and Conditions

Measure
Dam Safety
1. Plans and specifications will be reviewed in accordance with federal laws and Forest Service standards and criteria for dams. It is critical that the City, through their engineering representative and licensed contractor, implement the project according to the professional standard of care and generally accepted industry standards, especially for critical elements that affect the overall safety and integrity of the embankment.
2. The dam owners are responsible to provide their own radio or telephone communications.
3. During the construction period, the City of Missoula and their engineering representative will have an updated emergency action plan in place to respond to incidents, such as flooding and potential filling of the reservoir from a major storm event during critical portions of the work.
Wilderness Resource, Recreation and Wildlife
4. The work crew will camp in an established campsite(s) or existing hardened site(s), as specified by the USFS Wilderness Specialist, at least 200 feet from water.
5. Human waste will be consolidated in a trenched latrine and/or temporary, backcountry latrines flown in and out for the duration of the project. If a trenched latrine is used, it will be located at least 200' from water and filled in at the end of the project.
6. Stock used to support project work will be tied and/or held in the wilderness in such a way as to minimize soil disturbance and avoid loss of native/desirable vegetation. Pack stock used for resupply will not be allowed to overnight at McKinley Lake.
7. Pack stock and helicopter transportation for project activities will be restricted to weekdays when possible and avoid flying directly over trails to minimize impacts to wilderness visitors.
8. To minimize disturbance to wildlife, especially grizzly bears, the helicopter will take as close to the same flight path as possible for each trip to and from the dam site. Helicopter operation below 500 feet above ground level (AGL) should be limited to the direct vicinity of the dam site.
9. All human trash will be removed from National Forest System lands during and at the completion of the project. Trash cannot be placed in the latrine or buried on site.
10. Use of the main Rattlesnake corridor (Road #99/Trail #515) will be limited to that which is necessary for project implementation. If using multiple vehicles, travel will occur in a convoy, when possible, to limit disturbance to forest visitors.
11. Motorized access inside the wilderness on Trail #534 will be limited to the existing drivable roadbed and that which is necessary for crew transportation. Vehicles will be parked outside the wilderness boundary.

Measure
12. Motorized tool use and mechanical transport will be restricted to the uses approved in the MRAF (Appendix C) and minimized in project work.
13. Limit motorized tool use to daytime hours (1/2 hour before sunrise to 1/2 hour after sunset) if possible.
14. Dam breach design and project materials will be compatible with the wilderness setting.
15. Any old dam materials (e.g., log cribbing, metal piping, etc.) remaining on site shall be scattered, if native material, or removed from National Forest System lands at the end of the project.
16. Any onsite borrow sources created for obtaining gravel and fine material will be weed-free, located off trail, and naturally rehabilitated to minimize evidence of use. Rock will be collected across a dispersed area to avoid removing noticeable quantities from any single concentrated area.
17. Northern Continental Divide Ecosystem (NCDE) Food Storage Order will be followed for the duration of the project (see details and definitions in special order). During daytime hours, all attractants, including human food and garbage shall be stored in a bear resistant manner. During nighttime hours, all attractants, including human food and garbage shall be stored in a bear resistant manner unless it is in immediate control, being prepared for eating, being eaten, being transported, or being prepared for storage. Attractants shall not be buried, discarded, or burned in an open campfire.
18. Contractors and their employees should carry bear spray and know how to use it. Contractors and their employees will be prohibited from carrying firearms. To resolve a bear-human conflict situation, project activities may be modified, cancelled, suspended, or temporarily ceased, as needed.
19. If any threatened, endangered, or sensitive species are encountered during project implementation, the botanist, wildlife biologist, or fisheries biologist should be notified. Project activities may be modified, cancelled, suspended, or temporarily ceased, as needed to protect these resources.
20. Staging areas, fuel storage and containment area, and camping site for McKinley Lake Dam will be identified by City of Missoula prior to initiation of project.
Water and Fisheries
21. If possible, all work will be accomplished outside of standing or running water.
22. If used, silt fence shall be employed in accordance with engineering specifications.
23. Water pumped over the dam during implementation to maintain a dry work area should flow into sites that would not erode.
24. Disturbed areas, including soil borrow areas, as much as is practical, shall be confined to within the high-water mark of the existing lake.

Measure
25. All fuel shall be stored in an approved spill containment structure that shall be of sufficient capacity to contain all the fuel stored in the structure. The basic containment structure shall include an HDPE-lined basin and berm to contain spills or leaks. Fuel will be stored more than 100 feet from the surface water. All hazardous material will be removed from the site at the end of the project. A hazardous spill kit will be on site.
26. Excavated areas shall be graded to a stable slope.
27. Areas of ground disturbance should be covered in slash for erosion control.
28. The stream channel at the outlet should be rehabilitated to meet the natural form and dimensions.
29. Contractors hired by the City of Missoula are responsible for obtaining needed permits and ensuring compliance
Soil Resource
30. Scarify compacted areas using typical hand tools and cover with available wood debris.
Heritage Resource
31. Major portions of the dam on either side of the breach shall be left intact.
Whitebark Pine
32. Protect individual and clumps of whitebark pine trees from blast zone as practicable.
33. Relocate any moveable whitebark pine that have established on top of the dam to an area outside the blast zone prior to any blasting.
Invasive Plants
34. All vehicles, equipment and supplies will be inspected and cleaned of weed-seed prior to entering the wilderness. Workers should be sure that the helicopter base used for staging equipment transfer into the wilderness is free of noxious weeds (FSM 2080). All equipment transported into the dam site should be cleaned prior to entering the wilderness to ensure no weed seed is introduced.
35. Contain stock in areas free of spotted knapweed and other visible noxious weeds at Elk Meadow in the NRA when used as a camp for the project resupply.
36. Weed-seed free feed is required for all stock while at Elk Meadow and recommended as feed for a few days prior to entering the wilderness. Low impact camping techniques should be used to reduce the risk of introducing weeds or creating habitat suitable for seed germination. Areas of bare soil will be revegetated as soon as possible after work is completed.

The following items are Forest Service (FS) Responsibility:

Table 2. Mitigation measures (FS)

Measures
1. The work crew will be briefed by a USFS Wilderness Specialist on minimum impact/leave no trace ethics prior to starting work in the wilderness and will follow minimum impact/leave no trace ethics while working and camping in the wilderness. USFS personnel will periodically inspect the project area to ensure compliance with minimum impact/leave no trace ethics.
2. Information will be posted at affected trailheads and the wilderness boundary to inform forest visitors about project work and potential impacts to recreation use and access. Project information will also be provided to the local newspapers, on the Forest web page, and through the Forest's social media.
3. Monitoring for the presence of noxious weeds at the project site, campsite and along the access trail would be required during and one year following the completion of the project. If noxious weeds are found to be present in the area, control and eradication measures will be implemented immediately.
4. Monitor location to ensure appropriate vegetative growth is occurring after implementation. If appropriate vegetative response is not occurring within the impacted area in the following two seasons, work with appropriate Forest Service personnel to seed with native species or transplant those species.
5. To provide for crew and public safety, the area directly around the dam site will be closed the entire duration of the project. Visiting McKinley Lake will still be allowed, but recreational camping there will not be possible.

Dam Breach Specifics

McKinley Lake Dam is a historic resource, and the breach would destroy a portion of the historical components of the dam. The dam was in place 57 years prior to the area being designated as wilderness and the dams in the Rattlesnake drainage are an important part of Missoula's history. The Forest consulted with State Historic Preservation Office as a part of the National Historic Preservation Act project review. During the consultation, the SHPO asked the Forest to consider options for breaching the dam that would cause the least amount of damage to the dam and to provide measures to mitigate the effect.

The City of Missoula would breach the dam along at its center where the natural outlet stream is located. This would leave most of the rock structure intact to preserve the historic integrity of the dam (Figure 2 and Figure 3). This location was determined by FS staff and City engineers to be the most suitable and leave as much of the dam intact as possible for historical purposes.

Figure 3. Approximate proposed breach location of McKinley Lake Dam as viewed from the lake side

The breach would bring the dam into compliance with dam safety standards. During the spring runoff period, water levels would reach and flow through the constructed breach. At the location of the constructed breach, water would then follow the natural stream channel to Carter Lake. There would be no need to work on the stream channel. The breach construction is anticipated to be completed within one field season.

Chapter 3 – Affected Environmental and Environmental Consequences

3.1 Introduction

This chapter describes the affected environment and presents the effects analyses related to the concerns identified and legal requirements. This chapter also provides the foundation for the scientific and analytic basis for comparison of Alternative 1 and Alternative 2. Detailed information on the effects analysis is located in the project record and contained within individual resource reports. Also see the environmental assessment completed by the City of Missoula and State of Montana under the Montana Environmental Policy Act. A copy is posted on this project page on Lolo National Forest website.

3.2 Hydrology

Resource Indicators and Measures

Table 3 below shows the water resource indicators and measures for both the affected environment and effects analysis. The following questions are answered to assess effects to the watershed resource:

- How would the proposed project activities, in addition to past, present, and future actions, affect stream channel stability and water quality, primarily sediment delivery to streams?
- How would the proposed project activities, including past, present, and future actions, affect water yield/water quantity including magnitude, timing, and duration of stream flows?
- How would project activities affect hillslope hydrology and watershed health?

Table 3. Resource indicators and measures for Alternative 2

Resource Element	Resource Indicator	Measure	Unit of Measure	Source
Water Quality	Sediment delivery	Road encroachment, road sediment delivery, PIBO data and stream crossings	Tons of sediment delivery (modelled), and undersized stream crossings	Forest Plan, pages II-1, II-2, II-12, III-58
Water Quality/ Stream Stability	Change in Water Yield and Increased Peak Flows	Proposed Treatments Equivalent Clearcut Acres (ECA)	Percentage of area of HUC watersheds in Equivalent Clearcut Acres (ECA)	Forest Plan, page II-12
Watershed Health	Altered hillslope hydrology	Road Density	Road Density in miles/mile^2	Columbia River Basin Study (USDA Forest Service, 1996)

Spatial and Temporal Context for Effects Analysis

Effects analysis for this project considers direct, indirect, and cumulative effects. Spatially, for these effects the bounds are the same: the boundaries of the 6th level watershed where any breach construction, trails or other project-associated activities would occur. This level of analysis was selected as it provides an adequate scale for determining potential effects.

The temporal scope of watershed effects is estimated to be from 2024 until 2027. The scope continues to year 2027, which is approximately three years after project implementation (expected 2024) and the estimated amount of time for effects from this project to stabilize and be no longer perceptible in nature. For short term effects, the temporal scope can range from hours to a few days after work is completed.

Affected Environment

Watershed Setting

Watershed boundaries were identified from the Forest watershed geographic information system (GIS) layer. Boundaries are based on the 6th Hydrologic Unit Code (HUC) watersheds. The project area is entirely located within the Upper Rattlesnake Creek subwatershed HUC 170102040101. According to the USGS (2016) McKinley Lake has a drainage area of approximately 28,967 acres.

The Stuart Mountain SNOTEL site located approximately 3.8 miles west of the project area at an elevation of 7,400 feet provides a summary of the precipitation data available for the project area. Climate data indicates that precipitation amounts are highest from November through February, when most of the precipitation is received in the form of snow. Precipitation is lowest from June through August.

Watershed Health

The Upper Rattlesnake 6th HUC watershed is mostly in designated wilderness. Of the 28,697 watershed acres, 20,855 (72 percent) is wilderness area. This area was managed in the past, as evidenced with 17 miles of roads existing in the watershed, four miles of which are in the designated wilderness area, and a history of dam development for municipal water resources. Ten dams were constructed 100+ years ago and are past their service life. The proposed dam for removal, the McKinley Lake Dam, was built in 1923 and is currently in a state of disrepair with active erosion and gullying occurring in the spillway and at risk of failure. There have also been past wildfires in the watershed and a history of timber harvest associated with the road building. Current management and use in the 6th HUC watershed consist primarily of year-round recreation, trail maintenance, and prescribed and natural wildfire activity.

Given the lack of open roads (or the presence of rarely used roads) or active management in the watershed, there are no current issues with altered hillslope hydrology and the road density is low and not impacting watershed health.

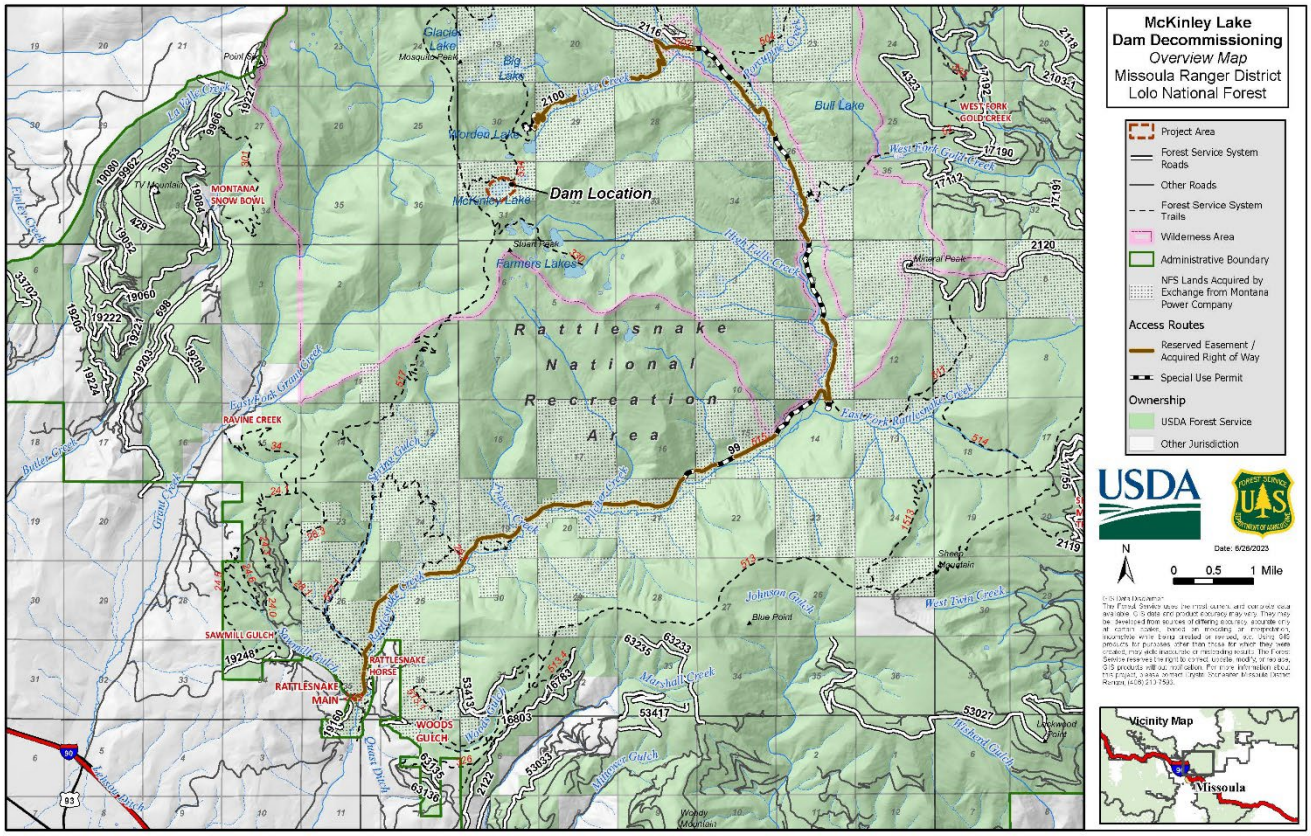

Figure 4. Map for the Rattlesnake drainage

Water Quality

The Rocky Mountain Research Station collects PACFISH/INFISH Biological Opinion (PIBO) data across the Columbia River Basin. There is one established site in Rattlesnake Creek, just inside of the 6th HUC boundary. This is a standardized methodology that looks primarily at fisheries habitat but also some key stream morphology and hydraulic indicators. Data from these sites was used to assess current stream conditions.

This site had an index score of 59 the last time it was sampled in 2014. The index score is a prediction of what a site should be as it is compared to a reference site with similar watershed characteristics. As such, the higher the total index score, the closer a site is to reference conditions and it is likely more functional, with 100 being the highest score possible. Although the sampled site is primarily below the wilderness area, it still has a management history and as such functions as a managed site. This index score is slightly higher than expected compared to other managed sites on the forest.

There are no 303(d) listed streams within the project area (Division of Water Quality 2014). 303(d) listed waters are those that are not meeting their designated beneficial uses. The project is no longer located within a local municipal watershed. According to the 2022 Montana Department of Environmental Quality report, Rattlesnake Creek is not assessed or needs more data for a designation.

As stated in a previous section, there are only 17 miles of road located in the 6th HUC watershed. With

such a low road mileage and density, these roads aren't impacting water quality on a watershed scale. There are 4.7 miles of National Forest System Road (NFSR) that runs adjacent to Rattlesnake Creek. This road also crosses Rattlesnake Creek as well as some tributaries. This road is primarily used as a trail for hiking, biking, and stock. Although near Rattlesnake Creek, this road isn't adversely impacting water quality or sediment delivery into the creek due to the low use of it. The only vehicular traffic is administrative use to administer the wilderness and access the wilderness dams, which occurs infrequently.

Stream Stability

Although the watershed has a history of management, including timber harvesting, there has been no active management since the area was designated the Rattlesnake Wilderness and National Recreation Area in 1980. Therefore, any past management has fully recovered hydrologically, and water yield has stabilized and no longer is an issue for stream stability. Any increases in water yield that occur now in the drainage are from naturally occurring wildfires.

The spillway outlet to the McKinley Lake dam is the main area where there is stream instability. The outlet is head cutting and causing localized erosion in the stream channel and a lowering of the stream base elevation. This is also the primary reason for drawdown of the dam. This headcutting puts the dam in danger of failure and subsequent resource damage and hazards to the public.

Direct and Indirect Effects

Alternative 1 – No terms and conditions

Under this alternative with no terms and conditions, water quality is at risk if protective measures for human waste and fuel storage are not taken. Outflow pipes from the siphon may erode an area below the dam if care is not taken to ensure the flowing water goes into an area of heavy vegetation. The City's preferred alternative does not involve stock use, so there is no risk to water quality from horses and mules near water. Heavy equipment working along the lakeshore has the potential to create temporary turbidity. Additional helicopter flights are not expected to influence water resources.

Alternative 2 – Proposed Action

Potential direct effects would primarily be from ground disturbance related to blasting, clean-up and placement of riprap, the workers campsite, and the seasonal change in flow patterns related to the breach. Potential indirect effects include, but are not limited to, altering water quality from human and animal waste (Table 3).

Water Quality

There is the potential for increased turbidity in the creek that drains McKinley Lake immediately after the water drawdown is completed. This is primarily due to exposed surface soil from excavation and breaching the dam. This would occur during any rainfall events or during spring runoff. Erosion control measures will be in place to mitigate this potential. McKinley Lake flows directly into Carter lake and any potential impacts will not be beyond Carter Lake.

The proposed location of the breach occurs where the dam currently leaks. The breach would carry water in a similar way the water currently flows when levels are high enough for the dam to leak. This should not change flow patterns or channels.

Potential indirect effects to water quality include, but are not limited to, campsites and associated human waste. Design criteria in the terms and conditions would reduce any potential effect to a negligible amount.

The work crew campsite area would result in the potential accumulation of human waste. To avoid or minimize resource impacts, terms and conditions for the management of human waste would be implemented and are incorporated as part of the proposed action.

Through the implementation of project design criteria and Best Management Practices (BMPs), the Clean Water Act, State water quality standards, and beneficial uses would be met. Direct or indirect effects to water quality under this alternative would be negligible.

Stream Stability

Both Alternatives will improve stream stability through restoring the natural form, function, and dimensions of the existing channel exiting McKinley Lake. The existing spillway channel has cut down and is actively eroding. Once the lake is restored to its natural level, water flow over the spillway should no longer occur and natural revegetation of the scoured area will stabilize the channel. Stopping the erosive headcutting of the spillway will be a beneficial effect in the long term.

Floodplain, Wetlands and Riparian Areas

Specific project design criteria have been developed by the City of Missoula and the State of Montana to protect the floodplains, wetlands and riparian areas from ground disturbance and potential water quality impacts. Along with our terms and conditions, the direct or indirect effects under this alternative would be negligible.

The proposed breach construction to stabilize the dam and stop the headcutting of the spillway would not result in indirect effects on the extent of wetland vegetation. Monitoring is recommended to determine whether breaching the dam reduces the spatial extent of this wetland environment.

Cumulative Effects

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Cumulative effects arise from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions. Effects must overlap in time and space to be cumulative. There are no past, present or foreseeable future actions within the locality of the McKinley Lake Dam Decommissioning Project area, whose effects when combined with the negligible effects from the proposed action would create cumulative effects to water quality, floodplains and wetlands, and stream morphology. While the future decommissioning of other dams in the Rattlesnake Wilderness has been contemplated, there are no current plans.

Summary of Effects

The design of this project is such that minimal effects to watershed resources are expected from Alternative 2, as discussed above. Design criteria and BMPs all contribute to the prevention of sediment delivery to streams and impacts to riparian areas or wetlands. The amount of actual sediment delivery is expected to be negligible. Therefore streams, riparian areas and wetlands are expected to experience minimal, short-term effects.

3.3 Soils

Affected Environment

McKinley Lake is a natural lake within a glacial cirque basin at an elevation of approximately 6860 feet. The lake is framed on the south and east sides by steep rocky slopes mapped within the 40QA (Glacial cirque headwalls), and 42QA (Glacial cirque basins) landtypes. The steep slopes are composed of fine-grained quartzite, argillite and siltite. The basin unit is underlain by a complex of glacial deposits and moderately shallow, residual material from argillites, siltites, and quartzites. Soils reflect the parent material, vegetation patterns, and climate.

Glacial cirque headwall soils are well-drained and moderately coarse to medium textured silt loams. Surface layers are very gravelly silt loams, while subsurface layers consist of very cobbly silt loams with 55 to 90 percent rock fragments. Soil depth ranges from 12 to 40 inches. Soil surface layers may have formed in volcanic ash influenced loess. Rock outcrop and talus are major components. Glacial cirque basin soils are well-drained to somewhat poorly drained and moderately coarse to medium textured. Surface layers range from silt loams to cobbly silt loams. Subsurface layers consist of gravelly sandy loams to very cobbly fine sandy loams.

The steep headwall sections generally have shallow soils, with low annual productivity due to steep slopes and rocky harsh high elevation climate. The basin units soil depths range from shallow to moderately deep and generally have moderately high to high productivity. In general, the terrain is suited to mechanical operations when wet areas can be avoided. Compaction can lower soil productivity, but operating equipment or limiting disturbance mechanisms to when the soil is dry, frozen, or snow covered helps maintain soil productivity.

Dam and Immediate Vicinity

McKinley Lake Dam was constructed in 1923 on top of a bedrock base. The dam is an embankment dam constructed of excavated earth and rock. An earthen core is within the inner dam and both sides of the dam are lined with rock. A small (estimated 1/10 acre) opening of rocky meadow is below the dam with the outlet channel in the approximate center. Outlet water flows into a natural perennial stream without infrastructure and the banks are stable and well vegetated.

The dam is adjacent to a steep rocky talus slope on the south and east, and to a forested area to the north and west. The spillway is off the southeast end of the dam and is eroded to a channel with very large boulders.

Crew Camp and Latrine

The proposed location for the crew camp and latrine is approximately 200 yards north of the dam worksite and would be accessed from Forest Trail 534. The selected area is forested and occupies approximately two acres.

Trail 534

Trail 534 from Rattlesnake Creek to McKinley Lake will be used by stock to resupply the camp, in Alternative 2. The trail is currently used by recreationists with stock.

Elk Meadow and Trail 515

Elk Meadow in the National Recreation Area is currently commonly used as a packer's camp for recreationists using stock to access the backcountry in the Rattlesnake Wilderness. Therefore, soil compaction on the site is already present. A portion of Trail 515 would be used by stock to reach Trail 534 to McKinley Lake.

Outlet Water and Perennial Stream Corridor

The unnamed perennial creek that flows east from the dam passes through forested areas before entering Carter Lake. Lake Creek flows out of Carter to the confluence with Rattlesnake Creek, two miles east. A wet meadow near Carter Lake and the end of the drivable two-track road (Trail 534) is a wetland. Existing condition indicates good stability and high vegetation cover.

Resource Indicators and Measures

Indicators and measures reflect the potential effects of the project and were easily applied to the field review that required rapid visual assessment. Soil erosion and compaction are indicators of soil condition and effective ground cover is an indicator of soil quality.

Soil Quality is defined as the capacity of soil to function and sustain biological activity, diversity and productivity; provide the hydrologic function of regulating and partitioning water and solute flow; storing and cycling nutrients and carbon; providing physical support, and filtering, buffering and degrading potential pollutants.

Short-Term Effects

Short-term effects for soils for this project can be defined as effects occurring up to one year following project completion. Given one growing season, effective ground cover impacted by the project is expected to have recovered to near pre-project surface cover levels, and surface runoff and soil erosion levels would be like pre-project conditions. Any sediments from project activities occurring in the area immediately downslope of the dam or near the outflow channel are expected to have been transported out with surface and stream water or stabilized in adjacent vegetation.

Long-Term Effects

Long-term effects for this project are expected to be up to five years after project completion. This time frame is based on a short growing season and that impacts of soil compaction can take several years to recover. Project areas with the most compaction may have microsites with increased surface runoff, soil erosion, and reduced vegetation. These areas could take up to five years to regain composition and cover similar to pre-project conditions. This area is approximately ¼ acre to ½ acre in size in the littoral zone of the lake.

Spatial and Temporal Bounds of Analysis

The spatial boundary for direct and indirect effects includes the defined project areas and the riparian corridor and floodplain of the unnamed perennial channel that carries water from McKinley Lake eventually into Lake Creek. The project areas are estimated to cover a total area of three acres and include the immediate vicinity of the dam, the crew camp, and the latrine. The length of the riparian corridor that would be most impacted if the dam failed would be the three-quarter mile stream channel to Carter Lake, and the approximately two-mile-long Lake Creek that flows east northeast from Carter Lake into Rattlesnake Creek. Any sediment and water discharges that might result from this project

are estimated to not have the potential to impact soil resources beyond Carter Lake. The temporal bounds of analysis for direct and indirect effects from the proposed project begins at the time of initial implementation and extends to five years post-completion.

Direct and Indirect Effects

Alternative 1 –

Under alternative 1, terms and conditions for breaching and decommissioning the dam would not be imposed on the City of Missoula. Measures to protect the soil resource are unlikely to be applied. Compacted areas may not be scarified to promote natural revegetation. Monitoring of the site post-implementation would be carried out by Forest Service personnel as funding allows. Soil displacement and compaction from small heavy equipment would be greater than the alternative arrived at in the minimum requirements analysis framework, resulting in Alternative 2. The operational work area is limited within the scope of the drainage and especially in the wilderness itself. While fewer personnel would be on site for a shorter period, impacts to the camp area would be similar to alternative 2 but would last longer without terms and conditions. No stock would be used, therefore, less wear and tear on trails leading to McKinley Lake would be expected.

Alternative 2 – Proposed Action

The proposed action would have potential effects on soil resources within the estimated three acres designated to the project, including: the dam worksite, the crew camp and latrine area. Effects along the riparian corridor and floodplain of the natural creek from the proposed action are unlikely (Table 4).

Dam Work Site Area

Excavation of a breach and stabilizing the embankment with rip rap would have the direct effect of soil compaction from rock piling, foot traffic, and supplies on the ground. The direct effect of the working breach is to allow lake levels that exceed approximately 3.5 feet of impoundment level to flow through and onto the ground below, where it will naturally drain into the perennial channel. Some sediment may flow with the lake water. The vegetation that has established on top of the dam would be removed at the site of the breach. Smaller whitebark pine trees will be relocated and replanted outside of the blast zone. Direct effects of the breach would be a pulse of increased surface runoff and potential soil erosion due to the water flow into the channel. However, by maintaining existing ground cover, soil erosion would be minimal. The increase of water volume and flow in the channel is not expected to impact the riparian corridor or floodplain.

Indirect effects from the breach excavation are increased vegetation and effective cover from the restoration of the littoral Zone along the lake shore.

Crew Camp

The use of the designated crew camp area would have the direct effect of soil compaction under tents, from foot traffic, and from the weight of stored supplies. If the proposed area has litter or duff cover, impacts from compaction would be reduced. Indirect effects of the campsite use would be reduced vegetation and effective ground cover from compaction and displacement of litter and duff, and the potential for increased surface runoff and soil erosion. The estimated area impacted by the crew camp

would be two acres. It may take two years for this area to recover. Stock delivering supplies to the camp would not remain overnight but would return to their base camp at Elk Meadow.

Latrine

The latrine would be a microsite and have no direct effects. Potential indirect effects would be soil erosion from the site of disturbed soil and contamination of soil surface or ground water that impacts water resources. It is unlikely any effects would result from a well-placed latrine being used in the proposed timeframe. Terms and conditions will require the latrine to be placed in a forested area 200' away from all surface water and from any wet meadow that may have a high water table. Soils in the project area can hold and decompose human waste.

Trail 534

Trail 534 from Rattlesnake Creek to McKinley Lake will be used by stock to resupply the camp. The trail is currently used by recreationists with stock. The amount of use by the City or its agents would not be significant. Manure from horses and mules will be a source of soil nutrients. Certified weed-free feed for the stock as required by terms and conditions will reduce the amount of noxious weed starts along the trail.

Elk Meadow and Trail 515

Elk Meadow in the National Recreation Area is currently commonly used as a packer's camp for recreationists using stock to access the backcountry in the Rattlesnake Wilderness. Therefore, soil compaction on the site is already present and use of the same site by the City of Missoula (or their agents) is not expected to increase this. A portion of Trail 515 would be used by stock to reach Trail 534 to McKinley Lake. Manure from horses and mules will be a source of soil nutrients. Certified weed-free feed for the stock as required by terms and conditions will reduce the amount of noxious weed starts along the trail.

Perennial Channel

The stream channel extends east from McKinley Lake to Carter Lake. Direct and indirect effects are not expected from the proposed action. L ake levels fluctuate naturally with seasonal runoff. The proposed breach would be constructed to allow water to flow into a constructed channel to route flows past the dam to the outlet channel. This channel would be constructed to safely route a 100-year or larger inflow design flood to the perennial channel.

Table 4. Soil Resource Direct and Indirect Effects for Alternative 2

Indicator	Cause of Soil or Vegetation Disturbance	Area and Area Footprint	Degree of Disturbance
Soil Erosion	Removal of material from dam to construct breach.	Dam area: Less than 0.2 acres	**Primary disturbance to soil would remain within current footprint of dam. No long-term (beyond one year) impacts expected in any area.**
Soil Compaction	Soil compaction due to piling of riprap, foot traffic, campsite use (tent footprints, fire rings etc.)	Campsite: 2 acres	**Highest compaction in meadows where soils are finer textured and often hydric.** **Indirect effect of increased surface runoff** **No long-term (beyond two years) impacts expected for any area.**
Effective Ground Cover	**Camp/supply objects on top of vegetation.**	**Campsite: 2 acres**	**Marginal impact to ground cover from camping. Grass and forbs will recover quickly.** **Indirect effect of increased surface runoff. No long-term (beyond one year) impacts expected in any area.**

Cumulative Effects Boundary

The spatial boundary for cumulative effects is the same as those for direct and indirect effects, including the identified project area and the stream and floodplain corridor from McKinley Lake to Lake Creek. Impacts from outside of this boundary would not impact soil resources within this project area boundary. The temporal boundary for cumulative effects would span the time from the dam construction in 1923 to five years post project completion.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Cumulative effects for the McKinley Lake Dam Decommissioning Project are limited and not quantifiable. The most notable impact to soil and watershed resources would have resulted from the original dam construction in 1923. There are no records of impacts from the dam construction. Although the spillway of the dam has been eroding for at least fifteen years, the outflow of water and sediment has been in small increments that have not impacted resources.

Wildlife, including elk and deer appear to have minimal impacts on the surrounding vegetation and effective cover. Current impacts to the proposed project areas come from recreation and are largely limited to the use of trails at the dam site and Forest Trail 534. Both foot traffic and pack stock use the trails and pack stock are allowed to graze, but grazing opportunities are very limited. Trails are

expected to be areas of compaction. Bare soil, surface runoff and erosion may be present. Camping may occur in both meadow and forested areas.

No other project is within the temporal boundaries of the McKinley Lake Dam Removal Project or would impact this area. Therefore, no cumulative effects are anticipated because of the proposed action.

Summary of Effects

Alternative 1 would result in more soil compaction and displacement at the dam breaching site due to use of heavy equipment. Some compaction would result from tents, supplies, and foot traffic within the crew camp area.

The proposed action (Alternative 2) would result in minimal direct and indirect effects within approximately three acres of project areas. Soil compaction would occur at the work site from the rocks and supplies stored on the ground, machinery, and foot traffic. Some compaction would result from tents, supplies, and foot traffic within the crew camp area. Compaction impacts on soils would be buffered by surface rock, litter, duff, and vegetation. Compaction impacts are estimated to be within microsites of the total project and would be generally short-term.

Soil erosion would increase in areas of compaction due to increased surface runoff and reduced vegetation. Additional soil erosion would result from areas where vegetation and associated duff layers have been removed or disturbed by project activities. The latrine has a low possibility of causing soil erosion or water pollution from ground disturbance and use. Soil erosion impacts would be localized and generally short-term as these impacts are expected to recover within a one-year period with scarification and placement of local available woody debris. However, time needed for the vegetation component of effective ground cover to recover can vary depending on other site factors and the degree of soil compaction.

3.4 Wilderness

This section will discuss and disclose the environmental effects of the McKinley Lake Dam Decommissioning and Restoration Project on the Wilderness Resource. Recreation is not addressed as a separate issue in this report because primitive and unconfined recreation is included as one of the five qualities of wilderness character that was analyzed.

Affected Environment

The project area **is in** the Rattlesnake Creek drainage within the Rattlesnake Wilderness. The Rattlesnake Wilderness was designated by Congress under the Rattlesnake National Recreation Area and Wilderness Act of 1980 and is comprised of approximately 34,304 acres on the Missoula Ranger District, Lolo National Forest. The wilderness area is bounded on the south by the Rattlesnake National Recreation Area (NRA), the South Fork Jocko Primitive Area to the north, and additional National Forest System Lands, private and state lands to the east and west. Despite its relatively small size, the Rattlesnake has long been important to area residents. The Rattlesnake Wilderness is the ancestral homelands of The Confederated Salish and Kootenai Tribes of the Flathead Nation. It is also a haven for recreation for the residents of Missoula, Montana. The enabling legislation of the Rattlesnake Wilderness cites the importance of the area as a municipal watershed, offering opportunities for enhancing wildlife habitat, recreational experiences, and educational values (U.S. Congress 1980).

Given its distance from the main trailhead near Missoula, the McKinley Lake area is a lightly visited wilderness destination, primarily used for backpacking, fishing, and some stock pack trips. Natural processes dominate in the area and the imprint of human activity is relatively unnoticeable, other than the earthen dam constructed in1923 prior to wilderness designation. Given the low use in the area, opportunities for solitude and primitive and unconfined recreation are high.

Resource Indicators and Measures

Impacts to the Wilderness Resource are assessed based on impacts to the five qualities of wilderness character identified in the Wilderness Act of 1964 and described in the interagency strategy for monitoring trends in wilderness character (Landres et al. 2015). The five qualities of wilderness character are defined as follows:

Untrammeled:

Wilderness is essentially unhindered and free from the intentional actions of modern human control or manipulation with an emphasis on the biophysical environment.

Undeveloped:

Wilderness is essentially without permanent improvements or the sights and sounds of modern human occupation.

Natural:

Wilderness ecological systems are substantially free from the effect of modern civilization.

Opportunities for Solitude or Primitive and Unconfined Recreation:

Wilderness provides outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Other Features of Value:

Wilderness may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Existing Condition

Resource indicators and their current condition within the project area are described below.

Untrammeled:

The McKinley Lake Dam constitutes existing trammeling within the project area. Although the dam was constructed prior to the designation of the Rattlesnake Wilderness in 1980, it is a human made structure that is currently imposing on the natural hydrologic flow from the lake to an outlet channel.

Another evidence of trammeling in the project area is fish stocking. Prior to construction of the McKinley Lake Dam and other dams inside the wilderness, the lakes were presumed to be historically fishless. With increasing recreation use, the lakes were eventually stocked (1960s-1980s) with the native species westslope cutthroat trout and non-native species such as rainbow trout (McKinley Lake) and Yellowstone cutthroat trout. Following wilderness designation, fish stocking was discontinued by the Montana Department of Fish, Wildlife and Parks (MT FWP) in the Rattlesnake Creek drainage and many of the stocked fisheries did not persist. At the last time of sampling by MT FWP (2006-2010), there was a self-sustaining population of rainbow trout in McKinley Lake (Knotek et al. 2013).

Fire suppression and noxious weed treatment also provide evidence of trammeling in the project area. Currently, all fires in the Rattlesnake Wilderness are managed under an immediate suppression strategy as outlined in the Limits of Acceptable Change based Management Direction, Rattlesnake National Recreation Area and Wilderness (U.S. Department of Agriculture 1992). The relatively small size of the wilderness, residential values of adjacent lands, and the previous protection afforded to the municipal watershed resulted in this suppression policy. In addition, noxious weed treatment (mechanical control and herbicide application) is used within the project area to control invasive plant species.

Undeveloped:

The McKinley Lake Dam constitutes a human development and permanent improvement in the project area and currently degrades the undeveloped quality of wilderness character. In addition, the City regularly uses motorized equipment and mechanical transport to access the dam for operation and maintenance, which also degrades the undeveloped quality.

Other developments in the project area include a constructed bear pole for overnight visitors to hang their food, and the roadbed and trail (#534) that provide access to the Lake Creek drainage and McKinley Lake from the wilderness boundary at the end of the main Rattlesnake corridor (Trail #515/Road #99).

Natural:

When constructed in 1923, the McKinley Lake Dam created unnatural conditions that have resulted in negative impacts to the surrounding natural environment. The existing earthen dam and reservoir cover approximately 16 acres of land. The reservoir area is disconnected from the outlet stream by the earthen dam that impounds diverted flows from the surrounding hillslopes. Additionally, as mentioned

previously, historic fish stocking in the lake also created an unnatural condition introducing rainbow trout into the watershed. Otherwise, natural processes are mostly undisturbed in the McKinley Lake area which is home to native vegetation typical of the elevation, topography, and climate, including whitebark pine, a species now protected under the Endangered Species Act (ESA). The Rattlesnake Wilderness is also home to many species of wildlife (including some protected under ESA) that benefit from its natural conditions, such as grizzly bear, black bear, Canada lynx, wolverine, mountain goat, moose, elk, and both white-tailed and mule deer. Because recreational use is low in the area, impacts to natural processes from human use are minimal with the greatest impact being trampling of vegetation at the few campsite locations.

Opportunities for Solitude or Primitive and Unconfined Recreation:

Due to its location within the wilderness boundary, approximately 4.5 miles from the start of Trail #534 at the end of the main Rattlesnake corridor (Trail #515/Road #99) which is approximately 16 miles from the main NRA trailhead, McKinley Lake has outstanding opportunities for visitors to experience solitude. The only developments in the area that affect primitive and unconfined recreation are trails with minimal trail features, trail signs, and a constructed bear pole at the lake for overnight visitors to hang their food.

Currently, the greatest impact to solitude in the area is the City's annual use of motorized equipment and mechanical transport to access the McKinley Lake Dam and other nearby wilderness dams for operation and maintenance which impacts opportunities for solitude for visitors to the Rattlesnake Wilderness. This includes both helicopter access and vehicle access up approximately two miles of the roadbed along Trail #534. However, even this use is limited to a couple of times per year.

Other Features of Value:

The historic value of the McKinley Lake Dam is unique. Originally constructed in 1923, the McKinley Lake Dam is now 100 years old. As such, the dam has been inventoried to determine its historic significance and value. It was originally recorded in July 2003 and again in 2022. The site has been determined as eligible for inclusion in the National Register of Historic Places by the MT State Historic Preservation Office. See the Heritage analysis for additional information on this and any other historic values in the project area.

Spatial and Temporal Bounds of Analysis

The affected spatial area of analysis for the Wilderness Resource includes Trail #534 from the wilderness boundary to McKinley Lake, the approximately 16-acre lake, and the surrounding project area that includes the worksite for the dam decommissioning and restoration and crew campsite. However, effects to the Wilderness Resource could have implications for the larger Rattlesnake Wilderness.

The temporal bounds of analysis include the span of time for the implementation of the proposed action (approximately13 weeks) because that is when the effects of the proposed action would take place. There would be no past or future impacts expected.

Direct and Indirect Effects

Those indicators mentioned above are used to compare the effects between alternatives and to determine the level of effect the proposed action could have on the Rattlesnake Wilderness and to what extent.

Alternative 1 – No Terms and Conditions

If Alternative 1 were selected, there would be no terms and conditions applied to the McKinley Lake Dam Decommissioning and Restoration Project by the USFS. By not applying terms and conditions to the project, impacts to wilderness character would be greater and would not meet the minimum requirements for authorized activities to protect and administer the wilderness resource as required by the Wilderness Act of 1964. The effects of this alternative on the five qualities of wilderness character are described below.

Untrammeled:

The effect on the untrammeled quality of wilderness character would be the same whether the USFS applied terms and conditions to the project or not. The only method used in the project that would have a short-term effect on the untrammeled quality of wilderness character would be the dewatering of the crib outlet area of the dam which is necessary to create a dry work area for the dam breach. The crib outlet area of the dam is already affecting the untrammeled quality of the area by controlling natural water flow out of the lake. No other actions would intentionally control, manipulate, or hinder the conditions or processes of ecological systems apart from the purpose of naturalizing the area following the dam breach. Overall, the dam project would positively affect the untrammeled quality long-term by breaching the human made structure and restoring natural water flow from the lake to the surrounding area.

Undeveloped:

The use of motorized equipment and mechanical transport without terms and conditions imposed by the USFS would have a negative effect on the undeveloped quality of wilderness character in the short-term. This would include unrestricted motorized use and mechanical transport such as use of a helicopter for mobilization, resupply, and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary and parking inside the boundary, use of a motorized pump for dewatering the crib outlet area of the dam, use of chainsaws for cutting vegetation, use of a motorized auger for creating boreholes for explosives, use of heavy equipment such as a mini excavator(s) and hauling vehicles (e.g., small tractor and trailer) for moving material onsite and constructing the outlet channel, and use of a motorized compactor for compacting the faces of the dam breach and outlet channel.

The dam breach, which would remove a portion of the human development and decommission the dam as an operational structure, would have a positive effect on the undeveloped quality long-term whether the USFS applied terms and conditions to the project or not. Following completion of the project, the City intends to relinquish their easement and cease motorized use and mechanical transport inside the wilderness related to McKinley Lake which would also improve the undeveloped quality long-term.

Natural:

The effect on the natural quality of wilderness character would be the same whether the USFS applied terms and conditions to the project or not. The only method used in the project that might have a short-term negative effect on the natural quality of wilderness character would be the use of explosives to breach

the dam. There's a chance that vegetation near the dam, fish in the lake, and wildlife nearby could be impacted during the blasting. However, any fish currently in the lake are non-native and have been unnaturally stocked in the past, and the effect to nearby wildlife would be very brief, causing short-term displacement.

The project overall, but specifically the dam breach using explosives, construction of an outlet channel, and site stabilization and revegetation would have a positive effect on the natural quality of wilderness character long-term. Partial removal of the unnatural, human-made development and restoration of the ecological processes of the lake area would increase the naturalness of the Rattlesnake Wilderness. Environmental benefits would include fisheries, riparian, floodplain, and wetland habitat restoration.

Opportunities for Solitude or Primitive and Unconfined Recreation:

The use of motorized equipment without terms and conditions imposed by the USFS would have a short-term negative effect on the solitude of wilderness visitors while in use due to the sound of unregulated motorized equipment. This would include unrestricted use of motorized equipment such as use of a helicopter for mobilization, resupply, and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary, use of a motorized pump for dewatering the crib outlet area of the dam, use of chainsaws for cutting vegetation, use of a motorized auger for creating boreholes for explosives, use of heavy equipment such as a mini excavator(s) and hauling vehicles (e.g., small tractor and trailer) for moving material onsite and constructing the outlet channel, and use of a motorized compactor for compacting the faces of the dam breach and outlet channel. In this alternative motorized equipment would likely be used daily causing noise impacts for the duration of the project. In addition, the sound from the use of explosives would also negatively impact the solitude of wilderness visitors, although this impact would be very brief on the one day blasting was scheduled to occur.

Primitive and unconfined recreation within the wilderness would likely not be affected by the project if no terms and conditions were imposed by the USFS as area closures and restrictions would not necessarily be put into place. However, recreation use in the Rattlesnake National Recreation Area would be affected by the unregulated use of vehicle transportation along the main Rattlesnake corridor (Trail #515/Road #99) related to the project.

The project would negatively affect opportunities for solitude in the short-term while work is being conducted on the dam due to an increase in human activity and noise at the project site. This is true of both alternatives; however, this alternative would intensify the effect by increasing the use of motorized equipment when no terms and conditions are imposed on the use by the USFS. Long-term, the project would have a positive effect on opportunities for solitude at McKinley Lake in eliminating the City's motorized use and mechanical transport inside the Wilderness related to operation and maintenance of the McKinley Lake Dam.

Other Features of Value:

The dam breach itself, with or without terms and conditions imposed by the USFS, would have a negative effect on the historical value of the dam by removing a portion of the historic structure, however, leaving most of the structure in place would preserve the historic value long-term. No other cultural resources would be affected by the project. Although it should be noted that use of heavy equipment such as a mini excavator(s) and hauling vehicles that would be used in this alternative would pose a greater risk to any potential subsurface cultural resources, as there would be less control and visual inspection than working by hand.

Alternative 2 – Proposed Action

If Alternative 2 were selected, there would be terms and conditions applied to the McKinley Lake Dam

Decommissioning and Restoration Project by the USFS. Applying these terms and conditions would minimize the effects to wilderness character and meet the minimum requirements for authorized activities to protect and administer the wilderness resource as required by the Wilderness Act of 1964. The effects of the proposed action on the five qualities of wilderness character are described below, as detailed in the MRAF (Appendix C) under Alternative 2: Dam Decommissioning and Restoration – Use of Traditional Tools and Skills with Minimal Motorized Equipment and Mechanical Transport.

Untrammeled:

As stated above, the effect on the untrammeled quality of wilderness character would be the same whether the USFS applied terms and conditions to the project or not. Like Alternative 1, the only method used in the project that would have a short-term effect on the untrammeled quality of wilderness character would be the dewatering of the crib outlet area of the dam which is necessary to create a dry work area for the dam breach. The crib outlet area of the dam is already affecting the untrammeled quality of the area by controlling natural water flow out of the lake. No other actions would intentionally control, manipulate, or hinder the conditions or processes of ecological systems apart from the purpose of naturalizing the area following the dam breach. Overall, the dam project would positively affect the untrammeled quality long-term by breaching the human made structure and restoring natural water flow from the lake to the surrounding area.

Undeveloped:

All methods of the proposed action that include the use of motorized equipment and mechanical transport would have a negative effect on the undeveloped quality of wilderness character in the short-term. This includes use of a helicopter for mobilization and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary, use of a motorized pump to prime the siphon for dewatering the crib outlet area of the dam, use of a motorized auger for creating boreholes for explosives, and use of wheelbarrows/carts for moving material onsite. However, in the proposed action use of motorized equipment and mechanical transport and corresponding effects has been minimized based on analysis in the MRAF (Appendix C), which is in contract to Alternative 1 where no USFS terms and conditions are applied to the project.

Although stock would be used for a resupply, the effects from this use would be minimal compared to using stock for the mobilization and demobilization of all equipment and materials to the project site. The stock use that would occur for the resupply would be similar to that of a wilderness visitor(s) camping at Elk Meadow in the NRA and taking day trips into the wilderness. In addition, terms and conditions for stock use in the wilderness and NRA would be applied by the USFS.

The dam breach, which would remove a portion of the human development and decommission the dam as an operational structure, would have a positive effect on the undeveloped quality long-term whether the USFS applied terms and conditions to the project or not. Following completion of the project, the City intends to relinquish their easement and cease motorized use and mechanical transport inside the wilderness related to McKinley Lake which would also improve the undeveloped quality long-term.

Natural:

As mentioned above, the effect on the natural quality of wilderness character would be the same

whether the USFS applied terms and conditions to the project or not. The only method of the proposed action that might have a short-term negative effect on the natural quality of wilderness character would be the use of explosives to breach the dam. There's a chance that vegetation near the dam, fish in the lake, and wildlife nearby could be impacted during the blasting. However, any fish currently in the lake are non-native and have been unnaturally stocked in the past, and the impact to nearby wildlife would be very brief, causing short-term displacement.

The project overall, but specifically the dam breach using explosives, construction of an outlet channel, and site stabilization and revegetation would have a positive effect on the natural quality of wilderness character long-term. Partial removal of the unnatural, human-made development and restoration of the ecological processes of the lake area would increase the naturalness of the Rattlesnake Wilderness. Environmental benefits would include fisheries, riparian, floodplain, and wetland habitat restoration.

Opportunities for Solitude or Primitive and Unconfined Recreation:

All methods that include the use of motorized equipment would have a short-term negative effect on the solitude of wilderness visitors while in use due to the sound of motorized equipment. This includes use of a helicopter for mobilization and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary, use of a motorized pump to prime the siphon for dewatering the crib outlet area of the dam, and use of a motorized auger for creating boreholes for explosives. However, motorized equipment would not be used daily and thus noise impacts would be periodic and limited to the minimum use necessary to complete the project. In addition, the sound from the use of explosives would also negatively affect the solitude of wilderness visitors, although this effect would be very brief on the day blasting was scheduled to occur. As stated above, in the proposed action use of motorized equipment and corresponding effects has been minimized based on analysis in the MRAF (Appendix C), which is in contract to Alternative 1 where no USFS terms and conditions are applied to the project.

Primitive recreation would not be affected by the proposed action; however, unconfined recreation would be affected by closing off overnight use of McKinley Lake for the duration of the project to provide for crew and public safety. In addition, recreation use in the Rattlesnake NRA would be affected by the use of vehicle transportation along the main Rattlesnake corridor (Trail #515/Road #99) related to the project. However, in contrast to Alternative 1, the USFS would apply terms and conditions to this use to minimize effects to recreationists and other resources.

The project would negatively affect opportunities for solitude in the short-term while work is being conducted on the dam due to an increase in human activity and noise at the project site. This is true of both alternatives; however, this alternative would decrease the effect by minimizing the use of motorized equipment with terms and conditions imposed on the use by the USFS. Long-term, the project would have a positive effect on opportunities for solitude at McKinley Lake in eliminating the City's motorized use and mechanical transport inside the Wilderness related to operation and maintenance of the McKinley Lake Dam.

Other Features of Value:

Like Alternative 1, the dam breach itself would have a negative effect on the historical value of the dam by removing a portion of the historic structure, however, leaving most of the structure in place would preserve the historic value long-term. No other cultural resources would be affected by the proposed action. However, by imposing terms and conditions that minimize motorized use and do not allow for

use of heavy equipment as detailed in Alternative 1, there would be minimal risk to potential subsurface cultural resources as there would be more control and visual inspection when working by hand.

Cumulative Effects

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past, present, and reasonably foreseeable activities in the project area include dam operation and maintenance, weed treatment, and recreational use. There would be no cumulative effects from implementation of Alternative 1 or 2 when combined with these activities because the effects of the proposed project would be confined to the length of time during project implementation.

The project area represents a very small portion of the 34,304-acre wilderness area. While the project is being implemented, there are numerous other lakes, and much of the wilderness away from McKinley Lake that would be available for recreation and wilderness use. In addition, the preservation of wilderness character (untrammeled, undeveloped, natural, opportunities for solitude or primitive and unconfined recreation, and other features of value) would remain high considering the small amount of affected area in relation to the amount of unaffected area remaining in the Rattlesnakes Wilderness. The effects of the project are also temporary (limited to one season).

Finally, while the removal or breaching of other dams in the Rattlesnake Wilderness has been discussed, no formal proposal has been submitted to the USFS for consideration and is therefore not included in the cumulative effects analysis.

Summary of Effects

Both alternatives will have short-term negative effects on wilderness character balanced with long-term positive effects. However, the USFS's application of terms and conditions in Alternative 2 would minimize the effects to wilderness character and meet the minimum requirements for authorized activities to protect and administer the wilderness resource as required by the Wilderness Act of 1964. The two qualities of wilderness character that would be most impacted by the project are the undeveloped and opportunities for solitude or primitive and unconfined recreation qualities due to the proposed blasting and motorized use and mechanical transport. While blasting would be an action taken under either alternative, in Alternative 2 the use of motorized equipment and mechanical transport and corresponding effects would be minimized based on analysis in the MRAF (Appendix C) and the USFS terms and conditions applied to the project.

Long-term the project would positively benefit the untrammeled, natural, undeveloped, and opportunities for solitude or primitive and unconfined recreation qualities of wilderness character by breaching the human made structure and restoring natural water flow from the lake to the surrounding area and corresponding ecological processes and eliminating the need for future motorized use or mechanical transport by the City for dam operation and maintenance. And although the dam breach itself would have a negative effect on the historical value of the dam by removing a portion of the historic structure, leaving most of the structure in place would preserve the historic value long-term.

Wild and Scenic River Designation

A wild and scenic rivers eligibility study in 1991 determined that Rattlesnake Creek, from its headwaters to the Forest boundary, is eligible for classification as "scenic." This includes Lake Creek upstream to Carter Lake. Nothing in this decommissioning activity will have any effect on that eligibility. Existing infrastructure will be used, and no roads, trails, or structures will be built. Therefore, no further analysis is necessary.

3.5 Heritage

Affected Environment

McKinley Lake Dam was initially constructed in 1923 by for municipal water and irrigation to the developing City of Missoula.

The spillway and dam cannot reasonably be repaired, and the best option is to breach it so it no longer presents a hazard. The dam is an example of early 20th century municipal water access practices which allowed the development of agriculture and communities in the Missoula Valley.

Because of its age, McKinley Lake Dam is a historic structure that meets the criteria for listing on the National Register of Historic Places under the National Historic Preservation Act of 1966 as amended. The Forest is required to consider how the proposed project may affect the historic dam. Cultural Resources may be identified as those resources either directly or indirectly related to the material life ways of a cultural group or groups as specified by the Code of Federal Regulations 36 CFR 296.3. Cultural resources may refer to sites, areas, buildings, structures, districts, and objects which possess scientific, historic, and social values.

Cultural resources are sensitive and irreplaceable resources that can be affected by a variety of activities and actions. The value of a cultural resource is intrinsic and relates to the educational, historical, cultural, aesthetic, and architectural properties of the resource.

To measure the effects to cultural resources, the Forest must consider the nature, extent, and degree of the effect and determine if the effect will be "adverse" as defined in 36 CFR 800.5. An adverse effect is defined as any activity that "may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800.5(a)(1)).

Cultural Resource indicators for this project are effects to National Register Eligible Sites within the area of potential effect for the project. Effects can be characterized as "potential effects," "direct adverse effects," and "indirect adverse effects." The resource measure is the number of sites in each of these resource indicator categories. For this project, the dam is the only cultural site being evaluated for effects.

Direct and Indirect Effects

Alternative 1

Alternative 1 would eliminate the center portion of the dam, just as the proposed action would, but the method of implementation would involve small heavy equipment. Both alternatives would employ

blasting as the initial way to move rock and loosen the remaining rock at the breach site. This is a direct adverse effect to this one cultural resource and is the same as described below. The result regarding the physical appearance of the structure is the same with either alternative. Both ends of the dam structure would remain in place. No interpretive signage describing the 100-year-old history of the dam as part of Missoula's municipal watershed would be installed.

Alternative 2 – Proposed Action

The actions proposed in Alternative 2 would have direct adverse effects to the one cultural resource affected by the project (historic McKinley Lake Dam). Project activities could also have indirect adverse effects on the historic McKinley Lake Dam.

Constructing a breach in the dam to achieve a stabilized structure that no longer requires maintenance is a component of the proposal that could adversely affect the historic integrity of the dam. Potential indirect effects to the historic McKinley Lake Dam could include damage to the dam because of increased traffic across the dam during breaching and staging activities, decommissioning of the mortar and rocks in the dam from vibrations and explosives. These are unavoidable because the dam must be breached.

However, the potential effects that could result from the above components of the project are addressed in the stipulations of the Memorandum of Agreement (MOA) established between the Montana State Historic Preservation Officer (SHPO) and the Lolo National Forest as specified in the heritage design criteria in Chapter 2, page 17 of this document. Fulfillment of the MOA and the heritage design criteria will ensure that adverse effects to the historic integrity of the dam would be minimized.

Cumulative Effects

Spatial and Temporal Bounds of Analysis

The spatial bounds of analysis include the project area in the vicinity of the dam and construction site because this is the area that could be most impacted from project activities. The temporal bounds of analysis for past activities include the initial construction of the dam from 1923 to the present, and the future temporal bounds include 50 years into the future because the historic integrity of the dam increases over time.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

There are no past, present, or reasonably foreseeable activities that when combined with the proposed action would contribute cumulatively to effects. As such there are no cumulative effects anticipated from the implementation of Alternatives 1 or 2.

Summary of Effects

Both alternatives would result in the physical destruction and removal of a portion of McKinley Lake Dam, which is eligible for inclusion in the National Register. The Forest has reviewed this project to determine how it would affect Historic Properties in accordance with 36 CFR 800. The Forest has completed identification efforts and evaluated cultural resources for eligibility for inclusion in the National Register of Historic Places. In accordance with 36 CFR 800.5(a)(2), the Forest has determined that the physical destruction of a portion of the McKinley Lake Dam will have an Adverse Effect on Historic Properties (Rust and Kilgore 2017).

The City of Missoula and the Lolo National Forest have worked with the State Engineers Office to ensure that the constructed breach would remove the least amount of the dam while meeting safety requirements. The City would breach the McKinley Lake Dam and remove the headgate mechanism at the outlet located near the center of the dam. This would minimize adverse effects by leaving most of the dam intact.

Both alternatives would generate some adverse effects to the historic aspect of the dam, specifically from removing part of the dam to construct a breach. However, these potential effects have been minimized as addressed in the MOA between the Montana SHPO and Lolo National Forest and described in the heritage design criteria in Chapter 2.

The Forest is consulting with the Montana SHPO to minimize the adverse effects of the project on the historic McKinley Lake Dam. Any stipulations may resolve the adverse effects and provide a way to minimize and offset the effects to the historic dam. Stipulations are specified in the Heritage design criteria section in Chapter 2 of this document. The MOA stipulations also provide a way to mitigate the adverse effects of the project on the historic dam by developing an interpretive sign at the main Rattlesnake trailhead outside the wilderness that provides information about the dam and helps to offset the proposed changes. Implementation of the MOA fulfills the requirements of Section 106 of the National Historic Preservation Act.

As a result, Alternative 2 would be preferable to Alternative 1 because the historical value of the dam would be memorialized with an interpretive sign. Not breaching the dam is not an option.

3.6 Terrestrial Wildlife

The Lolo National Forest provides habitat for many different species of wildlife, several of which occur within or near the McKinley Lake Dam project area. The presence or absence of these species depends on the amount, distribution, and quality of each animal's preferred habitat. Some of these species are affected by hunting or trapping, which is regulated by Montana Fish, Wildlife and Parks (Montana FWP). This analysis focuses on species listed as federally threatened or endangered on the Lolo National Forest and Forest Service sensitive species. The tables below provide lists of species, preferred habitat, whether the habitat or species are present in the project area, and whether detailed analysis was conducted for that species. If a species or their habitat does not occur within the project area, no further analysis was conducted. Management Indicator Species (MIS) including northern goshawk, pileated woodpecker, and Rocky Mountain elk are addressed to determine project compliance with Lolo Forest Plan standards and management area direction (U.S. Department of Agriculture 1986).

Affected Environment

McKinley Lake is located at an elevation of 6860 feet in the Rattlesnake Wilderness. The lake is approximately 16 acres in size and is surrounded by a mix of talus slopes, alpine forest, and meadows. The project area is in mapped Canada lynx habitat and designated Canada lynx critical habitat in the Rattlesnake lynx analysis unit (LAU). Approximately 72 percent (28,158 acres) of the Rattlesnake LAU is mapped as potential Canada lynx habitat. The majority of this is considered secondary habitat for lynx. Most of the non-habitat in the LAU is at high elevations above treeline. Foraging habitat is well-distributed throughout the LAU, providing abundant opportunities for lynx during the summer. The western half of McKinley Lake is surrounded by non-habitat, but potential lynx habitat exists adjacent

to the eastern half where the dam is located. This includes some potential lynx foraging habitat. The Rattlesnake LAU is almost entirely NFS land, with only 109 acres of private land at lower elevations near Missoula. Lynx and snowshoe hares have been observed in this LAU, though records are limited.

The project area is in secure habitat in the North Missoula grizzly bear analysis unit (GBAU). This GBAU is in Zone 1 of the Northern Continental Divide Ecosystem (NCDE). Approximately 62 percent of the North Missoula GBAU is currently providing secure habitat for grizzly bears. This GBAU provides potential foraging habitat for grizzly bears throughout the spring, summer, and fall. NCDE monitoring data verified year-round use of the analysis area by both male and female grizzly bears, including a female with cubs. About half of the Rattlesnake Creek Road, which will be used to access the area, is also in this GBAU. The other half and the small sections of two other restricted roads that would be used to access the project area are in the Rattlesnake bear management subunit in the Primary Conservation Area (PCA) of the NCDE. The North Missoula GBAU is part of the NCDE South End Occupancy Unit. This unit has been occupied by females with cubs every year from 2016-2021. The Rattlesnake subunit was occupied in both 2016 and 2021 (Costello and Roberts 2022).

Since McKinley Lake is in the designated wilderness, baseline disturbance primarily consists of hikers, backpackers, and equestrians recreating in the area. The City of Missoula has existing rights to access the area by helicopter or by motor vehicle and foot travel. Access by helicopter has typically occurred just once per year. Access by motor vehicle has been more common but still amounts to a low level of motorized use. Motorized use on restricted roads up to the wilderness boundary occurs on a regular basis. A food and wildlife attractant storage order is in place for NFS lands, requiring appropriate storage of attractants to minimize risk of human-bear conflict.

The project area is in maternal (denning) habitat for wolverine, which overlaps primary and female/male dispersal habitat. Implementation of the project would occur during summer, so wolverine denning would not be impacted by proposed activities. The Inman (2013, Inman et al. 2013) model approach identifies 29,203 acres of potential maternal (denning) habitat, 45,101 acres of primary habitat, 64,417 acres of female dispersal habitat, and 86,501 acres of male dispersal habitat in the analysis area. Wolverine have been observed in many locations across the analysis area.

McKinley Lake provides potential habitat for one sensitive species, the western toad, but this habitat is of low to moderate suitability for the species (Montana Natural Heritage Program, 05/2023). This species has been documented across the mountainous portion of western Montana up to an elevation of 9,220 feet (Maxell et al. 2003). Western toads use a wide variety of aquatic habitats for breeding and use upland habitats up to a mile from these areas outside the breeding season. The City of Missoula conducted herpetology surveys of the Rattlesnake Wilderness lakes in August of 2019 and 2020. Adult Columbia spotted frogs were observed at McKinley Lake, but breeding took place in ephemeral wetlands within the surrounding watersheds. This may also be true for western toads.

The alpine forest and meadows surrounding McKinley Lake provide potential habitat for two Management Indicator Species, the northern goshawk and Rocky Mountain elk. Northern goshawks have been observed near the project area, with the closest observation at Stuart Peak in 2016. Habitat modeling (Samson 2006) suggests that McKinley Lake is surrounded by potential nesting and foraging habitat for northern goshawks. However, habitat suitability models describe the habitat in the area as generally unsuitable for the species (Montana Natural Heritage Program, 05/2023). There are no

recorded observations of elk in or near the project area, but the area is within the general distribution for the species. McKinley Lake is in elk hunting district 201. The most recent count completed in 2022 estimated 2,164 elk in this hunting district. The project area is also within the general distribution for mountain goats and there is a small native population in the Rattlesnake Wilderness. The last survey was completed in 2021 and approximately thirteen individuals were observed.

Threatened, Endangered, Proposed, and Candidate Species

The U. S. Department of Interior Fish and Wildlife Service (FWS) sent the Lolo National Forest a list of Threatened, Endangered, Proposed, and Candidate (TEPC) species that may be present on the Forest. The list was dated May 1, 2023. Table 5 below lists those terrestrial TEPC species that occur, may occur, or have habitat that occurs on the Forest.

Table 5. Threatened, endangered, proposed, and candidate terrestrial wildlife species that may be present on the Lolo National Forest

Species/Critical Habitat	Status	Preferred Habitats	Species Occurrence in Project Area	Habitat Present in Project Area
Canada Lynx (*Lynx canadensis*)	Threatened	Subalpine fir habitat types (including cover types with pure or mixed subalpine fir, lodgepole pine, Douglas-fir, grand fir, western larch, and hardwoods) above 4,000 feet in elevation, vertical structural diversity in the understory (downed wood, seedling/saplings, shrubs, forbs) for foraging and denning	Resident, transient	Yes, suitable habitat is present. Project located in mapped Canada lynx habitat and designated critical habitat
Grizzly Bear (*Ursus arctos horribilis*)	Threatened	Alpine/subalpine coniferous forest and meadows, avalanche chutes, and riparian areas	Resident, transient	Yes, suitable habitat is present. Project located in secure habitat.
Yellow-billed Cuckoo (*Coccyzus americanus*)	Threatened	Large riparian areas with cottonwoods and willows	Not Present	No, no large areas of cottonwood or hardwood vegetation
North American Wolverine (*Gulo gulo luscus*)	Proposed	High elevations centered near the tree line in coniferous forests, rock alpine habitat above tree line,	Resident, transient	Yes, suitable habitat is present. Project located in maternal denning, primary, and dispersal

Species/Critical Habitat	Status	Preferred Habitats	Species Occurrence in Project Area	Habitat Present in Project Area
		cirque basins, and avalanche chutes that have food sources. Deep, persistent, and reliable spring snow cover (to mid-May) is the best predictor of wolverine occurrence.		habitat.

Resource Indicators and Measures of Effects

To compare the two alternatives and determine the potential impacts on listed or proposed species, the effects of habitat alteration, construction noise, and human activity have been evaluated. The measures and indicators were chosen because they will help determine if project activities, specifically disturbance effects from human activity and motorized equipment use, would trigger changes in habitat use and prey availability.

Spatial and Temporal Bounds of Analysis

The Rattlesnake LAU (39,101 acres) is the spatial extent used for the analysis of effects to Canada lynx and Canada lynx critical habitat. The McKinley Lake Dam Decommission project area lies entirely within this LAU. LAUs are large enough to include the home ranges of one female lynx and numerous snowshoe hares, and to represent the effects of management activities across the landscape.

Most proposed activities that could affect grizzly bears would occur within the North Missoula GBAU. However, portions of all three restricted roads that would be used to access the project area are in the Rattlesnake bear management subunit of the Primary Conservation Area of the NCDE. Both the North Missoula GBAU and the Rattlesnake subunit were used as the spatial extent for analysis of effects to the grizzly bear.

The full extent of both the North Missoula GBAU and the Rattlesnake subunit was used to analyze effects to the wolverine. At 86,501 acres (350 square kilometers), it is large enough to include at least one female wolverine home range but is not so large as to obscure the effects of alternatives. The temporal scale for the effects analysis is the duration of the project, up to13 weeks, starting in early July 2024.

Direct and Indirect Effects

Canada Lynx and Canada Lynx Critical Habitat

Alternative 1

The effects of this alternative represent implementation of the dam breach without the Forest Service's terms and conditions. The proposed activities include the removal of some vegetation on the surface of the dam consisting of shrubs and small trees. This vegetation is sparse so is not likely providing foraging habitat for lynx. Proposed blasting could damage some vegetation within the blast radius, but impacts would be minimal, and the structural stage of lynx habitat would be unchanged. The proposed activities would have an insignificant level of effect on Canada lynx habitat and critical habitat PCE

components.

Motorized equipment use at the work site could disturb and temporarily displace individual lynx from the immediate area during implementation of the project. Under this alternative, motorized equipment use would occur daily at the work site throughout project implementation. This would include some heavy equipment (i.e., mini-excavator and skid steer), as well as smaller equipment (i.e., motorized pump, auger, and compactor). All this equipment along with other supplies would be delivered to the work site with a helicopter. Helicopter activity would occur on five total days for delivery, resupply, and then removal of equipment and supplies. One day of blasting would present the highest level of disturbance during project implementation. All these effects would be short-term and disturbance levels would return to baseline conditions upon completion of project activities. The increased road and trail use associated with the project would have little effect on lynx habitat use. The proposed action would not impact the ability of lynx to travel in or between LAUs.

Alternative 2 – Proposed Action

The effects of this alternative represent implementation of the dam breach following the Forest Service's terms and conditions. Effects on vegetation would be the same as those discussed for alternative 1 and would have an insignificant level of effect on Canada lynx habitat and critical habitat PCE components. Proposed motorized equipment use at the work site could temporarily disturb individual lynx from the immediate area during implementation of the project. Under this alternative, motorized equipment use would be limited to the use of a motorized pump to start the siphon for dewatering and the motorized auger to create boreholes for explosives. Helicopter activity would occur on two days for delivery and then removal of equipment and supplies. One day of blasting would present the highest level of disturbance during project implementation. All these effects would be short-term and disturbance levels would return to baseline conditions upon completion of project activities. The increased road and trail use associated with the project would have little effect on lynx habitat use. The proposed action would not impact the ability of lynx to travel in or between LAUs.

Grizzly Bear

Alternative 1

The effects of this alternative represent implementation of the dam breach without the Forest Service's terms and conditions. Human activity, including the use of motorized equipment, could negatively affect grizzly bears by causing disturbance and temporary displacement from preferred habitats. Grizzly bears are highly dependent upon learned habitat; disturbance or displacement into unknown territory may lead to sub-marginal nutrition, reduced reproduction, or greater exposure to adult predatory bears or human food sources, which can lead to human-caused mortality (Mace and Waller 1997, U.S. Department of the Interior 2021). Most human activities would be confined to the direct vicinity of the dam site, but the project would also lead to increased foot traffic along the trail from the end of Carter Lake Road to the work site. The work crew would camp directly adjacent to the work site, so disturbance from human activity would be continual in the vicinity of the dam for the duration of the project. Crews would be required to follow the NCDE food storage order which would minimize the risk of human-bear conflict during the project.

Motorized equipment use at the work site could disturb and temporarily displace individual grizzly bears from the immediate area during implementation of the project. Under this alternative, motorized

equipment use would occur daily at the work site throughout project implementation. This would include some heavy equipment (i.e., mini-excavator and skid steer), as well as smaller equipment (i.e., motorized pump, auger, and compactor). All this equipment along with other supplies would be delivered to the work site with a helicopter. Helicopter activity would occur on five total days for delivery, resupply, and then removal of equipment and supplies. Two days of helicopter activity would occur during the first week for mobilization. Another day of activity would occur around midway through the project to resupply the work crews. Then two more days of helicopter activity would be needed during the final week of implementation to demobilize. The project would also lead to increased vehicular traffic along restricted roads (NFSR 99, 2116, and 2100) outside the wilderness and along the closed portion of NFSR 2100 in wilderness. The City of Missoula has existing rights to use these roads to access the wilderness dams. One day of blasting would present the highest level of disturbance during project implementation.

All these activities would occur in secure habitat for grizzly bears but would lead to only short-term temporary disturbance effects. Disturbance levels would return to baseline conditions upon completion of project activities. With this level of on-going disturbance in the vicinity of the project area, it is unlikely that a grizzly bear would use habitat in the McKinley Lake Basin during project implementation. There are several lake basins in the surrounding area that would provide similar secure habitat for bears disturbed by project activities. This alternative would not prevent grizzly bear movement in or between home ranges or recovery zones.

Alternative 2 – Proposed Action

The effects of this alternative represent implementation of the dam breach following the Forest Service's terms and conditions. Human activity, including the use of motorized equipment, could negatively affect grizzly bears by causing disturbance and temporary displacement from preferred habitats. As with alternative one, most human activities would be confined to the direct vicinity of the dam site, but the project would also lead to increased foot traffic along the trail from the end of Carter Lake Road to the work site. This alternative would also increase stock traffic along the trail from Elk Meadow to the work site on three days to complete the resupply. The work crew would be limited to ten individuals and this crew would be rotated every two weeks. The work crew would camp directly adjacent to the work site, so disturbance from human activity would be continual in the vicinity of the dam for the duration of the project. Crews would be required to follow the NCDE food storage order which would minimize the risk of human-bear conflict during the project. The crews would also carry bear spray and know how to use it in case a conflict arises during the project. To resolve a bear-human conflict situation, project activities would be modified, cancelled, suspended, or temporarily ceased, as needed.

Motorized activities associated with project implementation that could disturb and temporarily displace grizzly bears from the general vicinity would be greatly reduced under this alternative. Again, most disturbance from motorized activities would be limited to the McKinley Lake Basin. Motorized tool use at the work site would be limited to small equipment. This would include the use of a motorized pump to start the siphon for dewatering the lake and a motorized auger to create boreholes for explosive placement. Motorized tool use would be limited to daytime hours. All other work would be completed using hand tools and wheeled carts. The project would also lead to increased vehicular traffic along restricted roads (NFSR 99, 2116, and 2100) outside the wilderness and along the closed

portion of NFSR 2100 (Trail #534) in the wilderness. The use of motorized vehicles in the wilderness would be limited to that necessary to transport personnel to and from the end of the Carter Lake Road. The City of Missoula has existing rights to use these roads to access the wilderness dams.

Equipment and supplies would be delivered to the work site by helicopter. The helicopter would follow the same flight path for each trip from the Missoula airport to the dam site. Just over three miles of the helicopter flight path would cross secure habitat in the North Missoula GBAU. A landing area used previously for access is in an open area along the lake's shore near the dam. The helicopter would only be below 500 feet above ground level (AGL) in the direct vicinity of this landing area. This should limit the most intense helicopter disturbance to the McKinley Lake Basin. Helicopter activity would be limited to two periods of the project. This activity would occur on one day during the first week of implementation to deliver equipment and supplies to the work site. Upon completion of work at the dam, one day of helicopter activity would be needed to remove all equipment, supplies, and solid waste from the project area. Overall, there would be two days of helicopter activity, with no more than one day at a time and a rest period of nearly three months between disturbance events. In addition, proposed blasting would produce a brief but large and far-reaching pulse of disturbance. This disturbance would have impacts beyond the McKinley Lake Basin but would be much shorter in duration than other activities.

All these activities would occur in secure habitat for grizzly bears but would lead to only short-term temporary disturbance effects. Upon completion of project activities, disturbance levels would return immediately to pre-project levels with no long-term impacts to grizzly bears in the area. Even with the lower level of motorized disturbance in the vicinity of the project area, it is still unlikely that a grizzly bear would use habitat in the McKinley Lake Basin during project implementation due to the continuous presence of humans in the area. There are several lake basins in the surrounding area that would provide similar secure habitat for bears disturbed by project activities. The proposed action would not prevent grizzly bear movement in or between home ranges or recovery zones.

Wolverine

Alternative 1

The effects of this alternative represent implementation of the dam breach without the Forest Service's terms and conditions. Human activity, including the use of motorized equipment, could disturb and temporarily displace individual wolverine in the area. Most human activities would be confined to the direct vicinity of the dam site, but the project would also lead to increased foot traffic along the trail from the end of Carter Lake Road to the work site. The work crew would camp directly adjacent to the work site, so disturbance from human activity would be continual in the vicinity of the dam for the duration of the project.

Motorized equipment use at the work site could temporarily disturb individual wolverine during implementation of the project. Under this alternative, motorized equipment use would occur daily at the work site throughout project implementation. This would include some heavy equipment (i.e., mini-excavator and skid steer), as well as smaller equipment (i.e., motorized pump, auger, and compactor). All this equipment along with other supplies would be delivered to the work site with a helicopter. Helicopter activity would occur on five total days for delivery, resupply, and then removal of equipment and supplies. Two days of helicopter activity would occur during the first week for

mobilization. Another day of activity would occur around midway through the project to resupply the work crews. Then two more days of helicopter activity would be needed during the final week of implementation to demobilize. The project would also lead to increased vehicular traffic along restricted roads (NFSR 99, 2116, and 2100) outside the wilderness and along the closed portion of NFSR 2100 (aka Trail #534) in the wilderness. The City of Missoula has existing rights to use these roads to access the wilderness dams. One day of blasting would present the highest level of disturbance during project implementation.

All these activities would occur in maternal, primary, and dispersal habitat for wolverine but would lead to only short-term temporary disturbance effects. Since the project would be completed outside the denning period, no impacts to maternal habitat are expected. Disturbance levels would return to baseline conditions upon completion of project activities. There are several lake basins in the surrounding area that would provide similar habitat for wolverine disturbed by project activities. Potential prey may also avoid the immediate area during project implementation, but this would have negligible effects considering the size of a wolverine home range. The project would not prevent movement or dispersal of wolverine across the analysis area.

Alternative 2 – Proposed Action

The effects of this alternative represent implementation of the dam breach following the Forest Service's terms and conditions. As with alternative one, most human activities would be confined to the direct vicinity of the dam site, but the project would also lead to increased foot traffic along the trail from the end of Carter Lake Road to the work site. This alternative would also increase stock traffic along the trail from Elk Meadow to the work site on three days to complete the resupply. The work crew would be limited to ten individuals and this crew would be rotated every two weeks. The work crew would camp directly adjacent to the work site, so disturbance from human activity would be continual in the vicinity of the dam for the duration of the project.

Motorized activities associated with project implementation that could disturb and temporarily displace wolverine from the general vicinity would be greatly reduced under this alternative. Again, most disturbance from motorized activities would be limited to the McKinley Lake Basin. Motorized tool use at the work site would be limited to small equipment. This would include the use of a motorized pump to start the siphon for dewatering the lake and a motorized auger to create boreholes for explosive placement. Motorized tool use would be limited to daytime hours. All other work would be completed using hand tools and wheeled carts. The project would also lead to increased vehicular traffic along restricted roads (NFSR 99, 2116, and 2100) outside the wilderness and along the closed portion of NFSR 2100 (aka Trail #534) in the wilderness. The use of motorized vehicles in the wilderness would be limited to that necessary to transport personnel to and from the end of the Carter Lake Road. The City of Missoula has existing rights to use these roads to access the wilderness dams.

Equipment and supplies would be delivered to the work site by helicopter. The helicopter would follow the same flight path for each trip from the Missoula airport to the dam site. A landing area used previously for access is in an open area along the lake's shore near the dam. The helicopter would only be below 500 feet above ground level (AGL) in the direct vicinity of this landing area. This should limit the most intense helicopter disturbance to the McKinley Lake Basin. Helicopter activity would be limited to two periods of the project. This activity would occur on one day during the first week of implementation to deliver equipment and supplies to the work site. Upon completion of work at the

dam, one day of helicopter activity would be needed to remove all equipment, supplies, and solid waste from the project area. Overall, there would be two days of helicopter activity, with no more than one day at a time and a rest period of nearly three months between disturbance events. In addition, proposed blasting would produce a large and far-reaching pulse of disturbance. This disturbance would have impacts beyond the McKinley Lake Basin but would be much shorter in duration than other activities.

All these activities would occur in secure habitat for grizzly bears but would lead to only short-term temporary disturbance effects. Upon completion of project activities, disturbance levels would return immediately to pre-project levels with no long-term impacts to grizzly bears in the area. Even with the lower level of motorized disturbance in the vicinity of the project area, it is still unlikely that a grizzly bear would use habitat in the McKinley Lake Basin during project implementation due to the continuous presence of humans in the area. There are several lake basins in the surrounding area that would provide similar secure habitat for bears disturbed by project activities. The proposed action would not prevent grizzly bear movement in or between home ranges or recovery zones.

All these activities would occur in maternal, primary, and dispersal habitat for wolverine but would lead to only short-term temporary disturbance effects. Since the project would be completed outside the denning period, no impacts to maternal habitat are expected. Motorized equipment use and other human activity more than background levels may result in disturbance to individual wolverine in the vicinity. These activities were determined to not be a threat to the species (U.S. Department of the Interior 2018). Current information does not indicate that potential stressors associated with land management activities such as those proposed under the McKinley Lake Dam Decommissioning and Restoration Project (or other activities such as recreation, infrastructure development, and transportation corridors) pose a threat to the DPS (U.S. Department of the Interior 2013). Disturbance levels would return to baseline conditions upon completion of project activities. There are several lake basins in the surrounding area that would provide similar habitat for wolverine disturbed by project activities. Potential prey may also avoid the immediate area during project implementation, but this would have negligible effects considering the size of a wolverine home range. The project would not prevent movement or dispersal of wolverine across the analysis area.

Cumulative Effects

Past, present, and reasonably foreseeable cumulative effects in the analysis areas for threatened and proposed species would include recreational use by the public and trail maintenance by Forest Service personnel. It is likely that recreational use would be displaced to other areas of the wilderness during project implementation and very few recreational activities would occur in the area simultaneously with the project. Cumulative effects would also include the continued maintenance of other wilderness dams by the City of Missoula. This could include access by helicopter or by motor vehicle and foot travel. In addition, Montana Fish, Wildlife and Parks periodically completes fish and wildlife surveys in the analysis areas. These surveys could overlap with project implementation. Non-motorized recreation, maintenance, and surveys have little impact on Canada lynx, grizzly bears, and wolverine. Since project activities in the area would be short in duration, the combined effect to Canada lynx, grizzly bears, and wolverine from these uses (if they did occur simultaneously with the project) is likely to be very similar to the effects discussed in the direct and indirect effects section for each species.

The Marshall Woods Restoration Project is ongoing in the grizzly bear and wolverine analysis area. Activities associated with this project would cause additional disturbance that could overlap with implementation of the McKinley Lake Dam Project. The Marshall Woods Project area is at the southern end of the North Missoula GBAU with activities focused adjacent to private land and open roads where wildlife is already exposed to higher levels of disturbance. Grizzly bears are known to underuse habitat within 500 meters of roads open to public motorized use, so may already be avoiding these areas. Current information does not indicate that potential stressors such as land management activities pose a threat to the wolverine DPS (U.S. Department of the Interior 2013).

Because of the short duration of the project, negligible impacts to vegetation, and the diffuse nature of project-related disturbance, there would be minimal cumulative impacts to these wide-ranging species.

Summary of Effects

Project implementation would last for about 13 weeks during the summer, avoiding sensitive time periods for Canada lynx, grizzly bears, and wolverine. Most disturbance from project work would be isolated to the McKinley Lake Basin. Exceptions to this are the two days of helicopter activity, increased foot and stock traffic on trails, increased motorized vehicle traffic on roads, and the one day of blasting. All three species are wide ranging and likely rare in the project area. These species will likely avoid the area during implementation, but similar habitat is available nearby. Consultation with the U.S. Fish and Wildlife Service for Canada lynx, Canada lynx critical habitat, grizzly bear, and wolverine will be completed on the proposed activities before the decision for the McKinley Lake Dam Decommissioning and Restoration Project is finalized.

Sensitive Species

The USDA Forest Service has developed policy requirements for the designation of sensitive plant and animal species (Forest Service Manual (FSM) 2670; Supplement 2600-94-2). The Regional Forester's sensitive species list identifies species only when they meet one or more of the following three criteria:

- The species is declining in numbers or occurrences and evidence indicates it could be proposed for federal listing as threatened or endangered if action is not taken to reverse or stop the downward trend.
- The species' habitat is declining, and continued loss could result in population declines that lead to federal listing as threatened or endangered if action is not taken to reverse or stop the decline.
- The species' population or habitat is stable but limited.

Seven species of amphibians, birds, and mammals are listed as Regional Forester's sensitive species and are known or suspected to occur on the Lolo National Forest (Table 6). Only one of these, the western toad, is likely to occur within the project area, or have habitat in or near the project area, or be affected; directly, indirectly, or cumulatively by implementation of the proposed action. (For a detailed explanation as to how these determinations are made, please refer to the Wildlife Report in the project record.)

Table 6. USDA Forest Service sensitive terrestrial species occurrence within or near the project area

Species	Status	Occurrence in Project Area	Basis for Occurrence Determination
Black Swift	Sensitive	Not Present	Closest habitat in Rattlesnake Creek (low suitability) and closest observation in lower Rattlesnake Creek (1978)
Coeur d' Alene Salamander	Sensitive	Not Present	Project area is outside species range
Harlequin Duck	Sensitive	Not Present	Closest habitat and observations in Rattlesnake Creek
Idaho Giant Salamander	Sensitive	Not Present	Project area is outside species range
Little Brown Myotis	Sensitive	Unlikely	Project area is of low suitability for this species and closest observations in Evaro (2009) and Gold Creek (2005)
Northern Bog Lemming	Sensitive	Unlikely	Project area is of low suitability for this species and closest observation in Shoofly Meadow (1990)
Western Toad	Sensitive	Present	Low to moderate habitat suitability

Resource Indicators and Measures

The potential effects of the project were evaluated to determine if it will trigger changes in habitat, reproduction, or population numbers. Since surface disturbance would primarily be within the lakebed and at previously disturbed sites at the dam and outlet, no indicator or measure would be required for habitat removal. Disturbance from project activities will be considered substantial if it is determined that these activities would permanently displace wildlife, adversely affect reproduction, or adversely affect populations. A determination for disturbance effects is made by considering the proximity of noise to available habitat, the tolerance of the species to human and mechanical disturbance, and existing disturbance levels in the area.

Spatial and Temporal Bounds of Analysis

The analysis area for these sensitive wildlife species is the area within a 1.5-mile radius of the McKinley Lake Dam. This is the approximate distance that the noise disturbance from blasting would travel and potentially disturb wildlife. At approximately 4,515 acres, it is large enough to include home ranges of these species and to represent the effects of management activities across the landscape. All

proposed activities that could affect these species are contained within this area. The temporal scale for the effects analysis is the duration of the project, approximately 13 weeks, starting in early July 2024.

Direct and Indirect Effects

To compare the two alternatives, and to determine the potential impact of the proposed action on sensitive species, effects to individuals, reproduction, and habitat were evaluated.

Western Toad

Alternative 1

The effects of this alternative represent implementation of the dam breach without the Forest Service's terms and conditions. Under this alternative, heavy equipment (i.e., mini-excavator and skid steer) would be used to implement the project. The use of heavy equipment has a greater potential to cause mortality of individual adult and juvenile western toads than traditional methods of construction. Blasting could also lead to mortality of adult and juvenile toads in the project area. The dewatering of McKinley Lake in preparation for construction activities could impact eggs or larvae if present in early July. Western toad reproduction generally occurs from mid-May to early July but is dependent on temperature and snowmelt. These impacts would not have a measurable effect at the population level. The restoration of wetlands following the decommissioning of McKinley Lake Dam could have a beneficial effect on western toads by providing additional breeding habitat in the area.

Alternative 2 – Proposed Action

The effects of this alternative represent implementation of the dam breach following the Forest Service's terms and conditions. Under this alternative, no heavy equipment would be used. Traditional methods of construction, including the use of hand tools and wheeled carts, could also cause mortality to adult and juvenile western toads, but the potential for these effects is less than it would be if heavy equipment is used. As with alternative 1, blasting could also lead to mortality of adult and juvenile toads and dewatering could impact eggs or larvae. This would not have a measurable effect at the population level and the restoration of wetlands following the decommissioning could have a beneficial effect on western toads by providing more breeding habitat in the area.

Cumulative Effects

Past, present, and reasonably foreseeable cumulative effects in the analysis areas for sensitive species would include recreational use by the public and trail maintenance by Forest Service personnel. It is likely that recreational use would be displaced to other areas of the wilderness during project implementation and very few recreational activities would occur in the area simultaneously with the project. Cumulative effects would also include the continued maintenance of other wilderness dams by the City of Missoula. This could include access by helicopter or by motor vehicle and foot travel. In addition, Montana Fish, Wildlife and Parks periodically completes fish and wildlife surveys in the analysis areas. These surveys could overlap with project implementation. Non-motorized recreation, maintenance, and surveys have little impact on these sensitive species. Since project activities in the area would be short in duration, the combined effect to sensitive species from these uses (if they did occur simultaneously with the project) is likely to be very similar to the effects discussed in the direct and indirect effects section for each species.

Summary of Effects

In summary, it was determined that the McKinley Lake Dam Decommissioning and Restoration Project, would have "no impact" on black swift, Coeur d' Alene salamander, harlequin duck, Idaho giant salamander, little brown myotis, and northern bog lemming. It was also determined that the project "may impact individuals and habitat but would not move toward a trend of federal listing or cause a loss of viability in the population of western toads.

Management Indicator Species

The National Forest Management Act requires that the Forest Service provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area to meet overall multiple-use objectives. To help meet this statutory goal of diversity, the Forest Service published planning regulations in 1982 which provide that fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. These are known as management indicator species (MIS; Table 7).

Table 7. Management indicator species for terrestrial wildlife on the Lolo National Forest and habitat in the project area

Species	Primary Habitat	Habitat Present in Project Area?
Northern Goshawk	Mosaic of stand structures including large trees and moderate to high canopy closure	Yes
Pileated Woodpecker	Late successional stages of coniferous or deciduous forest with scattered, large snags	No
Rocky Mountain Elk	Habitat generalist of coniferous forest interspersed with openings	Yes

A comprehensive review of these species life's requirements, population trends, and habitats occupied by these species on the Forest can be found in the March 2020, Lolo National Forest's Report titled Life Histories and Population Analysis for Management Indicator Species of the Lolo National Forest. There are two terrestrial species of MIS that may be present or have habitat in the project area (Table 7). These are the northern goshawk and Rocky Mountain elk.

Resource Indicators and Measures

The potential effects of the project were evaluated to determine if it will trigger changes in habitat, reproduction, or population numbers. Since ground disturbance would primarily be within the lakebed and at previously disturbed sites at the dam and outlet, no indicator or measure would be required for habitat removal. Disturbance from project activities will be considered substantial if it is determined that these activities would permanently displace wildlife, adversely affect reproduction, or adversely affect populations. A determination for disturbance effects is made by considering the proximity of noise to available habitat, the tolerance of the species to human and mechanical disturbance, and existing disturbance levels in the area.

Spatial and Temporal Bounds of Analysis

The analysis area for effects to northern goshawks is the area within a 1.5-mile radius of the McKinley Lake Dam. This is the approximate distance that the noise disturbance from blasting would travel and potentially disturb wildlife. At approximately 4,515 acres, it is large enough to include several home ranges and to represent the effects of management activities across the landscape. The analysis area for Rocky Mountain elk is the Rattlesnake LAU. At 39,101 acres, it is large enough to include seasonal habitats for this species. All proposed activities that could affect these species are contained within these areas. The temporal scale for the effects analysis is the duration of the project, approximately 13 weeks, starting in early July 2024.

Direct and Indirect Effects

Northern goshawk

Alternative 1

The effects of this alternative represent implementation of the dam breach without the Forest Service's terms and conditions. Under this alternative, there is greater potential for disturbance to northern goshawks in or near the project area due to the daily use of motorized equipment and the higher number of helicopter flights. Proposed blasting could damage some vegetation within the blast radius, which has the potential to damage a nest if present. Goshawk nesting has not been documented in the area, but modeling suggests that there is potential nesting and foraging habitat surrounding McKinley Lake. Implementation of the project may impact individuals but would not affect the trend of populations on the Forest or impair the ability of the Forest to provide well-distributed habitat for northern goshawks. The abandonment of a nest in the area for one season, if it occurs, is unlikely to affect the population of northern goshawks on the Forest.

Alternative 2 – Proposed Action

The effects of this alternative represent implementation of the dam breach following the Forest Service's terms and conditions. The reduced motorized equipment and helicopter activity under this alternative would lessen the potential for disturbance to northern goshawks in or near the project area. Proposed blasting could damage some vegetation within the blast radius, which has the potential to damage a nest if present. Implementation of the project could still impact individuals, but the abandonment of a nest is less likely under this alternative.

Rocky Mountain Elk

Alternative 1

The effects of this alternative represent implementation of the dam breach without the Forest Service's terms and conditions. Under this alternative, there is greater potential for disturbance or temporary displacement of Rocky Mountain elk in or near the project area due to the daily use of motorized equipment and the higher number of helicopter flights. Increased vehicular traffic along roads used for the project could also disturb elk. Project activities would not occur during the critical winter period or the calving season. These disturbance effects would be short term and similar habitat is available nearby. Proposed activities would not impact the trend of elk populations on the forest or change habitat use patterns over the long-term.

Alternative 2 – Proposed Action

The effects of this alternative represent implementation of the dam breach following the Forest Service's terms and conditions. The reduced motorized equipment and helicopter activity under this alternative would lessen the potential for disturbance to Rocky Mountain elk in or near the project area. Increased vehicular traffic along roads used for the project could also disturb elk. Project activities would not occur during the critical winter period or the calving season. These disturbance effects would be short term and similar habitat is available nearby. Proposed activities would not impact the trend of elk populations on the forest or change habitat use patterns over the long-term.

Other Wildlife

Mountain Goats

Mountain goats are sensitive to low altitude helicopter flights, especially on winter range. The project area is outside mapped winter distribution for this species, but individuals could be disturbed by helicopter activities. Terms and conditions included in alternative 2 for the helicopter to follow the same flight path on each trip and to limit operation below 500 feet AGL to the direct vicinity of the work site would reduce the potential for disturbance to this species.

Migratory Birds

The proposed activities include the removal of some vegetation on the surface of the dam consisting of shrubs and small trees. If migratory bird nests are present at the time of vegetation clearing in this small area, these nests could be destroyed. Proposed blasting could damage some vegetation within the blast radius, which has the potential to damage or destroy nests in the area. Disturbance from continual human activity, the use of motorized equipment, and helicopter activity could disturb individuals but is unlikely to impact nesting in the area. Both alternatives may impact individual migratory birds, but this would not lead to population level effects.

Cumulative Effects

Past, present, and reasonably foreseeable cumulative effects in the analysis areas include recreational use by the public and trail maintenance by Forest Service personnel. It is likely that recreational use would be displaced to other areas of the wilderness during project implementation and very few recreational activities would occur in the area simultaneously with the project. Cumulative effects would also include the continued maintenance of other wilderness dams by the City of Missoula. This could include access by helicopter or by motor vehicle and foot travel. In addition, Montana Fish, Wildlife and Parks periodically completes fish and wildlife surveys in the analysis areas. These surveys could overlap with project implementation. Non-motorized recreation, maintenance, and surveys have little impact on these sensitive species. Since project activities in the area would be short in duration, the combined effect to sensitive species from these uses (if they did occur simultaneously with the project) is likely to be very similar to the effects discussed in the direct and indirect effects section for each species.

Summary of Effects

The pileated woodpecker does not have habitat in or near the project area, and therefore, would not be affected by implementation of the proposed project. Proposed activities may impact individuals but would not affect the trend of populations on the Forest or impair the ability of the Forest to provide well-distributed habitat for northern goshawk and Rocky Mountain elk. Implementation of the proposed activities may temporarily impact individuals or cause nest failures but would not adversely affect migratory bird populations. Terms and conditions would reduce the potential for impacts to the mountain goat herd in the Rattlesnake.

3.7 Fisheries and Aquatic Resources

Affected Environment

The proposed project is located within the Upper Rattlesnake Creek HUC 12 drainage and within the Rattlesnake Wilderness Area. This wilderness area was designated by the United States Congress in 1980. McKinley Lake is located at the headwaters of the Lake Creek drainage and just below the crest of the Rattlesnake Mountain range at an elevation of approximately 6860 feet. Conditions observed during the site visit included very stable, well-vegetated stream banks with low levels of sediment in the stream channel downstream of the lake and the proposed project area. Overall, habitat conditions for cutthroat trout and aquatic macroinvertebrates are excellent within the proposed project area and the unnamed tributary stream below the dam. Analysis of the aquatic macroinvertebrate sample collected in September 2022 resulted in a BCI of 78. This is an indicator of good water quality consisting of cold, well-oxygenated water with low sediment loads.

McKinley Lake was previously stocked with rainbow trout. Low water levels over the last few years have likely resulted in complete mortality of any residual fish. The Rattlesnake Creek, downstream of the proposed project area contains several fish species including Westslope cutthroat trout and bull trout.

McKinley Lake serves as a sediment sink and traps sediment delivered by runoff from the relatively small drainage area of approximately 0.66 square miles (422 acres; USGS 2016). Because of the relatively small drainage area upslope of McKinley Lake, the volume of sediment entering the lake and delivered to the stream channel directly below the dam is very low. Desired conditions are currently being met, as the stream substrate below the dam is very clean and the surrounding riparian area is functioning well to minimize sediment reaching the stream channel. The stream banks within and downstream of the proposed project area are very stable. Streamside vegetation is very well established and functioning at desired conditions to maintain bank stability. The lake shoreline is comprised primarily of large boulders on the south originating from the adjacent talus slope (Figure 5). The inlet to the lake is located on the east end of the lake. The immediate area around the inlet consists primarily of fine sediments. The remaining shoreline area is primarily boulder interspersed with lake sediments and soil. Overall, vegetation at the waterline is coniferous forest and shrubs.

Figure 5. View of McKinley Lake (June 30, 2022) showing shoreline conditions at near base lake water level

Endangered, Threatened, and Proposed Species

The Fish and Wildlife Service maintains the current list of threatened, endangered, proposed, and candidate species that receive protection under the Endangered Species Act. Terrestrial wildlife and plant species are analyzed in the Terrestrial Wildlife and Botanical Resources sections of this document. There is one fish species listed for Missoula County that have habitat in or adjacent to the Lolo National Forest.

Resource Indicators and Measures of Analysis

Sediment and lake levels were chosen as indicators and measures because it will help to compare effects of the no terms and conditions alternative and Proposed Action for Bull trout individuals and critical habitat.

There is no suitable habitat for federally listed fish within or near the project area. Water depletion is used as a resource indicator because removal of water has the potential to effect habitat of federally listed fish species downstream in the drainage. The measure used is the volume of water depleted (acre/feet) from the drainage for the No Action and Proposed Action Alternatives.

Spatial and Temporal Bounds of Analysis

The Lake Creek drainage is the spatial boundaries for analyzing for direct and indirect effects in the Project Area. This area was selected because it includes the area of potential impacts of the proposed project and associated activities on aquatic species and habitat.

The temporal bounds would be the time of project implementation and three years post project. The temporal bounds will be the one season needed to decommission the dam and three years after for site stabilization. It would encompass the period when effects to downstream habitat could potentially occur.

Direct and Indirect Effects

Both alternatives would have no to effect Bull trout or Bull trout critical habitat identified in Table 8. There is no suitable habitat in the project area and there would be no water depletion as a result of either alternative. No direct or indirect effects are anticipated to Bull trout.

Table 8. Endangered Aquatic Species Listed for Missoula County and the Lolo National Forest

Species	Status	Habitat Use and Local Distribution
Bull Trout	Threatened	Bull Trout exhibit fluvial, adfluvial, and resident life history strategies in the Middle Clark Fork River core area. Rattlesnake Creek is part of the Middle Clark Fork River core area and is mapped designated critical habitat for Bull Trout. Rattlesnake Creek is foraging, migrating, overwintering, spawning, and rearing habitat for Bull Trout. Rattlesnake Creek contains one of the 10 local Bull Trout populations within the Middle Clark Fork River Core area.
Westslope Cutthroat Trout	R1 Sensitive Species	Westslope cutthroat trout are found in perennial cool, moderate to high water quality streams. There is a population residing in Carter Lake downstream of McKinley Lake and Westslope cutthroat trout are known to reside in Rattlesnake creek.

Cumulative Effects

There would be no cumulative effects associated with either alternative. Since there are no direct or indirect effects expected from either alternative, there would be no cumulative effects.

Summary of Effects

Suitable habitat for these endangered fish species occurs three miles from the proposed project area. Carter Lake downstream of the project area will settle out all sediment and temperature pulses and will keep any effects from reaching bull trout individuals and their critical habitat. In addition, there would be no water depletion from the drainage because of the Proposed Action. Therefore, it is determined that there would be "**no effect**" to the bull trout as a result of the proposed project.

Sensitive Species

The USDA Forest Service has developed policy requirements designation of sensitive plant and animal species (Forest Service Manual (FSM) 2670; Supplement 2600-94-2). The Regional Forester's sensitive species list contains taxa only when they meet one or more of three criteria, which were previously identified in the Region 1 Sensitive Species section for terrestrial wildlife on page 49 of this EA.

Westslope Cutthroat Trout are listed as sensitive by the R1 Regional Forester on the Lolo National Forest. These species are further described in Table 8 above.

Westslope cutthroat trout

This species is dependent on perennial, cool, water with moderate to high water quality. Rattlesnake Creek and Lake Creek downstream of the proposed project area, as well as Carter Lake according to the Mountain Lake Surveys from 2013 (Knotek et al.) contain populations of Westslope cutthroat trout.

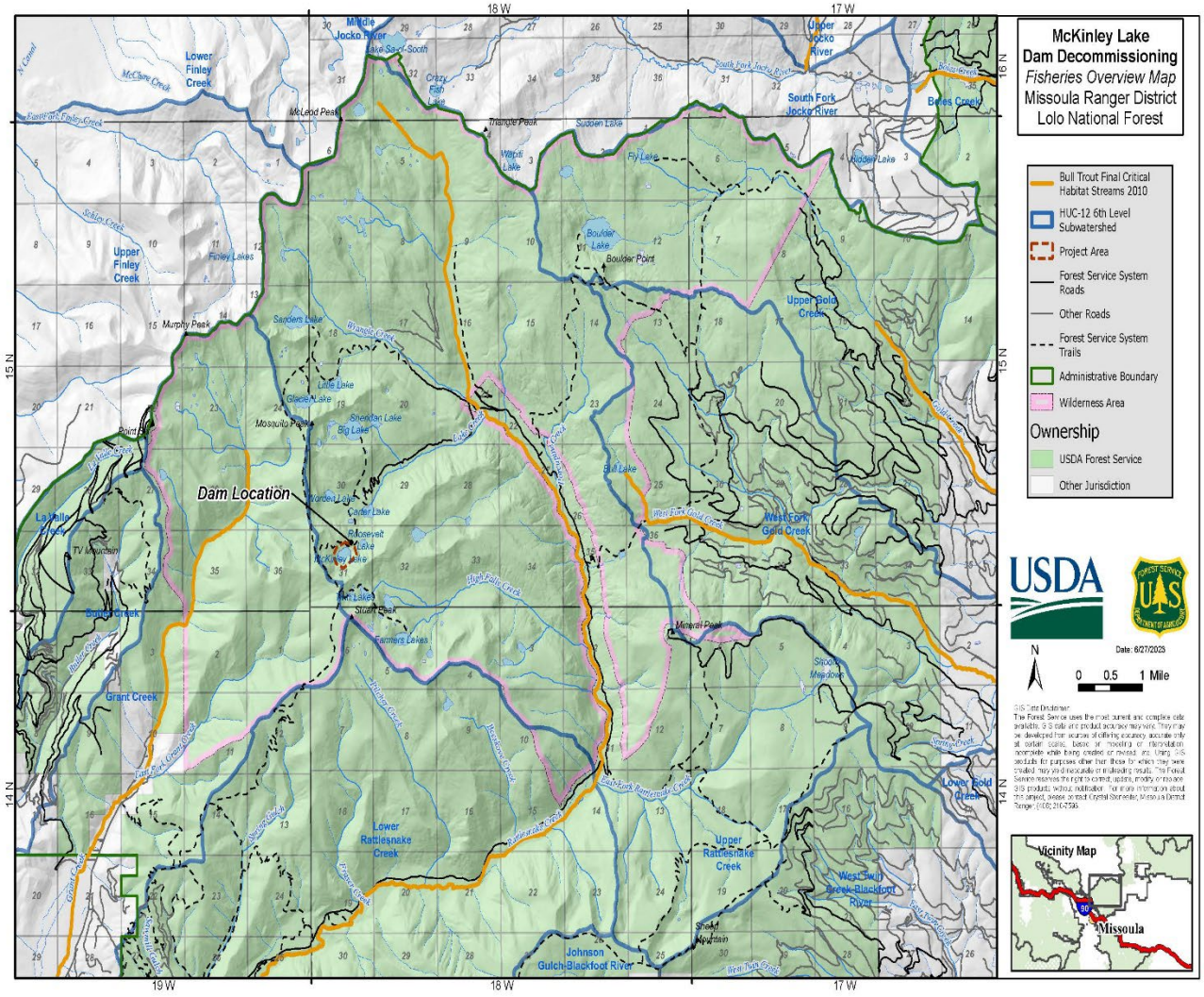

Figure 6 McKinley Lake – Fisheries Overview with Bull Trout Occurrence (Westslope Cutthroat Trout occupy Same Habitat as Bull Trout

Resource Indicators and Measures of Analysis

The measures and indicators listed in Table 9 below were chosen because they will help to compare effects of the Alternatives 1 and 2 for Forest Sensitive species.

The sediment levels in stream reaches downstream of proposed project activities and lake water levels are used as indicators to compare and contrast the potential effects of the Alternatives on aquatic species and habitat. The measure used for potential sediment levels is the area (less than one acre) impacted by project activities that have the potential to contribute sediment to the stream channel. The measure for lake level is the seasonal change in water elevation (feet).

Table 9. Resource indicators and measures for assessing effects for the McKinley Lake Dam Decommissioning Project

Resource Element	Indicator	Measure
Aquatic Habitat	Sediment	Area (acres) impacted
Aquatic Habitat	Lake levels	Seasonal change in water elevation (feet)

Spatial and Temporal Bounds of Analysis

The spatial boundaries for analyzing for direct and indirect effects is the Project Area. It includes the area of potential impacts of the proposed project and associated activities on aquatic species and habitat.

The temporal bounds would be from the time the project is implemented to three years following the completion of activities within the indicated spatial boundary. This period would allow sufficient time for the project area to stabilize and effects from activities associated with the project to no longer be detectable.

Direct and Indirect Effects

Because there are no known populations of Westslope cutthroat trout within or near the proposed project area, there would be no direct effects to this species as a result of activities associated with the proposed action. cutthroat trout do not occur within the proposed project area or the unnamed tributary below McKinley Lake, but do occur downstream in Carter Lake, Lake Creek, and Rattlesnake Creek. The population in Carter Lake could realize indirect effects from sediment and temperature pulses after implementation from the dam decommissioning. However, these indirect effects will be insignificant.

Activities associated with the Proposed Project would be restricted to the area within the footprint of the dam and would implement design criteria and install silt fence between the project area and the stream channel. Design criteria would prevent sediment movement to the channel and protect water quality downstream. This would greatly minimize or eliminate these potential indirect effects of sediment delivery to the outlet stream. This potential sediment delivery would only occur during the construction period and the time it takes for localized disturbed vegetation and soil to stabilize. The duration of this effect is expected to be less than three years following the installation. These effects are expected to be insignificant and short in duration. Therefore, activities of the proposed action are expected to "**May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend**

Toward Federal Listing or Loss of Viability to the Population or Species (MIIH)" on the quality of habitat for Westslope cutthroat trout at the completion of the proposed dam decommissioning project.

Cumulative Effects

Cumulative effects from the project on Westslope cutthroat trout will be minimal. There could be a pulse of sediment and temperature difference from dam decommissioning in the first year of implementation. However, with there being no measurable change to the hydrograph and the removal of the dam could see a beneficial effects in the long term from removal of non-native rainbow trout that hybridize with Westslope cutthroat trout. The project area is in a wilderness area. There would be no increase in roads, no timber harvest activities, no increase in visitation by the public.

Summary of Effects

No indirect effects to westslope cutthroat trout are expected because of dam decommissioning. There could be the possibility of pulses of sediment and temperature into Carter Lake downstream of McKinley Lake that could have an impact on the population of Westslope cutthroat trout residing in Carter Lake. Therefore, the proposed McKinley Lake Dam Decommissioning project is expected to **"May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Toward Federal Listing or Loss of Viability to the Population or Species" (MIIH**) on Westslope cutthroat trout populations or habitat.

These species are but a sample of the species considered when aquatic macroinvertebrate samples are collected for evaluation of the aquatic ecosystem. The Forest has been collecting macroinvertebrate data on major streams since 1987. Therefore, baseline information is available. Current data is compared to baseline data to monitor changes in the habitat. The development of species/habitat relationships of fish and wildlife is identified as an objective in the Forest Plan with the associated guideline to maintain all streams for a biotic condition index (BCI) of 75 or above.

Resource Indicators and Measures of Analysis

The measures and indicators (Table 9) were chosen because they will help to compare effects of the Alternatives 1 and 2 for Forest Management Indicator Species.

The sediment levels in stream reaches downstream of proposed project activities and lake water levels are used as indicators to compare and contrast the potential effects of the Alternatives on aquatic species and habitat. The measure used for potential sediment levels is the area (acres) impacted by project activities that have the potential to contribute sediment to the stream channel. The measure for lake level is the seasonal change in water elevation (feet).

Spatial and Temporal Bounds of Analysis

The spatial boundaries for analyzing for direct and indirect effects is the Project Area. This area was selected because it includes the area of potential impacts of the proposed project and associated activities on aquatic species and habitat.

The temporal bounds would be from the time the project is implemented to three years following the completion of activities within the indicated spatial boundary. This period of time was selected because it would allow sufficient time for the project area to stabilize and effects from activities associated with

the project to no longer be detectable.

Direct and Indirect Effects

Alternative 1

Under the no-terms-and-conditions alternative and implementation of the City's preferred method of implementation There is no change in effects to fisheries from this Alternative compared to alternative 2.

Alternative 2 – Proposed Action

There are no activities of the proposed action that would result in direct effects to cutthroat trout and macroinvertebrate populations or habitat. This is because none of the activities of the Proposed Action would occur within the lakebed or stream channel.

Indirect effects of constructing a breach in McKinley Lake Dam include the beneficial effects of reduced water level fluctuations and non-native rainbow trout population in McKinley Lake. As well as the impact of sediment and temperature pulses possible downstream after dam decommissioning. Water levels in the lake have fluctuated approximately 10 feet over the past 20 years because of the outlet works remaining open. Water levels on the lake would rise due to inflow exceeding outflow during runoff associated with spring snowmelt or large storm events. During these events, the lake level could rise 10 feet to the elevation of the spillway on the south end of the dam. The proposed constructed breach would bring the high-water level down approximately six feet lower than the elevation of the current spillway. This would result in approximately six feet less annual fluctuation of water levels within the lake.

Stable water levels would provide better conditions for the development of riparian and submergent aquatic vegetation. This vegetation provides forage and habitat for aquatic macroinvertebrates and increases the productivity of the shallow littoral areas of the lake. Increased productivity of aquatic macroinvertebrates provides more food for fish species including cutthroat trout (Wetzel and Likens 1990). Because of the beneficial effects and no direct or negative indirect effects resulting from activities of the proposed project, it is determined that the proposed McKinley Lake Dam Decommissioning project would have beneficial effects to cutthroat trout and aquatic macroinvertebrates.

Cumulative Effects

Because there would be no direct effects, and indirect effects would be beneficial to bull trout in Rattlesnake Creek and aquatic macroinvertebrate habitat within the lake, there would be no cumulative effects associated with the activities of the proposed project.

Summary of Effects

Implementation of the proposed action is expected to have no direct effects to bull trout, westslope cutthroat trout or aquatic macroinvertebrates, as discussed above. The incorporation of project design criteria in the implementation of the proposed action is expected to result in low to no sediment reaching the steam channel below the dam. An indirect effect to trout and aquatic macroinvertebrate populations and habitat would be beneficial because of stabilized lake water levels. Stabilized water levels are expected to improve the development of shoreline and aquatic vegetation. This would improve conditions for aquatic macroinvertebrates which provide food for fish populations.

The proposed action would also eliminate the hazard of a potential dam failure and the associated resource damage that would occur.

The proposed project is expected to improve aquatic habitat within the project area. Therefore, the McKinley Lake Dam Decommissioning Project **would not contribute to a negative trend on the Lolo National Forest for bull trout and aquatic macroinvertebrates**.

3.8 Botanical Resources

Endangered, Threatened, and Proposed Species

The U. S. Department of Interior Fish and Wildlife Service (FWS) sent the Lolo National Forest a list of Threatened, Endangered, Proposed, and Candidate (TEPC) species that may be present on the Forest. The list was dated May 1, 2023. The only plant species included on this list is whitebark pine.

Affected Environment

Whitebark pine was recently listed as threatened on December 15, 2022. This species is dominant in treeline habitats and a common component of subalpine habitats. It occurs in almost all major mountain ranges of western and central Montana. Populations of whitebark pine in Montana and across most of western North America have been severely impacted by past mountain pine beetle outbreaks and by the introduced pathogen, white pine blister rust. The results of which have been major declines in whitebark pine populations across large areas of its range. Additionally, negative impacts associated with encroachment and increased competition from other trees, primarily subalpine fir, have occurred because of fire suppression in subalpine habitats.

The project area is in potential whitebark pine habitat in the Rattlesnake Mountains. Existing literature and anecdotal information suggest the presence of whitebark pine trees in vicinity of the dam. The exact locations and full extent of this species presence will be documented in vegetative surveys in summer 2023. The City of Missoula has completed vegetation surveys at all the wilderness dams. No whitebark pine trees are known to occur on the dam or within the proposed breach location on the dam but likely occur in forested areas surrounding the dam. The Montana Natural Heritage Program has several recorded observations of whitebark pine in the vicinity of McKinley Lake. There are no whitebark pine plus trees in or near the project area.

Resource Indicators and Measures of Analysis

To compare the two alternatives and determine the potential impacts on whitebark pine, project activities that could damage or kill individual seedlings, saplings, or mature trees were considered.

Spatial and Temporal Bounds of Analysis

The analysis area for effects to whitebark pine is the project area. All proposed activities that could affect whitebark pine are contained within this area. The temporal scale for the effects analysis is the duration of the project, approximately 13 weeks, starting in early July 2024.

Direct and Indirect Effects

Alternative 1

The effects of this alternative represent implementation of the dam breach without the Forest Service's terms and conditions. Under this alternative, whitebark pine seedlings or saplings present on the McKinley Lake Dam could be damaged or killed during vegetation removal or blasting. In addition, any seedlings, saplings, or mature trees within the blast radius could be damaged or killed by material from the blast.

Alternative 2 – Proposed Action

The effects of this alternative represent implementation of the dam breach with the Forest Service's terms and conditions. Under this alternative, terms and conditions would reduce the potential for effects to seedlings, saplings, or mature trees in the area. Any moveable whitebark pine that have established on top of the dam would be relocated to an area outside the blast zone prior to any blasting and, as practicable, individual or clumps of whitebark pine trees within the blast radius would be protected during blasting.

Cumulative Effects

Past, present, and reasonably foreseeable cumulative effects in the analysis areas for whitebark pine include recreational use by the public. Recreationists could damage or kill whitebark pine seedlings, saplings, or mature trees through collection of firewood or other means. It is likely that recreational use would be displaced to other areas of the wilderness during project implementation and very few recreational activities would occur in the area simultaneously with the project. Whitebark pine in the area would also continue to be exposed to the risks of white pine blister rust and mountain pine beetle. Since project activities in the area would be short in duration, the combined effect to whitebark pine from these effects is likely to be very similar to the effects discussed in the direct and indirect effects section. Both alternatives would expose five acres of soil, some of which could become strata for the establishment of whitebark pine seedlings.

Summary of Effects

Whitebark pine are known to occur near the project area. The proposed action has the potential to kill or damage individual seedlings, saplings, or mature trees during vegetation removal on the dam and during blasting. Terms and conditions would reduce the potential for these effects. The proposed action will not impact the extent or severity of white pine blister rust or mountain pine beetle, the two primary threats to whitebark pine. Similarly, the proposed action will have no effect on forest community composition or encourage the spread of subalpine fir in the project area which could out-compete whitebark pine.

Sensitive Species

The dam and surrounding area at McKinley Lake were surveyed in 2020. The list of plants found was compared with the Regional Forester's 2023 sensitive species list.

No sensitive species are known to be present. Steps to avoid or protect plants will be made if any are discovered before or during implementation.

Based on this information, the McKinley Lake Decommissioning Project is expected to have "**no impact**" to sensitive plants. Best available scientific information indicates this determination is made with high level of certainty.

3.9 Noxious Weeds

The City of Missoula provided their records of annual weed monitoring and treatment in the Rattlesnake corridor and at McKinley and Carter Lakes. The information is sufficient for assessing the environmental effects of the proposed project.

Affected Environment

As part of their special use permit and easement access, the City of Missoula is responsible for weed control along Road 99 in the Rattlesnake corridor within the National Recreation Area, and along Trail 534 up Lake Creek in the Rattlesnake Wilderness. Weeds are inventoried, monitored, and treated annually. In 2021, there was a population of spotted knapweed, oxeye daisy, and common tansy at Elk Meadow in the National Recreation Area, covering about one-half acre, which was treated. Weeds at McKinley Lake (oxeye daisy, sheep sorrel, and Kentucky bluegrass) have been hand pulled whenever they have been discovered, and it is now believed to be weed-free.

Supplies and equipment to and from the project site at the Lake would be initially transported by helicopter. Vehicles would also be used to transport crews part way up trail 534 and to bring supplies and equipment to and from the stock base camp but will remain on the established road. In alternative 2, stock would be used for resupply from Elk Meadow to McKinley Lake. Elk Meadow is an established area used for stock and receives moderate use.

Methodology

Known noxious weed sites pertinent to this analysis were identified from City of Missoula records as well as the Lolo National Forest GIS layer for invasive species. Inventoried weed sites are treated annually, and existing condition of these sites updated in the inventory files and electronic database.

Potential was determined by the presence or absence of noxious weeds at these study sites in relation to the protection measures included in terms and conditions.

Direct and Indirect Effects

Resource Indicators and Measures

Presence and absence of noxious weeds is the resource indicator used to determine the potential establishment and spread of noxious weeds at the project site because of activities associated with the proposed project.

Spatial and Temporal Bounds of Analysis

The spatial bounds for analyzing the extent of potential effects of the project to noxious weed establishment are from Elk Meadow to McKinley Lake along the corridor of trails 515 and 534. The spatial boundary of potential establishment and spread of noxious weeds by project ground disturbing activities is the dam site and Elk Meadow.

The temporal bounds would be during the approximate 13-weeks when the activities of the Proposed Action would occur within the indicated spatial boundary.

Alternative 1 – City's preferred alternative

Under this alternative, there would be no tools or equipment transported into the McKinley Lake project area via the ground. Tools and equipment would be delivered by helicopter. Crews would arrive by ground transport every two weeks and camp at McKinley Lake. Crew members would drive their vehicles up the old existing roadbed (Trail 534) to within 1.5 miles of McKinley Lake. No stock would be used for resupply.

Ground disturbing activities would involve removal of a portion of the dam to create a notch which would be 10 or more feet wide at the base as well as sloping and stabilization of side slopes. Side slope stabilization would be accomplished using riprap materials available on site. Any ground disturbance provides an environment for noxious weed seeds to germinate and become established. Work would be accomplished by blasting and small heavy machinery supported by hand crews using traditional and power tools and wheelbarrows/carts. Fewer laborers would be needed, and for a shorter period due to the efficiency of the small heavy equipment.

The potential for weed seeds or plant materials being brought in and establishing would be higher without terms and conditions imposed for equipment cleaning before being brought into the wilderness or NRA. Because no stock would be used to resupply the camp and worksite, there is no potential for weeds to be introduced from hay or manure.

Alternative 2 – Proposed Action

Under this alternative, needed tools and supplies would be transported to the site by helicopter at the beginning of the project then transported out at the end of the project. Crew members would be transported by vehicle every two weeks. Crew members would drive their vehicles up the old existing roadbed (Trail 534) to within 1.5 miles of McKinley Lake but would not leave any vehicles within the wilderness boundary. Additional food and supplies would be packed in with stock from Elk Meadow to McKinley Lake

Ground-disturbing activities would involve removal of a portion of the dam to create a notch which would be 10 or more feet wide at the base as well as sloping and stabilization of side slopes. Side slope stabilization would be accomplished using riprap materials available on site. Any ground disturbance provides an environment for noxious weed seeds to germinate and become established. Work would primarily be accomplished by blasting and hand crews using traditional tools, with the assistance of wheeled carts or barrows to assist in moving rock. Use of hand tools rather than motorized equipment as well as use of onsite materials would greatly reduce the potential for weed seeds to be transported to the project area where they could potentially germinate and become established. Measures to ensure the power auger is clean before being transported into the wilderness will eliminate the risk of weed spread. The pump to start the siphon will also be clean, as would wheeled carts or barrows.

Because of terms and conditions for equipment cleaning, the potential of noxious weed seeds or plant materials being transported to the McKinley Lake area attached to tools or equipment would be less than Alternative 1, and the potential for establishment and spread of noxious weeds would be extremely low to no occurrence. Weed free hay would reduce the likelihood of weeds being established by manure from pack stock along the trail or at Elk Meadow. Monitoring and treatment in subsequent years by the City of Missoula and Forest Service will ensure no new populations are established.

The possibility of direct or indirect effects are extremely low from noxious weed establishment and spread as a result of the Proposed Action.

Cumulative Effects

Spatial and Temporal Bounds of Analysis

The spatial boundaries of potential establishment and spread of noxious weeds are at the Elk Meadow stock camp and trailside from Elk Meadow to the dam site/crew camping area. The spatial boundaries of potential establishment and spread of noxious weeds by project ground disturbing activities is at the breach construction site and associated areas used for excavated soil and rock in completing and stabilizing the constructed breach.

The temporal bounds would be from the time the project is implemented to one year following the completion of activities within the indicated spatial boundary. This period was selected because it would allow sufficient time for the potential spread of seeds and growth of noxious weeds as a result of project activities to be detected.

Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Past, present or reasonably foreseeable future actions within the McKinley Lake area that have occurred or may occur within or adjacent to the project area were reviewed for their potential to add to impacts of the proposed project.

The McKinley Lake area receives light recreational use by backpackers as well as horse packers. Recreationists and their pack stock always have the potential of introducing weed seed from their gear or animals. The level of recreational use is not expected to change because of this project, except during implementation of the dam decommissioning.

The combination of recreational use and the proposed project activities are not expected to increase the likelihood of noxious weed establishment or spread in the McKinley Lake area or along the access trail.

Summary of Effects

Under alternative 1, there would be no pack stock are involved, although ground disturbance at the dam breaching site may be greater with the use of small pieces of heavy equipment such as a mini-excavator and/or a skidsteer. A lack of terms and conditions could allow for the introduction of weed seed if equipment was not rigorously cleaned before it entered the Rattlesnake Recreation and Wilderness Areas.

Under alternative 2, ground disturbance at the dam site would be minimal. Ground disturbance from stock use and labor crews would be greater. With terms and conditions and the mitigation measures for monitoring the site after implementation, there would be little to no effect on the spread and establishment of noxious weeds in the McKinley Lake Area, along the trails or at Elk Meadow.

Chapter 4 – Agencies and Individuals Informed or Consulted

4.1 Agencies, Governments, and Individuals Informed or Consulted

- City of Missoula
- Montana State Historic Preservation Office
- Montana Department of Natural Resources and Conservation
- Missoula County
- Trout Unlimited
- Kirk Thompson and Bob Beckley, Retired USFS wilderness specialists/engineers
- The Watershed Education Network
- Wilderness Watch

4.2 Tribal Units of Government and Tribal Organizations

- Confederated Salish and Kootenai Tribe
- Nez Perce Tribe

Appendix A – Maps

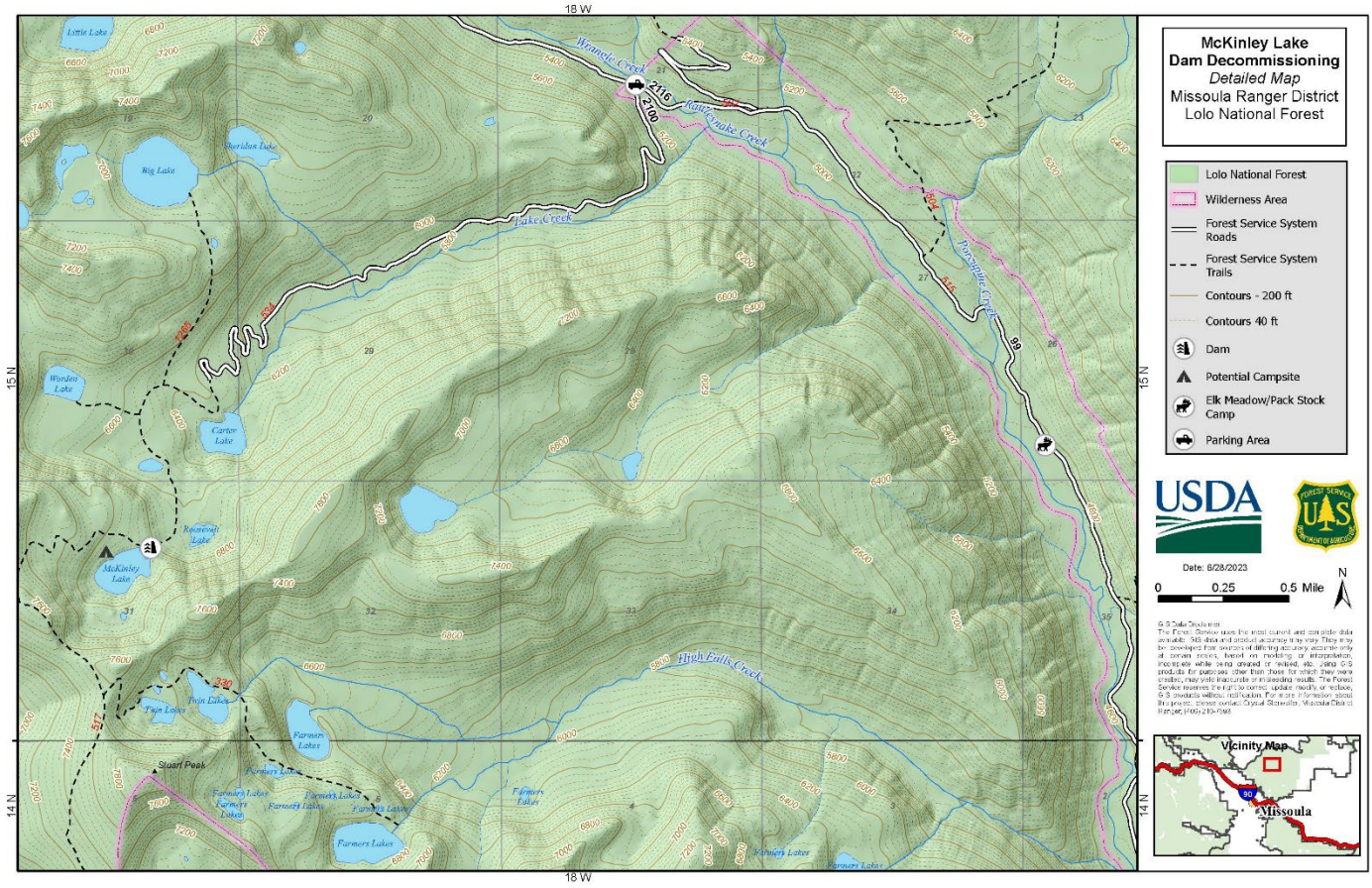

Figure 7. Detailed site map for dam breach, campsite, stock camp, and parking

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Appendix C - Minimum Requirement Analysis Framework

MINIMUM REQUIREMENTS ANALYSIS FRAMEWORK WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

— Section 4(c), Wilderness Act of 1964

McKinley Lake Dam Decommissioning and Restoration Project

Step 1: Determine If Administrative Action May Be Necessary

Issue Statement

There are ten earthen dams on eight mountain lakes in the Rattlesnake Wilderness located northeast of Missoula on the Missoula Ranger District, Lolo National Forest. The dams were built between 1911 and 1923, prior to the Wilderness Act of 1964 and the designation of the Rattlesnake Wilderness in 1980. The dams were constructed to serve as part of the Rattlesnake Creek water supply and drinking water for the City of Missoula (City). In 1983, the City discontinued use of water from the Rattlesnake drainage for municipal purposes, however, the dam owner maintained the water rights associated with the water storage in the dammed lakes. Once the dams were no longer used for municipal purposes, they became largely non-operational and have suffered from a lengthy maintenance backlog. In 2017, the City acquired the ten dams in the Rattlesnake Wilderness as part of the 2017 acquisition of the Mountain Water Company. Five of the dams operate under a pre-Federal Land Management Policy Act right-of-way or easement held by the City and five are administered by the U.S. Forest Service (USFS) under a special use permit. As the current dam owner, the City is responsible for annual monitoring and maintenance of each dam.

In 2018, the City completed an engineering and cost benefit evaluation of dam ownership in the Rattlesnake watershed (HDR 2018). This feasibility study provided preliminary recommendations to repair the dams with the largest water rights for long-term water storage and decommission the other dams with smaller water rights. The City has neither the staff nor financial resources to repair and maintain all ten dams, so in the long-term the City intends to complete either decommissioning or rehabilitation of each dam. This would alleviate inspection requirements, operational and financial obligations, and current risk associated with the aged structures. To begin this work, the City, in partnership with Trout Unlimited, has proposed a pilot dam decommissioning and restoration project at McKinley Lake, which is the focus of this Minimum Requirements Analysis Framework.

McKinley Lake lies within T15N, R18W, Section 31, in the Lake Creek drainage of the Rattlesnake Wilderness with approximate coordinates of 47.018º latitude and -113.921º

longitude. The size of the lake is approximately 16 acres and the approximate elevation is 6,850 feet. Primary public access is via the main Rattlesnake Creek Trail #515/Road #99 to the wilderness boundary and then Trail #534 to the lake. The McKinley Lake Dam was constructed in 1923 and operates under easement as an "Org Dam." Org dams are regulated for dam safety by the Montana Department of Natural Resources and Conservation's (DNRC) Dam Safety Program.

The McKinley Lake Dam is classified as a "significant" hazard under the USFS hazard rating system. Erosion at the dam spillway has created a severe headcut and, along with significant seepage at the dam toe, the dam has been recommended for monitoring and immediate mitigation. Failure of the dam could threaten downstream public safety, water quality, and fisheries, including bull trout, a threatened species protected under the Endangered Species Act. Decommissioning the McKinley Lake Dam would eliminate the City's current and future costs and maintenance requirements, remove an environmental and public safety threat, and improve natural resource conditions at the lake and in the wilderness.

Because the McKinley Lake Dam is located within an easement owned by the City, the USFS does not have jurisdiction over the dam. However, actions taken on National Forest System (NFS) lands outside the easement area or actions that will impact NFS lands and resources require the USFS to be involved. Because the City will need access to the McKinley Lake Dam via NFS lands designated as wilderness to conduct the proposed project, administrative action by the USFS may be necessary. The City would need adequate access to their easement at McKinley Lake Dam and possibly the use of motorized equipment and mechanical transport (prohibited uses under the Wilderness Act of 1964) to decommission the dam to achieve the goal of the proposed project in accordance with their responsibility under federal and state dam safety laws and regulations.

Options Outside of Wilderness

Can the issue be resolved or addressed outside of wilderness?

☐ YES **STOP – EXPLAIN BELOW AND DO NOT TAKE ACTION**

☒ NO **EXPLAIN BELOW AND PROCEED TO THE NEXT SECTION**

The dam is located on an existing City-owned easement at McKinley Lake within the Rattlesnake Wilderness of the Lolo National Forest. Dam decommissioning and restoration work must occur on site inside the wilderness. In addition, access on or over wilderness land will be needed to transport the necessary equipment, materials, and personnel on site to conduct the dam decommissioning and restoration work.

Criteria for Determining Necessity

Do any of the criteria below apply?

A. Wilderness Character

Based on the Issue Statement, are any of the qualities of wilderness character degraded, impaired, or threatened to a degree that it is necessary to analyze potential action otherwise prohibited by Section 4(c) to address the issue?

UNTRAMMELED

☒ YES ☐ NO

Action is necessary to preserve the untrammeled quality of the Rattlesnake Wilderness in the long-term. The untrammeled quality is defined as being “essentially unhindered and free from the intentional actions of modern human control or manipulation” with an emphasis on the biophysical environment (Landres et al. 2015). This quality is preserved when no manipulation or control of natural processes occurs. The McKinley Lake Dam was constructed prior to the designation of the Rattlesnake Wilderness, but the dam constitutes trammeling in that it is a human made structure that is currently imposing on the natural hydrologic flow from the lake to an outlet channel. The act of decommissioning the dam and restoring the impacted area would be considered a short-term trammeling action, but breaching the human made structure and restoring natural hydrologic flow from the lake would restore the untrammeled quality long-term.

UNDEVELOPED

☒ YES ☐ NO

Action is necessary to preserve the undeveloped quality of the Rattlesnake Wilderness in the long-term. The undeveloped quality is defined as being “essentially without permanent improvements or the sights and sounds of modern human occupation” (Landres et al. 2015). This quality is preserved when wilderness retains its primeval character and influence and is essentially without permanent improvements or modern human occupation. The McKinley Lake Dam was constructed prior to the designation of the Rattlesnake Wilderness and was recognized as part of the municipal watershed in the Rattlesnake National Recreation Area and Wilderness Act of 1980 (Public Law 96-476 1980). However, the existing dam constitutes a human development and permanent improvement in the wilderness and currently degrades the undeveloped quality. In addition, the City regularly makes use of motorized equipment and mechanical transport to access the dam for operation and maintenance, which also degrades the undeveloped quality. Removing a portion of the human development by breaching the dam and decommissioning the dam as an operational structure would improve the undeveloped quality long-term. Following completion of the project, the City would relinquish their easement and cease motorized use and mechanical transport inside the wilderness related to McKinley Lake which would also improve the undeveloped quality long-term.

NATURAL

☒ YES ☐ NO

Action is necessary preserve the natural quality of the Rattlesnake Wilderness. The natural quality is defined as protecting and managing the area so “that wilderness ecological systems are substantially free from the effects of modern civilization” (Landres et al. 2015). This quality is preserved when unnatural conditions are corrected, and ecological systems are restored. When constructed in 1923, the McKinley Lake Dam created unnatural conditions that have resulted in negative impacts to the surrounding natural environment. The existing earthen dam and reservoir cover approximately 16 acres of land. The reservoir area is disconnected from the outlet stream by the earthen dam that impounds diverted flows from the surrounding hillslopes. Decommissioning the dam would restore natural ecological processes at the lake by lowering the full pool elevation of the lake and exposing the littoral zone (shoreline), which has been submerged for 100 years since dam construction. It is estimated that over five acres of reconnected floodplains, wetlands, and forested (including whitebark pine) habitat would be restored and protected long-term by this project. Newly developed floodplain areas would reconnect and protect the riparian habitat corridor to the lake margins and stream outlet and the

free flow of water from the lake through the outlet channel would be returned to a natural state.

OUTSTANDING OPPORTUNITIES FOR SOLITUDE or PRIMITIVE and UNCONFINED RECREATION

☒ YES ☐ NO

Action is necessary to preserve outstanding opportunities for solitude. As mentioned above under "Undeveloped," the City regularly makes use of motorized equipment and mechanical transport to access the McKinley Lake Dam for operation and maintenance which impacts opportunities for solitude for visitors to the Rattlesnake Wilderness. Following completion of the project, the City would relinquish their easement and cease motorized use and mechanical transport inside the wilderness related to McKinley Lake which would also improve outstanding opportunities for solitude long-term.

OTHER FEATURES OF VALUE

☐ YES ☒ NO

Action is not necessary to preserve other features of value within the Rattlesnake Wilderness. The Wilderness Act of 1964 indicates that wilderness areas "may also contain ecological, geological, or other features of scientific, educational, scenic, or historical use" (Public Law 88-577 1964) that reflect the character of an area. Originally constructed in 1923, the McKinley Lake Dam is 100 years old. As such, the dam has been inventoried to determine its historic significance and value. It was originally recorded in July 2003 and again in 2022. The site has been determined as eligible for inclusion in the National Register of Historic Places (NRHP) by the MT State Historic Preservation Office. It is not necessary to conduct the dam decommissioning and restoration project to preserve the historical value of the dam, rather the historical value of the dam should be taken into consideration when determining how to breach the dam to maintain its historic value once decommissioned as an operational structure. Partial removal of the dam would allow some of the historic structure to remain on site, preserving this quality of wilderness character. No other cultural resources would be affected by the project.

B. Valid Existing Rights

Is action necessary to satisfy a valid existing right? If so, cite the specific right, terms and conditions, and source.

☒ YES ☐ NO

McKinley Lake Dam was constructed in 1923 prior to the Wilderness Act of 1964 and the Rattlesnake National Recreation and Wilderness Act of 1980. The dam is operated under a pre-Federal Land Management Policy Act right-of-way or easement held by the City. The easement assigns the City the "right to use, maintain, reconstruct, operate, and remove, and to affect with storage waters, structures, dams, pipes and associated facilities, including trails" underlying and adjacent to water storage lakes, including McKinley Lake (Easement 1979). Therefore, action is necessary to satisfy the City's valid existing right to "remove" or breach a portion of the McKinley Lake Dam, affecting storage waters, structures, dams, pipes, and associated facilities.

C. Special Provisions of Wilderness Legislation

Is action necessary to satisfy a special provision in wilderness legislation (i.e., Section 4(d) of the Wilderness Act of 1964 or subsequent wilderness-enabling laws) that requires action? Cite law and section.

☐ YES ☒ NO

Section 4.(d)(4) of the Wilderness Act of 1964 provides for the authorization of "the establishment and maintenance of reservoirs" (Public Law 88-577 1964), but does not include authorization to decommission a reservoir. Similarly, under special provision in the Rattlesnake National Recreation and Wilderness Act of 1980, the City has "the right to operate and maintain" water storage facilities (Public Law 96-476 1980), such as the McKinley Lake Dam, but the right to decommission or breach the dam is not included in the special provision. Thus, action is not necessary to satisfy a special provision in wilderness legislation.

D. Requirements of Other Federal Laws

*Not including special provisions found in wilderness-enabling laws, does another Federal law, by itself or as implemented or interpreted through EO, court order, etc., **require** action? Cite law and section.*

☒ YES ☐ NO

The McKinley Lake Dam is classified as a "significant" hazard under the USFS hazard rating system. The City is responsible for operating and maintaining the dam in accordance with applicable federal and state laws and regulations for a significant hazard dam. Federal regulations on dam safety were initiated in 1977 when the Federal Guidelines for Dam Safety were issued (and later reprinted in 2004). In addition to the federal regulations, there are other authorities through which the USFS regulates safety of dams including the National Dam Inspection Act of 1972 (Public Law 92-367 1972) and the Dam Safety and Security Act of 2002 (Public Law 107-310 2002). McKinley Lake Dam is not currently meeting regulations for a significant hazard dam; thus, action is necessary to either conduct maintenance to bring the dam into compliance with the applicable regulations or decommission the dam. If no action is taken, failure of the dam could cause non-recoverable environmental damage such as erosion and sediment transfer to the outlet channel and then Carter Lake and possibly to Lake Creek and ultimately Rattlesnake Creek where bull trout (a threatened species under the Endangered Species Act) are present.

Step 1: Determination – Is Administrative Action Necessary in Wilderness?

Based on the responses and detailed explanations in A through D above, is there a need to proceed to Step 2? If at least one criterion in B through D in Step 1 has been met, or at least one quality of wilderness character is threatened, check the "Yes" box and provide a thorough explanation of the rationale described in A through D. It may also be helpful to describe in this determination how action would be consistent with the public purposes of wilderness or satisfy a specific agency obligation. If none of the criteria have been met, action is NOT necessary. Check the "No" box, explain why the proposed project does not meet the criteria, and stop your analysis.

☒ YES **EXPLAIN BELOW AND COMPLETE STEP 2 OF THE MRAF**

☐ NO **STOP – EXPLAIN BELOW AND DO NOT TAKE ACTION**

Administrative action in the Rattlesnake Wilderness is necessary to preserve wilderness character long-term (untrammeled, undeveloped, natural, and outstanding opportunities for solitude), satisfy a valid existing right to remove the dam, and requirements of other federal laws related to dam safety.

Step 2: Determine the Minimum Activity

Other Direction

Is there "special provisions" language in legislation or other congressional direction that explicitly allows consideration of (but does not require) a prohibited use? (Step 1 has a similar question in Section C, but that question is specific to other legislation requiring action in wilderness; this question is specific to other legislation addressing ***consideration of prohibited uses)****.*

AND/OR

Has the issue been addressed or prescribed in agency policy, management plans, or legal directive (e.g., treaty, EO, court order, or other binding agreement with federal, state, or local agencies or authorities)?

☒ YES **DESCRIBE OTHER DIRECTION**

☐ NO **SKIP TO "UNCONTROLLABLE TIMING REQUIREMENTS" BELOW**

Rattlesnake National Recreation Area and Wilderness Act of 1980

As mentioned above, under special provision in the Rattlesnake National Recreation Area and Wilderness Act of 1980, the City has "the right to operate and maintain" water storage facilities, and it is stated, "Nothing in this Act shall be construed to permit the Secretary to affect or diminish any water right which is vested under either State or Federal law at the time of enactment of this Act, nor the rights of the owner of such water right to customary and usual access, including necessary motorized use over and along existing roads and trails used in connection therewith…" (Public Law 96-476 1980). This language allows consideration of motorized use (helicopter and vehicle) within the Rattlesnake Wilderness by the City to access the McKinley Lake Dam.

Forest Service Manual

FSM 2323 – Management of Other Resources in Wilderness

FSM 2323.13: Provide facilities and improvements only for protection of the wilderness resource.

FSM 2323 – Use of Motorized Equipment or Mechanical Transport in Wilderness

FSM 2326.02 – Objectives

1. Accomplish management activities with nonmotorized equipment and nonmechanical transport of supplies and personnel.

2. Exclude the sight, sound, and other tangible evidence of motorized equipment or mechanical transport within the wilderness except where they are needed and justified.

FSM 2326.03 – Policy

1. Ensure that Forest Service employees acquire and maintain necessary skills for primitive travel by foot, horse, canoe, or other nonmechanical means and the use of hand tools. For definitions see FSM 2320.5.

2. Do not approve the use of motorized equipment or mechanical transport unless justified as described in 2326.1. For definitions see FSM 2320.5.

FSM 2326.1 – Conditions Under Which Use May Be Approved

Allow the use of motorized equipment or mechanical transport only for:

5. To meet minimum needs for protection and administration of the area as wilderness, only as follows:

a. A delivery or application problem necessary to meet wilderness objectives cannot be resolved within reason through the use of nonmotorized methods; b. An essential activity is impossible to accomplish by nonmotorized means because of such factors as time or season limitations, safety, or other material restrictions.

Specify, for each wilderness, the places and circumstances in which motorized equipment, mechanical transport, or aircraft are necessary for protection and administration of the wilderness and its resources in the forest plan; The Line Officer approving the use of motorized equipment, aircraft, or mechanical transport shall specify what uses of that equipment are suitable and will have the least lasting impact to the wilderness resource. Schedule use of this equipment to minimize impact on wilderness visitors.

Lolo National Forest Plan

III. <u>Management Direction</u>, Management Area 12

C. <u>Standards</u>

1. Wilderness areas will be managed according to the Wilderness Act of 1964 and implemented through direction in the Forest Service Manual.

<u>Wildlife and Fish:</u>
4. The conservation of threatened and endangered species and their habitats will receive high priority in the management of the wilderness resource.

Uncontrollable Timing Requirements

What, if any, are the considerations that would dictate timing of the action?

It is critical to complete the dam decommissioning and restoration work in one season to eliminate the risks of a dam failure if the dam decommissioning is left partially finished over the winter. In the scenario where the dam decommissioning is not fully complete and left to overwinter, the dam would be subject to spring runoff and the associated sheer forces of the higher lake levels that occur when the lake fills with snowmelt. This would have the potential to

undermine the structure that is half finished and could potentially lead to a failure of the partially removed earthen berm. A combination of higher soil moisture levels in the dam during the springtime and increased sheer pressure from the lake water could compromise the dam. Completing the dam removal in one season would eliminate this potential risk because the work would be completed during the driest time of the year and be left in a stable condition at the end of the project. The associated water levels would also be lower overwinter and the following spring.

Workflow Components

What are the distinct components or phases of the action?

Component 1	Transportation of equipment and materials to and from the project site.
Component 2	Transportation of personnel to and from the project site.
Component 3	Dewatering the crib outlet area of the lake and dam.
Component 4	Decommissioning and partial dam removal (dam breach); construction of outlet channel.
Component 5	Site stabilization and revegetation.

Step 2: Alternatives

Alternative 1

Dam Decommissioning and Restoration – Use of Traditional Tools and Skills Only

Component Methods

How will each of the components of the action be performed under this alternative?

Component	Workflow Components	Component Methods for this Alternative
1	Transportation of equipment and materials to and from the project site.	Equipment and materials would be transported by pack stock to the project site.
2	Transportation of personnel to and from the project site.	Personnel would travel by foot to the project site.
3	Dewatering the crib outlet area of the lake and dam.	Dewatering would occur using a hand-primed siphon and piping.
4	Dam breach and construction of outlet channel.	Dam breach would occur using explosives and construction of outlet channel would occur using traditional hand tools and pack stock.
5	Site stabilization and revegetation.	Site stabilization and revegetation would occur using traditional hand tools and pack stock.

Description of the Alternative

Under this alternative, as early as summer of 2024, the McKinley Lake Dam would be

decommissioned using only traditional tools and skills including blasting and the use of stock. The construction window each season is roughly 13 weeks total from early July through the end of September. Thus, with the use of entirely non-motorized equipment and non-mechanical transport, dam decommissioning and restoration work would be anticipated to occur over the course of two seasons, requiring approximately 119 work days or 17 weeks, not accounting for any possible delays and adverse weather conditions (Appendix A).

Equipment and materials would be transported to and from the project site by pack stock. A stock camp would be established at Elk Meadow in the Rattlesnake National Recreation Area (NRA), approximately three miles from the wilderness boundary. The main Rattlesnake corridor (Trail # 515/Road #99) is currently impassable to stock trailers due to its condition, so stock would have to be led up the corridor from the main Rattlesnake Trailhead or the West Fork Gold Creek Trailhead to the Elk Meadows camp for staging. The stock size limit for the Rattlesnake NRA and Wilderness is 10, so the project would be limited to the use of 10 pack stock for transportation at one time. Two of the stock would be used as riding animals for packers and the other eight would be used for transporting equipment and materials. The pack train would perform one round trip to the project site each day and could transport approximately 960 pounds (8 pack mules, 120 lbs/mule). It is estimated that approximately 48 pack train trips over 48 days (see Appendix A) would be needed to transport all equipment and material to and from the project site over the course of the two seasons needed to complete the project. In addition to the pack stock needed for transportation of equipment and supplies, two additional stock (mules/draft horses) would be used on site to assist work personnel with construction work. There is no graze available near the project site, so certified weed free seed would need to be packed in via the pack train. In addition, stock holding areas (highline and electric fencing) would need to be established for these two animals to be kept when not working.

Work personnel would drive up the main Rattlesnake corridor (Trail #515/Road #99) through the NRA to the wilderness boundary. They would then hike from the wilderness boundary up Trail #534 along Lake Creek to the project site. The group size limit for the Rattlesnake Wilderness is 10, so the project work crew would be limited to 10 personnel at one time. The project site is approximately 4.5 miles from the wilderness boundary with roughly 1,800 feet of elevation gain. A crew camp would be established at McKinley Lake for the duration of the project.

The project would begin by drawing down the water level in the lake and dewatering the crib outlet area of the dam using a hand-primed siphon and PVC piping. This would be needed to create a dry work area. Movement of any necessary riprap from the upstream and downstream faces of the dam would occur by hand with the possible use of rigging equipment and either hauled to a storage area by stock or by hand. Wetland vegetation from downstream of the dam would be transplanted to a temporary nursery area, and any necessary trees and vegetation needing to be cleared within the work area would be cut using axes, hand saws, and cross-cut saws. Following this work, boreholes for the explosives would be hand pounded into the dam embankment with sledgehammers and rods and the dam breach would be blasted using explosives.

It is unlikely that hand pounded boreholes will be able to extend through the entire dam embankment, thus multiple blasts with explosives would likely be needed, creating a greater risk to the work crew. The blast area would be cleaned up using shovels, buckets, stock plows, and a Fresno scraper or other earth moving tool. A temporary low flow channel for overwintering would then be established and graded using hand tools. It is likely that project work would only be able to proceed to this point during the first year of construction, so a temporary stabilization of the construction site would need to occur.

During the second year, the work crew would re-mobilize and re-establish camp using the same

means as year one, remove the temporary stabilization structure, and repair any damage or erosion that might have occurred over the winter and during spring runoff. A permanent low flow channel would then be constructed by hand with non-motorized/non-mechanical tools. Riprap would be hand placed within the dam breach and the permanent low flow channel. Once the permanent channel was complete, flow would be switched from the temporary low flow channel to the permanent one. The spillway channel (approximately 300 square feet) would then be rehabilitated into a more natural condition and wetland vegetation would be replanted. Wetland vegetation would also be replanted along a portion of the exposed shoreline to facilitate regrowth on site. A post-construction survey would be performed and then demobilization of work personnel and equipment would occur.
# of Days to Complete Project (construction days): **119 (17 weeks, two work seasons)**
# of Laborers: **Up to 10**
# of Stock: **Up to 10 for transportation & 2 used on site**
# of Pack Train Trips: **~48 trips over 48 days**
# of Helicopter Flight Days: **0**
Motorized Equipment/Mechanical Transport used: **None**

Wilderness Character

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0 *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
1	Equipment and materials would be transported by pack stock to the project site.	0	N	N	N	0
2	Personnel would travel by foot to the project site.	0	0	0	0	0
3	Dewatering would occur using a hand-primed siphon and piping.	N	0	0	0	0
4	Dam breach would occur using explosives and construction of outlet channel would occur using traditional hand tools and pack stock.	0	P	P	N	N
5	Site stabilization and revegetation would occur using traditional hand tools and pack stock.	0	0	P	0	0

UNTRAMMELED: Explain the intensity of the action that would intentionally control, manipulate, or hinder the conditions or processes of ecological systems:

The only method that would have a short-term effect on the untrammeled quality of wilderness character would be the dewatering of the crib outlet area of the dam and lake which is already impacting the untrammeled quality of the area. No other methods would intentionally control, manipulate, or hinder the conditions or processes of ecological systems apart from the purpose

of naturalizing the area following the dam breach. Overall, the dam project would positively affect the untrammeled quality long-term by breaching the human made structure and restoring natural water flow from the lake to the surrounding area.

UNDEVELOPED: Explain the effects to this quality in terms of how "the imprint of man's work [would] remain substantially unnoticeable," and how wilderness will continue to be in contrast with other areas of "growing mechanization":

The only method that would have a negative effect on the undeveloped quality of wilderness character would be physical impacts to Trail #534 caused from approximately 48 pack train trips over 48 days. These impacts would include increased dust, damaged drainage structures, dislodged rocks, holes in the outside of the tread in proximity to steep side slope, and loosened tread made more susceptible to erosion. Stock use is currently low in the Rattlesnake Wilderness; thus these impacts would be immediately noticeable by wilderness visitors. Follow-up trail maintenance and reconstruction work would likely be needed to mitigate the impacts to the trail caused by excessive stock traffic which would increase project cost and time.

The dam breach, which would remove a portion of the human development and decommission the dam as an operational structure, would have a positive effect on the undeveloped quality long-term. Following completion of the project, the City intends to relinquish their easement and cease motorized use and mechanical transport inside the wilderness related to McKinley Lake which would also improve the undeveloped quality long-term.

NATURAL: Explain the effects to this quality in terms of protection, degradation, or restoration of natural conditions:

Use of pack stock for transportation of equipment and materials to the project site (~ 48 pack train trips over 48 days) would have a negative effect on the natural quality of wilderness character. Stock use is currently low in the Rattlesnake Wilderness, thus the projected increase in stock use along Trail #534 would cause an impact to wildlife and their movement in the area for the duration of the packing. Additionally, the use of explosives would have a short-term negative impact on the natural quality of wilderness character. There's a chance that vegetation near the dam, fish in the lake, and wildlife nearby could be impacted during the blasting. However, any fish currently in the lake are non-native and have been unnaturally stocked in the past, and the effect to nearby wildlife would be very brief, causing short-term displacement.

The project overall, but specifically the dam breach using explosives, construction of an outlet channel, and site stabilization and revegetation would have a positive effect on the natural quality of wilderness character long-term. Partial removal of the unnatural, human-made development and restoration of the ecological processes of the lake area would increase the naturalness of the Rattlesnake Wilderness. Environmental benefits would include fisheries, riparian, floodplain, and wetland habitat restoration.

OUTSTANDING OPPORTUNITIES FOR SOLITUDE OR PRIMITIVE and UNCONFINED RECREATION: Explain how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or degraded. As appropriate, describe solitude, primitive recreation, and unconfined recreation separately:

Use pack stock for transportation of equipment and materials to the project site (~ 48 pack train trips over 48 days) would negatively impact the solitude of wilderness visitors for two summer seasons. Stock use is currently low in the Rattlesnake Wilderness, thus the projected increase in stock use along Trail #534 would be felt by wilderness visitors. In addition, the sound from the use of explosives would also negatively affect the solitude of wilderness visitors, although this

would be very brief on the day blasting was scheduled to occur. Primitive recreation would not be affected by the project; however, unconfined recreation would be affected by closing off overnight use of McKinley Lake for the duration of the project in order to provide for crew and public safety.

The project as a whole would negatively affect opportunities for solitude in the short-term while work is being conducted on the dam due to an increase in human activity and noise at the project site. This is true of all project alternatives; however, this alternative would have the greatest effect on solitude due to the use of pack stock for transportation and the need to conduct the project over two seasons. Long-term, the project would have a positive effect on opportunities for solitude at McKinley Lake in eliminating the City's motorized use and mechanical transport inside the wilderness related to operation and maintenance of the McKinley Lake Dam.

OTHER FEATURES OF VALUE: Explain any effects to features of scientific, educational, scenic, or historical value that are not accounted for in the above qualities, including cultural and paleontological resources that are integral to wilderness character:

The dam breach itself would have a negative effect on the historical value of the dam by removing a portion of the historic structure, however, leaving most of the structure in place would preserve the historic value long-term. No other cultural resources would be affected by the project.

Alternative 2:

Dam Decommissioning and Restoration – Use of Traditional Tools and Skills with Minimal Motorized Equipment and Mechanical Transport

Component Methods

How will each of the components of the action be performed under this alternative?

Component	Workflow Components	Component Methods for this Alternative
1	Transportation of equipment and materials to and from the project site.	Equipment and materials would be transported by helicopter and pack stock to the project site.
2	Transportation of personnel to and from the project site.	Personnel would travel by vehicle approximately two miles inside the wilderness and then by foot to the project site.
3	Dewatering the crib outlet area of the lake and dam.	Dewatering would occur using a siphon, primed by a motorized pump, and piping.
4	Dam breach and construction of outlet channel.	Dam breach would occur using explosives and construction of outlet channel would occur using traditional hand tools and wheelbarrows/carts.
5	Site stabilization and revegetation.	Site stabilization and revegetation would occur using traditional hand tools, as well as wheelbarrows/carts.

Description of the Alternative

Under this alternative, as early as summer of 2024, the McKinley Lake Dam would be decommissioned using traditional tools and skills, including blasting, as well as minimal motorized equipment and mechanical transport to complete the project in one season. The construction window each season is roughly 13 weeks total from early July through the end of September. The use of some motorized equipment and mechanical transport would shorten the construction window for dam decommissioning and restoration work to approximately 84 workdays or 12 weeks, not accounting for any possible delays and adverse weather conditions (see Appendix A).

Equipment and materials would be transported to and from the project site using a helicopter. One day of helicopter use would occur for initial mobilization and one day for demobilization at the end of the project. Each helicopter trip would be able to deliver approximately 2,000 to 3,000 pounds of equipment and materials depending on the type of helicopter used. A helicopter round trip from Missoula to the project site would be approximately one hour in length, thus up to 24,000 pounds of equipment and materials could be delivered or removed from the project site in a day based on an eight-hour day (see Appendix A). A resupply would occur approximately halfway through the project using pack stock.

To perform the resupply, a stock camp would be established at Elk Meadow in the Rattlesnake

NRA, approximately three miles from the wilderness boundary. The main Rattlesnake corridor (Trail # 515/Road #99) is currently impassable to stock trailers due to its condition, so stock would have to be led up the corridor from the main Rattlesnake Trailhead or the West Fork Gold Creek Trailhead to the Elk Meadow camp for staging. The stock size limit for the Rattlesnake NRA and Wilderness is 10, so the resupply would be limited to the use of 10 pack stock for transportation at one time. Two of the stock would be used as riding animals for packers and the other eight would be used for transporting the resupply of equipment and materials. The pack train would perform one round trip to the project site each day and could transport approximately 960 pounds (8 pack mules, 120 lbs/mule). It is estimated that approximately 3 pack train trips over 3 days (see Appendix A) would be needed to transport all resupply equipment and materials to and from the project site. Depending on the timing of the resupply, a separate pack train trip may be needed to transport the explosives to the project site when the blasting is set to occur.

Work personnel would drive up the main Rattlesnake corridor (Trail #515/Road #99) through the NRA and inside the wilderness boundary on the roadbed along Trail #534 approximately two miles as done when accessing the area for dam operation and maintenance. They would then hike the remaining 2.5 miles and 1,000 feet elevation gain up the single-track portion of Trail #534 to the project site. Vehicles would be driven down and parked outside the wilderness boundary. The group size limit for the Rattlesnake Wilderness is 10, so the project work crew would be limited to 10 personnel at one time. A crew camp would be established at McKinley Lake for the duration of the project.

The project would begin by drawing down the water level in the lake and dewatering the crib outlet area of the dam using a siphon, primed by a motorized, gas-powered pump, and PVC piping. Use of a motorized pump rather than a hand pump, as described in Alternative 1, would better ensure successful siphoning of the lake water, which is critical to creating a dry work area for the dam breach. Movement of any necessary riprap from the upstream and downstream faces of the dam would occur by hand with the possible use of rigging equipment and hauled to a storage area using of wheelbarrows/carts. Use of wheelbarrows/carts to move material rather than by hand only, as described in Alternative 1, would decrease the time needed to move material and reduce the physical strain on crew members. Wetland vegetation from downstream of the dam would be transplanted to a temporary nursery area using wheelbarrows/carts, and any necessary trees and vegetation needing to be cleared within the work area would be cut using axes, hand saws, and cross-cut saws. Following this work, boreholes for the explosives would be created in the dam embankment using a motorized, gas-powered auger and the dam breach would be blasted using explosives.

Use of a motorized auger to create boreholes rather than hand pounding holes with sledgehammers and rods, as described in Alternative 1, would better ensure adequate boreholes are created for the explosives and reduce the likelihood that multiple blasts would be needed. If set up correctly, it is likely only one blast would be needed to create the dam breach. The blast area would then be cleaned up using shovels, buckets, and wheelbarrows/carts.

Following cleanup of the blast area, a permanent low flow channel would be established and graded using hand tools. The motorized pump and siphon would be available for emergency dewatering if necessary. Riprap would be hand placed within the dam breach and the permanent low flow channel. A hand compactor(s) would be used to compact a solid foundation and base for the final riprap channel at the outlet, as well as the faces of the dam breach. The spillway channel (approximately 300 square feet) would then be rehabilitated into a more natural condition and wetland vegetation would be replanted. Wetland vegetation would also be replanted along a portion of the exposed shoreline to facilitate regrowth on site. A post-construction survey would be performed and then demobilization of work personnel and

equipment would occur.

If the project can be completed in one season, a temporary stabilization of the construction site would not be needed and the risk of any damage or erosion that could occur if left over winter and during spring runoff would be eliminated.

# of Days to Complete Project (construction days): **84 (12 weeks, one work season)**
# of Laborers: **Up to 10**
# of Stock: **Up to 10 for transportation**
# of Pack Train Trips: **~3 trips over 3 days**
# of Helicopter Flight Days: **2**
Motorized Equipment/Mechanical Transport used: **Motorized pump, motorized auger, and wheelbarrows/carts**

Wilderness Character

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0 *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
1	Equipment and materials would be transported by helicopter and pack stock to the project site.	0	N	0	N	0
2	Personnel would travel by vehicle approximately two miles inside the wilderness and then by foot to the project site.	0	N	0	0	0
3	Dewatering would occur using a siphon, primed by a motorized pump, and piping.	N	N	0	N	0
4	Dam breach would occur using explosives and construction of outlet channel would occur using traditional hand tools and wheelbarrows/carts.	0	P	P	N	N
5	Site stabilization and revegetation would occur using traditional hand tools and wheelbarrows/carts.	0	N	P	0	0

UNTRAMMELED: Explain the intensity of the action that would intentionally control, manipulate, or hinder the conditions or processes of ecological systems:

The only method that would have a short-term effect on the untrammeled quality of wilderness character would be the dewatering of the crib outlet area of the dam and lake which is already impacting the untrammeled quality of the area. No other methods would intentionally control, manipulate, or hinder the conditions or processes of ecological systems apart from the purpose of naturalizing the area following the dam breach. Overall, the dam project would positively affect the untrammeled quality long-term by breaching the human made structure and restoring natural water flow from the lake to the surrounding area.

UNDEVELOPED: Explain the effects to this quality in terms of how “the imprint of man’s work [would] remain substantially unnoticeable,” and how wilderness will continue to be in contrast to other areas of “growing mechanization”:

All methods that include the use of motorized equipment and mechanical transport would have a negative impact on the undeveloped quality of wilderness character in the short-term. This includes use of a helicopter for mobilization and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary, use of a motorized pump to prime the siphon for dewatering the crib outlet area of the dam, use of a motorized auger for creating boreholes for explosives, and use of wheelbarrows/carts for moving material onsite.

Although stock would be used for a resupply, the impacts from this use (~3 pack train trips) would be minimal compared to using stock for the mobilization and demobilization of all equipment and materials to the project site (~48 pack train trips) described in Alternative 1. The stock use that would occur for the resupply would be similar to that of a wilderness visitor(s) camping at Elk Meadow and taking days trips into the wilderness.

The dam breach, which would remove a portion of the human development and decommission the dam as an operational structure, would have a positive effect on the undeveloped quality long-term. Following completion of the project, the City intends to relinquish their easement and cease motorized use and mechanical transport inside the wilderness related to McKinley Lake which would also improve the undeveloped quality long-term.

NATURAL: Explain the effects to this quality in terms of protection, degradation, or restoration of natural conditions:

The only method that might have a short-term negative effect on the natural quality of wilderness character would be the use of explosives to breach the dam. There's a chance that vegetation near the dam, fish in the lake, and wildlife nearby could be impacted during the blasting. However, any fish currently in the lake are non-native and have been unnaturally stocked in the past, and the effect to nearby wildlife would be very brief, causing short-term displacement.

The project overall, but specifically the dam breach using explosives, construction of an outlet channel, and site stabilization and revegetation would have a positive effect on the natural quality of wilderness character long-term. Partial removal of the unnatural, human-made development and restoration of the ecological processes of the lake area would increase the naturalness of the Rattlesnake Wilderness. Environmental benefits would include fisheries, riparian, floodplain, and wetland habitat restoration.

OUTSTANDING OPPORTUNITIES for SOLITUDE or PRIMITIVE and UNCONFINED RECREATION: Explain how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or degraded. As appropriate, describe outstanding opportunities for solitude or primitive and unconfined recreation separately:

All methods that include the use of motorized equipment would have a short-term negative effect on the solitude of wilderness visitors while in use due to the sound of motorized equipment. This includes use of a helicopter for mobilization and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary, use of a motorized pump to prime the siphon for dewatering the crib outlet area of the dam, and use of a motorized auger for creating boreholes for explosives. However, motorized equipment would not be used daily and thus noise impacts would be periodic and limited to the minimum use necessary to complete the project. In addition, the sound from the use of explosives would also negatively affect the solitude of wilderness visitors, although this impact would be very brief on the day blasting was scheduled to occur.

Primitive recreation would not be affected by the project; however, unconfined recreation would be affected by closing off overnight use of McKinley Lake for the duration of the project in order to provide for crew and public safety.

The project as a whole would negatively affect opportunities for solitude in the short-term while work is being conducted on the dam due to an increase in human activity and noise at the project site. This is true of all project alternatives; however, this alternative would minimize this

effect by completing the project in one season and by minimizing the use of motorized equipment. Long-term, the project would have a positive effect on opportunities for solitude at McKinley Lake in eliminating the City's motorized use and mechanical transport inside the wilderness related to operation and maintenance of the McKinley Lake Dam.

OTHER FEATURES OF VALUE: Explain any effects to features of scientific, educational, scenic, or historical value that are not accounted for in the above qualities, including cultural and paleontological resources that are integral to wilderness character:

The dam breach itself would have a negative effect on the historical value of the dam by removing a portion of the historic structure, however, leaving most of the structure in place would preserve the historic value long-term. No other cultural resources would be affected by the project.

Alternative 3:

Dam Decommissioning and Restoration – Primary use of Motorized Equipment and Mechanical Transport

Component Methods

How will each of the components of the action be performed under this alternative?

Component	Workflow Components	Component Methods for this Alternative
1	Transportation of equipment and materials to and from the project site.	Equipment and materials would be transported by helicopter to the project site.
2	Transportation of personnel to and from the project site.	Personnel would travel by vehicle approximately two miles inside the wilderness and then by foot to the project site.
3	Dewatering the crib outlet area of the lake and dam.	Dewatering would occur using a siphon, primed by a motorized pump, and piping.
4	Dam breach and construction of outlet channel.	Dam breach would occur using explosives and construction of outlet channel would occur using traditional hand tools, as well as a mini excavator(s), motorized compactor, and motorized hauling vehicles.
5	Site stabilization and revegetation.	Site stabilization and revegetation would occur using traditional hand tools, as well as a mini excavator and motorized hauling vehicles.

Description of the Alternative

Under this alternative, as early as summer of 2024, the McKinley Lake Dam would be decommissioned with blasting, as well as the primary use of motorized equipment and mechanical transport to complete the project in one season. The construction window each season is roughly 13 weeks total from early July through the end of September. The primary use of motorized equipment and mechanical transport would shorten the construction window for dam decommissioning and restoration work to approximately 49 work days or 7 weeks, not accounting for any possible delays and adverse weather conditions (see Appendix A). Equipment and materials would be transported to and from the project site using a helicopter. Two days of helicopter use would occur for initial mobilization and two days for demobilization at the end of the project. Each helicopter trip would be able to deliver approximately 2,000 to 3,000 pounds of equipment and materials depending on the type of helicopter used. A helicopter round trip from Missoula to the project site would be approximately one hour in length, thus up to 24,000 pounds of equipment and materials could be delivered or removed from the project site in a day based on an eight-hour day (see Appendix A). There likely would also need to be

one helicopter day for a resupply approximately halfway through the project. Depending on the timing of the resupply, a separate helicopter trip may be needed to transport the explosives to the project site when the blasting is set to occur.
Work personnel would drive up the main Rattlesnake corridor (Trail #515/Road #99) through the NRA and inside the wilderness boundary on the roadbed along Trail #534 approximately two miles as done when accessing the area for dam operation and maintenance. They would then hike the remaining 2.5 miles and 1,000 feet elevation gain up the single-track portion of Trail #534 to the project site. Vehicles would be driven down and parked outside the wilderness boundary. The group size limit for the Rattlesnake Wilderness is 10, so the project work crew would be limited to 10 personnel at one time. A crew camp would be established at McKinley Lake for the duration of the project.

The project would begin by drawing down the water level in the lake and dewatering the crib outlet area of the dam using a siphon, primed by a motorized, gas-powered pump, and PVC piping. Use of a motorized pump rather than a hand pump, as described in Alternative 1, would better ensure successful siphoning of the lake water, which is critical to creating a dry work area for the dam breach. Movement of any necessary riprap from the upstream and downstream faces of the dam would occur using a mini excavator(s) and hauled to a storage area using hauling vehicles such as a small tractor and trailer. Use of a mini excavator(s) and hauling vehicles to move material rather than by hand only, as described in Alternative 1, or with wheelbarrows/carts, as described in Alternative 2, would significantly decrease the time needed to move material and reduce the physical strain on crew members. Wetland vegetation from downstream of the dam would be transplanted to a temporary nursery area using hauling vehicles, and any necessary trees and vegetation needing to be cleared within the work area would be cut using axes, hand saws, and chainsaws. Use of chainsaws to remove tress and vegetation would decrease time for vegetation removal. Following this work, boreholes for the explosives would be created in the dam embankment using a motorized auger and the dam breach would be blasted using explosives.

Use of a motorized auger to create boreholes rather than hand pounding holes with sledgehammers and rods, as described in Alternative 1, would better ensure adequate boreholes are created for the explosives and reduce the likelihood that multiple blasts would be needed. If set up correctly, it is likely only one blast would be needed to create the dam breach. The blast area would then be cleaned up using the mini excavator(s) and hauling vehicles.

Following cleanup of the blast area, a permanent low flow channel would be established and graded using the mini excavator(s). The motorized pump and siphon would be available for emergency dewatering if necessary. Riprap would be placed within the dam breach and the permanent low flow channel using the mini excavator(s). A motorized compactor would be used to compact a solid foundation and base for the final riprap channel at the outlet, as well as the faces of the dam breach. The spillway channel (approximately 300 square feet) would then be rehabilitated into a more natural condition using the mini excavator(s) and wetland vegetation would be replanted. Wetland vegetation would also be replanted along a portion of the exposed shoreline to facilitate regrowth on site. A post-construction survey would be performed and then demobilization of work personnel and equipment would occur.
If the project is able to be completed in one season, a temporary stabilization of the construction site would not be needed and the risk of any damage or erosion that could occur if left over winter and during spring runoff would be eliminated.
# of Days to Complete Project (construction days): **49 (7 weeks, one work season)**
# of Laborers: **Up to 10**
# of Stock: **Up to 10 for transportation**
# of Pack Stock Trips: **0**

# of Helicopter Flight Days: **5**
Motorized Equipment/Mechanical Transport used: **1-2 mini excavators, 2-3 hauling vehicles, motorized pump, motorized auger, 4 chainsaws, and a motorized compactor**

Wilderness Character

Component Number	For each component number, indicate the impact the **method for this alternative** will have on each of the five qualities of Wilderness: Positive = P, Negative = N, No Effect = 0 *Describe in detail the impacts to each of the five qualities in the narrative section below*	Untrammeled	Undeveloped	Natural	Solitude or Primitive and Unconfined Recreation	Other Features of Value
1	Equipment and materials would be transported by helicopter to the project site.	0	N	0	N	0
2	Personnel would travel by vehicle approximately two miles inside the wilderness and then by foot to the project site.	0	N	0	0	0
3	Dewatering would occur using a siphon, primed by a motorized pump, and piping.	N	N	0	N	0
4	Dam breach would occur using explosives and construction of outlet channel would occur using traditional hand tools, as well as a mini excavator, motorized compactor, and motorized hauling vehicles.	0	P	P	N	N
5	Site stabilization and revegetation would occur using traditional hand tools, as well as a mini excavator and motorized hauling vehicles.	0	N	P	N	0

UNTRAMMELED: Explain the intensity of the action that would intentionally control, manipulate, or hinder the conditions or processes of ecological systems:

The only method that would have a short-term effect on the untrammeled quality of wilderness character would be the dewatering of the crib outlet area of the dam and lake which is already impacting the untrammeled quality of the area. No other methods would intentionally control, manipulate, or hinder the conditions or processes of ecological systems apart from the purpose of naturalizing the area following the dam breach. Overall, the dam project would positively affect the untrammeled quality long-term by breaching the human made structure and restoring natural water flow from the lake to the surrounding area.

UNDEVELOPED: Explain the effects to this quality in terms of how “the imprint of man’s work [would] remain substantially unnoticeable,” and how wilderness will continue to be in contrast to other areas of “growing mechanization”:

All methods that include the use of motorized equipment and mechanical transport would have a negative effect on the undeveloped quality of wilderness character in the short-term. This

includes use of a helicopter for mobilization, resupply, and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary, use of a motorized pump for dewatering the crib outlet area of the dam, use of chainsaws for cutting vegetation, use of a motorized auger for creating boreholes for explosives, use of a mini excavator(s) and hauling vehicles for moving material onsite and constructing the outlet channel, and use of a motorized compactor for compacting the faces of the dam breach and outlet channel. In addition, the primary use of motorized equipment and mechanical transport in this alternative would have a greater effect on the undeveloped quality versus the minimum use of such equipment in Alternative 2.

The dam breach, which would remove a portion of the human development and decommission the dam as an operational structure, would have a positive effect on the undeveloped quality long-term. Following completion of the project, the City intends to relinquish their easement and cease motorized use and mechanical transport inside the Wilderness related to McKinley Lake which would also improve the undeveloped quality long-term.

NATRUAL: Explain the effects to this quality in terms of protection, degradation, or restoration of natural conditions:

The only method that might have a short-term negative effect on the natural quality of wilderness character would be the use of explosives to breach the dam. There's a chance that vegetation near the dam, fish in the lake, and wildlife nearby could be impacted during the blasting. However, any fish currently in the lake are non-native and have been unnaturally stocked in the past, and the effect to nearby wildlife would be very brief, causing short-term displacement.

The project overall, but specifically the dam breach using explosives, construction of an outlet channel, and site stabilization and revegetation would have a positive effect on the natural quality of wilderness character long-term. Partial removal of the unnatural, human-made development and restoration of the ecological processes of the lake area would increase the naturalness of the Rattlesnake Wilderness. Environmental benefits would include fisheries, riparian, floodplain, and wetland habitat restoration.

OUTSTANDING OPPORTUNITIES FOR SOLITUDE or PRIMITIVE and UNCONFINED RECREATION: Explain how opportunities for visitors to experience solitude or a primitive and unconfined type of recreation will be protected or degraded. As appropriate, describe solitude, primitive recreation, and unconfined recreation separately:

All methods that include the use of motorized equipment would have a short-term negative impact on the solitude of wilderness visitors while in use due to the sound of motorized equipment. This includes use of a helicopter for mobilization, resupply, and demobilization of equipment and materials to the project site, use of vehicles to transport work personnel approximately two miles inside the wilderness boundary, use of a motorized pump for dewatering the crib outlet area of the dam, use of chainsaws for cutting vegetation, use of a motorized auger for creating boreholes for explosives, use of a mini excavator(s) and hauling vehicles for moving material onsite and constructing the outlet channel, and use of a motorized compactor for compacting the faces of the dam breach and outlet channel. In this alternative, unlike Alternative 2, motorized equipment would likely be used on a daily basis causing noise impacts for the duration of the project. In addition, the sound from the use of explosives would also negatively impact the solitude of wilderness visitors, although this impact would be very brief on the one day blasting was scheduled to occur.

Primitive recreation would not be affected by the project, however, unconfined recreation would be affected by closing off overnight use of McKinley Lake for the duration of the project in order to provide for crew and public safety.

The project as a whole would negatively affect opportunities for solitude in the short-term while work is being conducted on the dam due to an increase in human activity and noise at the project site. This is true of all project alternatives, however, this alternative would minimize this effect by completing the project in one season, but increase the effect by increasing the use of motorized equipment. Long-term, the project would have a positive effect on opportunities for solitude at McKinley Lake in eliminating the City's motorized use and mechanical transport inside the Wilderness related to operation and maintenance of the McKinley Lake Dam.

OTHER FEATURES OF VALUE: Explain any effects to features of scientific, educational, scenic, or historical value that are not accounted for in the above qualities, including cultural and paleontological resources that are integral to wilderness character:

The dam breach itself would have a negative effect on the historical value of the dam by removing a portion of the historic structure, however, leaving most of the structure in place would preserve the historic value long-term. No other cultural resources would be affected by the project.

It should be noted that use of a mini excavator(s) and hauling vehicles would pose a greater risk to any potential subsurface cultural resources, as there would be less control and visual inspection than working by hand.

Step 2: Alternatives Considered but Dismissed

What alternatives were considered but dismissed?

No Action

This alternative would be to keep the dam and appurtenances in their current state with no improvements anticipated for the foreseeable future. The City would continue to monitor the dam, make minor repairs as needed, and take preventative action only if conditions indicated the dam would be in danger of failing.

Advantages: This alternative does not include initial capital improvement costs. There would still be annual costs for maintenance and owner inspections, and a cost for a periodic operation and maintenance engineering inspection and hazard assessment once every five years, as required by USFS regulations.

Disadvantages: The effects of aging on a dam nearly one hundred years old would continue. It would be impossible to know when serious symptoms related to dam safety may appear, but they would be inevitable in the future. The eroding spillway is already a serious symptom of an eventual failure to hold back the contents of McKinley Lake. Costs to repair, replace, or decommission the dam would eventually have to be expended at the time that serious deficiencies arose. The no action alternative for the dam would increase the City's risk and liability, and the potential negative effects to downstream resources.

This alternative fails to meet the purpose and need for the project and was determined to be unfeasible. Thus, the alternative was dismissed.

Rehabilitate the Dam to Meet USFS Standards

This alternative would address deficiencies on the existing dam and bring the dam into compliance with USFS standards. Proposed repairs would include:

- Performing a geotechnical investigation and analysis.
- Addressing seepage issues by lining the upstream slope with an impermeable liner.
- Addressing potential slope stability concerns by adding fill on the upstream and downstream slopes.
- Removing and replacing the outlet pipe and extending to accommodate added fill.
- Rebuilding the outlet intake tower and the outlet valve.
- Repairing the overflow spillway channel.

The embankment materials at McKinley Lake Dam are prone to seepage, which can result in embankment piping (internal erosion). The embankment could be reconstructed with more suitable embankment materials, but that would be expensive and potentially problematic due to the limited soil resources at the site. A more reasonable solution to eliminate the piping concern would be lining the upstream embankment slope with an impermeable geomembrane liner. This option would require temporarily removing the upstream riprap, preparing the liner subgrade, installing a geomembrane liner with cushion geotextile on both sides, and replacing the upstream riprap.

In addition, both the upstream and downstream embankment slopes are steep and probably need to be flattened to meet slope stability criteria. The new fill material could be coarse gravel and sand obtained from within the reservoir footprint. An upstream slope of 2:1 and downstream slope of 1.5:1 is proposed conceptually. The existing and proposed slopes are steeper than recommended in the NRCS Conservation Practice Standard POND (No.) CODE 378. Flattening the embankment slopes, in combination with an upstream liner that eliminates a high phreatic surface in the embankment, would address potential issues from rapid drawdown and other concerns that earthen embankment dam standards take into consideration. Slope stability analyses would be conducted to verify that the proposed combination of slopes with an upstream liner under various loading conditions meet USFS criteria. If not, then the downstream slope would be flattened until criteria are met. The replacement outlet pipe would be slightly longer than the existing slope because of the added fill.

Spillway repair would consist of either repairing and stabilizing the existing spillway or constructing a new spillway along a new alignment to the natural stream channel. The repair alternative would involve replacing eroded material in the area of the headcut with native borrow material and stabilizing with erosion resistant material. One possible solution would be installation of an articulated concrete block mat. Mobilizing the material to the site would be very expensive but could be an effective tool to stabilize the spillway. If a new spillway channel was constructed to tie-in to the stream channel, it would likely include riprap stabilization or a drop structure to dissipate energy. The new or repaired channel would be designed to pass the required flow and at the same time prevent erosion and headcutting.

Advantages: This alternative would address long-term concerns at the dam and would bring the dam into compliance with USFS standards. The improvements proposed for rehabilitation would likely be necessary to even consider raising the dam to increase storage capacity.

Disadvantages: This alternative would require a large capital improvement investment as well as ongoing operation and maintenance costs. While most seepage would be blocked, it is possible that foundation seepage could occur, which has the potential to pipe foundation material and undermine the dam. Further, the City does not foresee a need for this dam in the future.

Rehabilitation costs are estimated using unit costs from recent wilderness dams repair work. Remote access would necessitate helicopter transportation for personnel, equipment, and construction materials. Construction costs for remote access dams could be five to ten times

that of conventional construction. Estimated costs presented here include mobilization and demobilization costs, engineering and construction management fees, and a contingency of 30 percent. The estimated costs are as follows:

- Capital improvement costs $1,084,000
- Cost per acre-foot $5,577

This alternative fails to meet the purpose and need for the project and was determined to be unfeasible. Costs far outweigh the benefit. Thus, the alternative was dismissed.

Increase Dam Storage

This alternative would be a combination of raising the embankment height and completing rehabilitation items discussed above. With a surface area of approximately 16 acres, raising McKinley Lake Dam even a few feet could result in a significant increase in storage capacity. This alternative would be combined with the decommissioning of one or more other dams and would offset the lost storage volume. Because of the already narrow dam crest, raising the dam approximately 4 feet (which is estimated only for purposes of this analysis – actual increase in height would be based on a benefit-cost analysis) would require additional fill beyond that estimated for rehabilitation. Raising the dam four feet would increase the height from 15 to 19 feet, which requires a minimum crest width of 10.8 feet to meet USFS standards. Additional required embankment material was estimated assuming an 11-foot crest width, 2:1 upstream slope, and 1.5:1 downstream slope. The outlet pipe would need to be extended 14 feet. The modification would increase reservoir storage approximately 72 acre-feet, a 37 percent increase.

Advantages: This alternative could offset potential loss of storage volume by decommissioning other City-owned dams in the wilderness, and the City could potentially retain existing water storage while reducing the number of dams that require future maintenance.

Disadvantages: Increasing storage may not be compatible with the Wilderness Act. Also, there is an initial capital improvement cost associated with this alternative, and the alternative could not be implemented without completing rehabilitation work. Some cost efficiency would be realized by increasing storage at the time rehabilitation work is completed. Increasing the dam storage capacity would also increase the peak flow in the event of a dam breach, and a revised hazard assessment would be required. An evaluation would be needed to determine the effect on the current dam hazard classification. Since the current classification and spillway capacity criteria are based on the effect from dam failure, the amount of increased storage that could be added without changing the current dam hazard classification would have to be examined closely. Given the headcutting presently occurring in the overflow spillway channel, increasing the storage is likely unfeasible.

Costs for this alternative are based on the same assumptions as used for the rehabilitation alternative. The estimated costs are as follows:
- Capital improvement costs $2,495,000
- Existing water right plus increased storage 267 acre-feet
- Cost per acre-foot including rehabilitation $9,344

This alternative fails to meet the purpose and need for the project and was determined to be unfeasible. Thus, the alternative was dismissed.

References Cited

Easement, dated March 30, 1979, from Montana Power Company to Mountain Water Company,

recorded April 24, 1979, at volume 138, page 375, records of Missoula county, Montana (Doc. No. 444835).

HDR. 2018. Chapter 9 Rattlesnake Dams Feasibility Study. 2018 Water System Master Plan.

Landres, Peter; Barns, Chris; Boutcher, Steve; Devine, Tim; Dratch, Peter; Lindholm, Adrienne; Merigliano, Linda; Roeper, Nancy; Simpson, Emily. 2015. Keeping it wild 2: an updated interagency strategy to monitor trends in wilderness character across the National Wilderness Preservation System. Gen. Tech. Rep. RMRS-GTR-340. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 114 p.

Public Law 88-577 (16 U.S.C. 1131-1136). 1964. Wilderness Act.

Public Law 92-367. 1972. National Dam Inspection Act.

Public Law 96-476 (16 U.S.C 46011). 1980. Rattlesnake National Recreation Area and Wilderness Act of 1980.

Public Law 107-310. 2002. Dam Safety and Security Act of 2002.

Step 2: Determination – What is the Minimum Activity?

Selected Alternative

Alternative 2: Dam Decommissioning and Restoration – Use of Traditional Tools and Skills with Minimal Motorized Equipment and Mechanical Transport

Rationale, including a comparison of the selected alternative with other alternatives:

Alternative 2 is the selected alternative as it will allow for the project to be completed in one season with the use of minimal motorized equipment and mechanical transport. As explained in the "Uncontrollable Timing Requirements" section of this document, it is critical to complete the dam decommissioning and restoration work in one season to eliminate the risks of a dam failure if the dam decommissioning is left partially finished over the winter. Also, as detailed in the "Other Direction" section of Step 2, a special provision in the Rattlesnake National Recreation Area and Wilderness Act of 1980 allows consideration of motorized use (helicopter and vehicle) by the dam owner for access within the Rattlesnake Wilderness and has historically been utilized by the dam owners, including the City, on an annual basis for dam operation and maintenance. The use of a helicopter for one day for initial mobilization and one day for demobilization at the end of the project, as proposed in Alternative 2, would have a significantly less effect on wilderness character than the use of pack stock for transportation of equipment and material (~48 pack train trips) that would occur over approximately 48 days throughout the duration of the project as proposed in Alternative 1.

As detailed in the description of Alternative 2, use of a motorized pump rather than a hand pump, as described in Alternative 1, would better ensure successful siphoning of the lake water, which is critical to creating a dry work area for the dam breach. Use of a motorized auger to create boreholes for the explosives rather than hand pounding holes with sledgehammers and rods, as described in Alternative 1, would better ensure safe and adequate boreholes are created and reduce the likelihood of multiple blasts being needed. These are two critical aspects of the project being completed successfully in the wilderness setting.

Another impactive aspect of Alternative 1 would be the use of stock (mules/draft horses) on site to assist work personnel with construction work. As detailed in the alternative this would require certified weed free seed to be packed in via the pack train and creation of stock holding areas (highline and electric fencing) inside the wilderness for the two animals to be kept when not working. These actions would cause a significant trail impact due to the increased packing and onsite impacts wherever the stock holding area were established as stock are not routinely held inside the wilderness and can cause a significant amount of resource damage when held in a particular site long-term. Approving the use of wheelbarrows/carts for use during construction work, as proposed in Alternative 2, would mitigate these impacts.

While Alternative 3 would allow for the shortest project work time (~7 weeks), the motorized equipment and mechanical transport proposed in the alternative is not the minimum necessary to complete the project in alignment with the Wilderness Act of 1964 and the Rattlesnake National Recreation and Wilderness Act of 1980.

Mitigation measures and terms and conditions to reduce or eliminate any anticipated adverse effects of the selected alternative, including approval of motorized use and mechanical transport, will be included in the Environmental Assessment completed for the project.

Approved?	Prohibited Use	Quantity, Timing, Frequency, or Duration
☒	Mechanical Transport:	4 wheelbarrows/carts
☒	Motorized Equipment:	1 gas-powered pump, 1 gas-powered auger
☒	Motor Vehicles:	2-3 vehicles to transport work personnel ~2 miles every two weeks
☐	Motorboats:	Click or tap here to enter text.
☒	Landing of Aircraft:	2 days of helicopter use with multiple landings/day
☐	Temporary Roads:	Click or tap here to enter text.
☐	Structures:	Click or tap here to enter text.
☐	Installations:	Click or tap here to enter text.

Describe mitigation measures as well as monitoring and reporting requirements, if appropriate:

All mitigation and monitoring requirements will be detailed in the Environmental Assessment completed for this project. Project authorizations for mechanical transport, motorized equipment, and motor vehicle use (Wilderness Act Section 4(c) prohibited uses) will be recorded for the Rattlesnake Wilderness in the NRM Wilderness module in the years the project is accomplished per agency policy.

Approvals

Project Title (from page 2)**:**

McKinley Lake Dam Decommissioning and Restoration Project

Refer to agency policies for the following signature authorities:

Prepared by:
Name: Katie Knotek Position: Forest Recreation Program Manager

Signature _____ Date _____

Reviewed by:
Name Click or tap here to enter text. Position Click or tap here to enter text.

Click or tap here to enter reviewer comments.

Signature _____ Date _____

Reviewed by:
Name Click or tap here to enter text. Position Click or tap here to enter text.

Signature _____ Date _____

Click or tap here to enter reviewer comments.

Approved by:

Name Click or tap here to enter text. Position Click or tap here to enter text.

Signature _____ Date _____

APPENDIX A

	Alternative 1	Alternative 2	Alternative 3
Mobilization to Project Site	67 pack stock loads for crew camping gear and food (8,000 lbs). **~10 pack train trips in & out** 150 pack stock loads for equipment and materials (18,000 lbs). **~21 pack train trips in & out** **~31 total pack train trips**	**1 helicopter day** for crew camping gear, food, equipment, and materials.	**2 helicopter days** for crew camping gear, food, equipment (including heavy equipment), and materials.
Supply/Resupply	***Packing for initial mobilization and continued supply/resupply would occur over several weeks**	24 pack stock loads for misc. resupply. **~3 pack train trips in and out** **~3 total pack train trips**	**1 helicopter day** for misc. resupply.
Demobilization from Project Site	17 pack stock loads for crew camping gear (2,000 lbs). **~ 2 pack train trips in & out** 117 pack stock loads for equipment and materials (14,000 lbs). **~15 pack train trips** **~17 total pack train trips**	**1 helicopter day** for crew camping gear, equipment, and materials.	**2 helicopter days** for crew camping gear, equipment (including heavy equipment), and materials.
Total Trips	**~48 pack train trips** **~48 packing days** **0 helicopter days**	**~3 pack train trips** **~3 packing days** **2 helicopter days**	**0 pack train trips** **0 packing days** **5 helicopter days**
Estimated Project Work Time	**17 weeks (2 seasons)**	**12 weeks (1 seasons)**	**7 weeks (1 season)**

PACK STOCK AND HELICOPTER TRIP ESTIMATES BY ALTERNATIVE

Notes:

P**ack stock load** = 1 mule with project supplies (120lbs total); number of pack stock loads is based on estimated weights of items being packed.

Pack train = 10 total riding and pack stock

Alt 1 Mobilization and Supply/Resupply: Pack train = 2 packers on horse +1 mule for feed + 7 mules for gear, food, equipment, and materials

Alt 1 Demobilization: Pack train = 2 packers on horse + 8 mules for gear, equipment, and materials

Alt 2 Resupply: Pack train = 2 packers on horse + 8 mules for gear, equipment, and materials