



National Park Service
US Department of the Interior
Glacier National Park, Montana
Waterton-Glacier International Peace Park

MINIMUM REQUIREMENTS ANALYSIS

PROJECT TITLE: Westslope Cutthroat and Bull Trout Preservation in Gunsight Lake

PREPARED BY: Glacier National Park
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PART A: IS ADMINISTRATIVE ACTION NECESSARY TO MANAGE THE AREA AS WILDERNESS?

DESCRIPTION OF THE SITUATION THAT MAY PROMPT ADMINISTRATIVE ACTION

Westslope cutthroat trout and bull trout are increasingly at risk from the severe, negative effects of non-native fish through competition, hybridization, and predation. Non-native fish were introduced to Glacier via fish stocking that began soon after the park was established in 1910 (and perhaps earlier) and continued until the early 1970s. Non-native fish have also migrated into park waters from lakes and streams outside the park.

Gunsight Lake, at the headwaters of the St. Mary River, was historically fishless but stocked in 1916 with 35,000 non-native cutthroat trout and again from 1920 to 1936 with 224,000 rainbow trout. The rainbow trout established a self-sustaining population and are currently the only fish species present at the lake, since downstream waterfalls are barriers to upstream fish migration. The non-native rainbow trout at Gunsight Lake can migrate downstream and hybridize with native westslope cutthroat trout. Hybridization degrades native genetics, lowering adaptability and fitness within populations, which can result in lower reproductive rates and individuals that are less resilient to disease and environmental stressors. Ongoing hybridization with non-native rainbow and Yellowstone cutthroat trout is occurring in almost every westslope cutthroat population in the St. Mary River drainage, but some still contain genetically pure individuals. Such populations are of high conservation value.

There are also multiple threats to bull trout populations throughout the park, including non-native fish, juvenile bull trout mortality from irrigation systems outside the park, and climate change related habitat degradation (Mogen et. al. 2011). There is increased evidence that hybridization between bull trout and brook trout is threatening the genetic lineage of St. Mary bull trout. The St. Mary River drainage is the only drainage in the United States where bull trout are found east of the Continental Divide. Because of this, St. Mary River drainage bull trout are extremely valuable to bull trout conservation as a whole.

Climate change compounds the stressors to native fish, as changes in stream flow and warmer water temperatures stress native trout, degrade habitat, and favor non-native species. Overall, native fish populations are at risk and/or declining in much of their native habitats due to the presence of invasive

fish species and habitat changes (e.g., hotter, drier summers warming water temperatures) resulting from a changing climate.

1. Describe Options Outside of Wilderness. Can action be accomplished outside of Glacier’s recommended wilderness?

☐ Yes ☒ No **Explain:** Non-native rainbow trout at Gunsight Lake pose a risk to downstream native fish populations. In order to address this risk, action would need to be taken at Gunsight Lake, which is in the park’s recommended wilderness.

2. Is action necessary to satisfy valid existing rights or a special provision that requires action?

☐ Yes ☒ No **Explain:** There are no existing rights or special provisions that apply to Glacier’s recommended wilderness.

3. Describe Requirements of Legislation, Policy, and Guidance. Is action necessary to meet the requirements of other federal laws? Does taking action conform to and implement relevant standards and guidelines and direction contained in policy, management plans, species recovery plans, tribal government agreements, and/or other interagency agreements?

Explain and cite law, policy, etc.:

Yes. The park’s enabling legislation charges the NPS with the “preservation of the park in state of nature so far as is consistent with the purposes of this Act, and for the care and protection of the fish and game within the boundaries thereof.” 61 Pub. L. 171, 36 Stat. 354 (May 11, 1910). The **National Park Service Organic Act of 1916** requires the NPS to “promote and regulate the use of the National Park System by means and measures that conform to the fundamental purpose of the System units, which purpose is to conserve the scenery, natural and historic objects, and wild life in the System units and to provide for the enjoyment of the scenery, natural and historic objects, and wild life in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” 54 U.S.C. § 100101(a). **The 1978 Redwood Act** directs that “the protection, management, and administration of the System units shall be conducted in light of the high public value and integrity of the System and shall not be exercised in derogation of the values and purposes for which the System units have been established, except as directly and specifically provided by Congress.” 54 U.S.C. § 100101(b).

Laws such as the 1916 Organic Act that established the NPS, the park’s enabling legislation, and the 1978 Redwood Act all direct the NPS to conserve and manage native populations of plants and animals within the parks in an unimpaired state for the enjoyment of future generations.

The Wilderness Act requires the NPS to administer wilderness areas for such other purposes for which they may have been established as also to preserve their wilderness character and provides that wilderness areas “shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.” 16 U.S.C. § 1133(b). The Wilderness Act also provides as follows:

Nothing in this Act shall modify the statutory authority under which units of the national park system are created. Further, the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act shall in no manner lower the standards evolved for the use and preservation of such park, monument, or other unit of the national park system in accordance with the Act of August 25, 1916, the statutory authority under which the area was created, or any other Act of

Congress which might pertain to or affect such area, including, but not limited to, the Act of June 8, 1906 (34 Stat. 225; 16 U.S.C. 432 et seq.); section 3(2) of the Federal Power Act (16 U.S.C. 796 (2)); and the Act of August 21, 1935 (49 Stat. 666; 16 U.S.C. 461 et seq.).

Public Law 88-577, § 4(a)(3). The NPS manages recommended wilderness as wilderness pursuant to the NPS 2006 Management Policies.

NPS management policies (2006) also direct the NPS to conserve and manage native populations and direct parks to control invasive species on NPS lands. Counter to this direction, the park is losing native bull trout from large areas of their range and many westslope cutthroat trout populations are being hybridized; taking action would meet the park's legal mandate for conserving native fish. Taking action is also consistent with the park's General Management Plan (1999).

The Endangered Species Act (ESA) provides that Federal agencies shall...utilize their authorities...by carrying out programs for the conservation of endangered species and threatened species..." 16 U.S.C. § 1536(a)(1). Conservation, as defined in the ESA, means "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measure provided pursuant to the [Endangered Species] Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management." 16 U.S.C. § 1536(3).

Executive Order 13112, "Invasive Species" requires federal agencies to control invasive species populations and "provide for restoration of native species and habitat conditions," and Executive Order 13751, "Safeguarding the Nation from the Impacts of Invasive Species" amends Executive Order 13112 and directs "actions to continue coordinated Federal prevention and control efforts related to invasive species".

The NPS's Management Policies guide and regulate how the NPS carries out its authority and obligations under the laws. Section 4.1.5, states:

"The Service will reestablish natural functions and processes in parks unless otherwise directed by Congress. Impacts on natural systems resulting from human disturbances include the introduction of exotic species; the contamination of air, water, and soil; changes to hydrologic patterns and sediment transport; the acceleration of erosion and sedimentation; and the disruption of natural processes."

Section 4.1.5 further states that such efforts may include "removal of exotic species" and "restoration of native plants and animals."

NPS Management Policies Section 4.4.1.1 states, "In addition to maintaining all native plant and animal species and their habitats inside parks, the Service will work with other land managers to encourage the conservation of populations and habitats of these species outside parks whenever possible." Methods to meet this objective include "prevent the introduction of exotic species into units of the national park system, and remove, when possible, or otherwise contain individuals or populations of these species that have already become established in parks."

NPS Management Policies Section 4.4.4 states, "Exotic species will not be allowed to displace native species if displacement can be prevented."

NPS Management Policies Section 4.4.4.2 states, "All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species [among others]

interferes with natural processes and the perpetuation of natural features, native species or natural habitats” or “disrupts the genetic integrity of native species.”

Section 6 of the NPS Management Policies addresses wilderness preservation and management. Section 6.3.1 states “The National Park Service will take no action that would diminish the wilderness eligibility of an area possessing wilderness characteristics until the legislative process of wilderness designation has been completed.”

NPS Management Policies Section 6.3.5 states “All management decisions affecting wilderness must be consistent with the minimum requirement concept” to determine if administrative actions are necessary and how to minimize impacts.

NPS Management Policies Section 6.3.7 addresses the management of natural resources within wilderness management areas. This section states, “Without natural resources, especially indigenous and endemic species, a wilderness experience would not be possible,” and “Management intervention should only be undertaken to the extent necessary to correct past mistakes, the impacts of human use, and influences originating outside of wilderness boundaries.”

NPS Natural Resource Management Reference Manual 77 provides guidance to NPS employees responsible for managing, conserving, and protecting the natural resources in NPS units. The “Freshwater Resources Management” section states, “Direct species interventions may be required in some cases when native species are absent from the aquatic ecosystem or when nonnative species are present.” This section further acknowledges that “Restoration of native aquatic populations that have been impacted by the introduction of one or more nonnative species will usually require physical intervention, capture, and removal of the nonnative species. Such restoration may also require supplemental restocking of the native species,” and that “Direct restoration measures will usually require severe treatment of the aquatic community either through poisoning of all habitats used by nonnatives within the area to be restored or temporary water diversion and clean-up of the desired habitat.”

4. Describe how action would contribute to the preservation or degradation of wilderness character:

Is action necessary to preserve one or more of the five qualities of wilderness character? How would the action contribute to the preservation of, or degrade wilderness character as described by the tangible qualities of wilderness character below?

Untrammeled (Wilderness is essentially free from the intentional actions of modern human control or manipulation):

No, this project is not required to preserve the untrammeled quality of wilderness character in the park.

Undeveloped (Wilderness retains its primeval character and influence, and is essentially without structures or installations, the use of motors or mechanical transport):

No, the project is not required to preserve the undeveloped quality of recommended wilderness.

Natural (Wilderness ecological systems are substantially free from the effects modern civilization and have been shaped largely by natural processes):

Yes, the action is needed to preserve the natural quality of recommended wilderness, since action would seek to remedy the risk to native fish of severe, negative effects of non-native fish, including competition, hybridization, and predation. Native fish are integral to the natural quality

of recommended wilderness in the park. Bull trout, federally listed as threatened, and westslope cutthroat trout, a state listed species of concern, are essential to Glacier's aquatic ecosystems and to maintaining biodiversity in the park and throughout the Crown of the Continent Ecosystem. Both species are part of a historic fishery that is fundamental to Glacier's designation as a biosphere reserve and World Heritage Site and have long been integral to the culture of native peoples as well as the park and surrounding communities. The risks to native fish from non-native fish put the natural quality of wilderness character at risk; therefore, preserving the natural quality includes taking steps to preserve native fish. Given that no action at Gunsight Lake would result in the continued hybridization of downstream populations of westslope cutthroat trout, taking action is necessary to protect the natural quality of the wider St. Mary River drainage.

Outstanding opportunities for solitude or a primitive and unconfined type of recreation (Wilderness provides opportunities for people to experience natural sights and sounds, solitude, risk, adventure, and other attributes):

Action is not necessary to preserve this quality.

Other features of value (Wilderness preserves other features that are ecological, geological, scientific, educational, scenic, or historical value):

Action is necessary to protect this quality. In Glacier National Park's *Building Blocks for Wilderness Stewardship* (2022), bull trout and westslope cutthroat trout are both identified as contributing to the other features of value quality as iconic natural resources. Bull trout are federally listed as threatened; the park contains about one-third of the bull trout's remaining lake habitat in the US. Westslope cutthroat trout, a state listed species of concern, occupy less than 30% of their historic range in Montana, with genetically pure populations at considerable risk. Both species are part of a historic fishery that is fundamental to Glacier's designation as a biosphere reserve and World Heritage Site, have long been integral to the culture of native peoples as well as the park and surrounding communities, and are an important focus for native fish restoration and science in the park. Taking action to protect bull trout and westslope cutthroat trout is necessary to protect these iconic resources that contribute to the other features of value quality of the park's wilderness character.

5. Describe the effects to the public purposes of wilderness: How would action support the public purposes for wilderness (as stated in Section 4(b) of the Wilderness Act) of recreation, scenic, scientific, education, conservation, and historic use?

This project would support the public purposes of wilderness. Conservation is one of the public purposes of wilderness. Taking action would support conservation by seeking to remove an ongoing risk to native westslope cutthroat trout from hybridization with non-native fish and provide native westslope cutthroat trout and bull trout with increased security, ensuring both species remain on the landscape. Removing a well-documented threat to wilderness, invasive species, further serves the conservation purpose of wilderness.

The project would also support the scientific and educational purposes of wilderness. Glacier National Park has a notable legacy of research and scientific accomplishment in the study of ecological systems and the protection of natural resources such as native fish. Scientific research in the park includes investigations of genetically healthy native fish populations, the effects of non-native fish on native fish and aquatic ecosystems, and methods for controlling non-native fish and protecting native species. Failure to take action to protect native fish in the St. Mary River drainage would represent the loss of a valuable opportunity for continued research on genetically intact populations of westslope cutthroat trout, the control of non-native species, and the conservation of native species.

Action, therefore, would support the conservation, scientific, and educational purposes of the park's recommended wilderness. Action would also support recreational use by providing for an enhanced fishing experience (e.g., fishing for Glacier's native fish).

6. Explain the effects to resources and wilderness character that would occur from taking NO ACTION.

Current management would continue if no action is taken. Since no action would be taken, there would be no effects to the untrammeled and undeveloped qualities of recommended wilderness, nor to opportunities for solitude and unconfined recreation. Taking no action would negatively affect the natural quality of recommended wilderness and iconic natural resources (other features of value) by allowing non-native rainbow trout to continue to hybridize and compete with native westslope cutthroat trout. This would jeopardize westslope cutthroat populations in downstream tributaries, resulting in the continued loss of the few remaining westslope cutthroat conservation populations in the St. Mary River drainage, and put genetic lineages of the species at risk of permanent loss. Risks to bull trout populations would also persist, increasing the overall risk to their long-term conservation, especially in the face of climate change.

Consideration of taking no action in the above discussion suffices for a no-action alternative; therefore, a no-action alternative is not included in Part B of this MRA.

PART A DECISION: *Is taking administrative action necessary to the management of the wilderness?*

☒ **Yes** ☐ **No**

Explain: As demonstrated above, action is necessary to preserve the natural quality and other features of value of wilderness character. Native westslope cutthroat trout and bull trout are increasingly at risk from the severe, negative effects of non-native fish through competition, hybridization, and predation, as well as habitat degradation from a changing climate. Native fish are integral to the natural quality of wilderness character in the park, and bull trout and westslope cutthroat trout are both identified as contributing to the other features of value quality as iconic natural resources. Bull trout, federally listed as threatened, and westslope cutthroat trout, a state listed species of concern, are essential to Glacier's aquatic ecosystems and to maintaining biodiversity in the park and throughout the Crown of the Continent Ecosystem. Action is needed to offset the risks to these species, not only in the St. Mary River drainage, but to benefit native fish species conservation as a whole.

Action is also needed for compliance with law and NPS management policy.

Taking action would also support the conservation, scientific, and educational purposes of wilderness, and would benefit recreation by preserving opportunities for fish for native trout.

PART B: DETERMINE THE MINIMUM ACTIVITY – *How will action be taken (i.e., what methods would be used) and what would be the effects to wilderness character?*

Description of alternative methods taking action: For each alternative, describe what methods and techniques will be used, when and where the action will take place, the general effects to wilderness resources, including all five qualities of wilderness character (untrammelled, natural, undeveloped, opportunities for solitude and unconfined recreation, and other features of value) and what mitigation measures are necessary. Strive to craft an alternative with the least or no amount of Section 4(c) of the Wilderness Act prohibited activities. These include temporary roads, the use of motor vehicles, motorized equipment, motorboats, the landing of aircraft, mechanical transport, structures, and/or installations.

ACTION ALTERNATIVE 1

Remove non-native rainbow trout from Gunsight Lake using rotenone, followed by translocation of native westslope cutthroat and bull trout and mountain whitefish to the lake

Methods:

- **Use motorboats for rotenone application to the lake**
- **Use motorized equipment (gas-powered water pumps and generators) for rotenone application and detoxification**
- **Use helicopters and pack stock to transport equipment and translocate native fish to the project area**

Alternative 1 would remove (cull) non-native rainbow trout from Gunsight Lake by means of rotenone. Rotenone is the only fish toxicant that is currently registered and approved for use by the EPA (EPA 2007). Rotenone removal would be supplemented by nets and electrofishing as necessary. Electrofishing would be employed in tributaries to augment and evaluate the success of tributary rotenone treatments. Gill nets may also be set in areas of freshwater input, like tributary mouths where rainbow trout might otherwise find refuge from the rotenone in the lake. Only non-native rainbow trout would be caught in the nets because this is the only species present. Any dead fish that come to the surface would be collected and either manually sunk in the lakes or removed from the site to avoid attracting bears and other wildlife.

Rotenone would be applied to the lake from motorized watercraft, such as an inflatable boat with an outboard motor or other small motorboat (by means of tubing extending into the water from a container in the boat), and to the stream from drip stations (estimated six) and backpack sprayers. One or two motorized boats would run intermittently for an estimated 8 to 12-hour period each day of the rotenone application period, estimated at two to four days. Rotenone would be applied to the wake of the boat such that the rotenone is delivered evenly and consistently to the lake. Drip stations are generally a simple, non-motorized apparatus such as a 5-gallon bucket or drip bag with tubing extending into the stream. Backpack sprayers would be used to apply rotenone to any off-channel fish-bearing habitat. Gas-powered water pumps would be used to help distribute the rotenone to the deeper portions of the lake as needed, and generators and an auger dispenser would be used to distribute potassium permanganate to the St. Mary River for detoxification. One boat would contain a gas-powered water pump to pump rotenone beneath the thermocline (temperature gradient layers), deep into the lake to ensure all non-native rainbow trout are removed. Slow-release rotenone mixtures consisting of rotenone and an inert substance (such as sand and unflavored gelatin) would be used in areas of upwelling to prevent target fish from avoiding exposure. The rotenone would be released as the mixture breaks down in the water; the mixture would be contained (in a burlap bag, for example) and removed at the end of the treatment.

Following application of the rotenone, potassium permanganate would be used to detoxify the stream and neutralize the rotenone. The potassium permanganate would be applied by means of a motorized auger dispenser powered by a gas-powered generator (anticipated to be 1000-3000 watts in size). The generator would operate continuously (24 hours a day, 7 days a week) until the rotenone detoxifies, as determined by the survival of sentinel fish placed in cages in the creek both upstream and downstream of the detoxification site. Detoxification would occur at the same time as the rotenone treatment and continue afterwards for an anticipated three to four weeks.

Certified Piscicide Applicators and trained staff would oversee the application of the rotenone and other chemicals, as required by the Montana Department of Agriculture, Montana Fish, Wildlife and Parks, and NPS policy. Approximately 15 project personnel would likely be on site during removal of rainbow trout and chemical applications. Personnel would camp at the wilderness campground at Gunsight Lake and an undesignated site near the Mirror Pond detoxification site for the duration of the rotenone application and detoxification period (anticipated two to four days for rotenone application and three to four weeks for detoxification with potassium permanganate).

The treatment area including the Gunsight Pass Trail would be temporarily closed to the public during rotenone application (anticipated for approximately one week around the rotenone application period). The trail closure may need to be in place longer depending on variables that could affect the length of the application period such as weather, equipment failures, etc. The closure will extend from Reynolds Campground junction on the east and from just east of Gunsight Pass from the west. The Gunsight Lake wilderness campground would be closed for the duration of the project, from early September 2023 to spring 2024.

Following the removal of rainbow trout from Gunsight Lake, westslope cutthroat trout, bull trout, and mountain whitefish would be translocated into the lake. This would establish secure populations of westslope cutthroat and bull trout (since non-native fish cannot access the lake due to a downstream waterfall that prevents upstream fish migration), and conserve at-risk genetic diversity found in local St. Mary westslope cutthroat trout and bull trout populations. It would also serve to genetically swamp any remaining rainbow trout (remaining rainbow trout are anticipated to be at extremely low numbers) with genetically pure westslope cutthroat trout and reduce the reproductive potential of any remaining rainbow trout. Mountain whitefish would provide an important forage species for bull trout and provide a buffer against bull trout predation on westslope cutthroat trout.

Translocation of westslope cutthroat and bull trout and mountain whitefish to Gunsight Lake would involve the collection of individual trout or trout gametes from donor streams (could include Canyon Creek¹, Jule, Rose, Two Dog, Wild, Divide, Boulder, Swiftcurrent, Kennedy, Otatso, Midvale, and Lee Creek drainages, among other streams, as well as Slide and Red Eagle Lakes) inside and outside the park. Collection of the donor fish would likely begin in 2023 using manual methods such as angling, dip netting, trapping, electrofishing and/or seining². Project personnel (an estimated five to ten-member crew) would be onsite collecting the donor fish from source populations over an approximately one to two-week period. Donor native fish collection could occur any time during spring, summer, or fall.

Bull trout would likely be spawned and released onsite and the spawned/fertilized bull trout eggs would be taken to the hatchery to be hatched and raised. Westslope cutthroat trout would likely be taken to the

¹ Canyon Creek would be used as a donor source for mountain whitefish.

² Seining is a method of fishing that employs a net that hangs vertically in the water with its bottom edge held down by weights and its top edge buoyed by floats, and then moved through the water manually or by boat.

hatchery where they would be spawned. Juvenile westslope cutthroat trout would also be stocked back into the donor source population to offset the removal of adults and swamp existing hybridized trout in the donor population(s). Hybrids would be removed from donor streams, identified through genetic analysis to reduce the hybrid abundance and contribution. Donor westslope cutthroat and bull trout would be transported from the stream on foot and then by vehicle to the hatchery. Mountain whitefish are expected to be direct transferred from donor streams to Gunsight Lake without a hatchery. Other spawning and rearing strategies may also be attempted, including streamside spawning and rearing in egg incubators. Streamside incubators are typically a small (approximately 8-inch x 8-inch) plastic basket or bucket or similar container that would be filled with gravel and eggs. Incubators would not require the use of any motorized equipment.

The collection of donor fish may need to be repeated each year for an estimated three years depending on the success of hatchery propagation and the number of fish that can be translocated to Gunsight Lake at a given time. Translocation would take place over multiple years (estimated six to eight) to establish multiple age classes of all three species. Westslope cutthroat trout and mountain whitefish would be translocated to the lake first, possibly in 2024 at the earliest, three to four years before bull trout are introduced. This would allow the westslope cutthroat trout and whitefish to reach sexual maturity and establish a reproducing population before adding additional competition and/or predation from bull trout. We anticipate introducing two- to four-year classes of westslope cutthroat trout and mountain whitefish followed by two- to four-year classes of bull trout. Translocated native fish would be monitored, which would require marking them with tags, fin clips, or other means and tracking them using fixed-location remote stations.

Project personnel would hike to the project area for all stages of the project (i.e., removal of rainbow trout, collection of donor fish, translocation of native fish, monitoring, etc.). Equipment and gear would be packed to the lake on foot or by livestock whenever feasible (e.g., depending on weight and size of equipment, whether equipment can be safely packed on livestock, and whether trail conditions are conducive to livestock use). Helicopters would be necessary to transport boats, rotenone, the generator, water pumps, and possibly other equipment to and from the project area. Items to be packed versus flown-in by helicopter would be at the discretion of the NPS packers. Fish for translocation would likely need to be transported to the lake by helicopter to reduce the risk of mortality compared with transport on foot or with livestock. Helicopters would deliver and pick up equipment and fish by means of long-line sling loads, and/or fish could be aerially stocked.

The number of flights would depend on the size of helicopter available at the time (i.e., smaller helicopters could carry less weight, resulting in more flights). At this time, approximately 15 flights (estimated) may be required for the rotenone application and detoxification phases of the project. The number of flights for fish translocation is estimated at one to two flights per year over a period of approximately six to eight years. Glacier National Park limits administrative flights to 50 flights each year. Every effort would also be made to combine flights for this project with other administrative flights.

Untrammelled Quality. Alternative 1 would impact the untrammelled quality of wilderness character because it would intentionally manipulate the biophysical environment through removing non-native fish, collecting donor fish, and translocating native westslope cutthroat and bull trout and whitefish to Gunsight Lake. The intensity of impact would initially be dramatic, because rotenone would lethally remove all fish and other gill-breathing organisms from Gunsight Lake downstream to approximately Mirror Pond in a matter of days. These effects would be highly localized, limited to Gunsight Lake and approximately three miles downstream. This would be approximately 0.8 percent of the total acreage (13,623.5 acres) of lakes in the park's recommended wilderness, and approximately 0.3 percent of the 1,550 miles of perennial stream in the park. Impacts to the untrammelled quality would be temporary,

occurring during three to four weeks of rotenone application and detoxification, for one to two weeks per year for an estimated three years during collection of donor fish, and continuing intermittently during translocation operations until translocation of native fish to Gunsight Lake is complete, within an estimated 6-8 years.

Undeveloped Quality. Alternative 1 would cause temporary adverse impacts to the undeveloped quality of recommended wilderness from the use of motorized watercraft, generators, and water pumps, which are prohibited 4(c) uses unless determined the minimum necessary for the administration of wilderness. Long-line sling load operations and planting fish with helicopters would also be considered aircraft landings, which are Section 4(c) prohibited uses under the Wilderness Act. Auger dispensers, remote incubators, signs along the trail, and fish monitoring devices, such as tags and fixed-location remote sensors, would also adversely impact this quality because they would be installations on an otherwise undeveloped landscape. Impacts to the undeveloped quality would be temporary, ceasing once the equipment can be removed from the project area; most of the impacts would end after the rotenone has detoxified, estimated at three to four weeks. After this, adverse impacts would be infrequent and punctuated, occurring during long-line sling load and helicopter fish planting operations for translocation (estimated at one to two flights per year for approximately six to eight years). Post-treatment monitoring devices for translocated fish (e.g., the fish could be marked with tags) would cause longer-term impacts, as they could be in place for several years. Devices would be small, concealed, and would be removed upon monitoring completion.

Marking and tracking translocated fish would benefit scientific and conservation public purposes of wilderness because it would provide data on fish movement and evaluate the success of the project, and because the information gained could inform fisheries research elsewhere in the park.

Solitude and Unconfined Recreation. Alternative 1 would have temporary adverse impacts to opportunities for unconfined recreation since the treatment area, including the Gunsight wilderness Campground and the Gunsight Pass Trail, would be temporarily closed to public access during rotenone application. Alternative 1 would also have the potential to adversely impact solitude due to noise from motorized watercraft, water pumps, generators, and helicopter operations. Impacts from project noise would be temporary, since most of the noise would end following the rotenone application and detoxification portion of the project (two to four days for rotenone application; 3-4 weeks for detoxification) and would cease completely after helicopter long-line sling load and fish planting operations for translocation are completed (estimated at one to two flights per year for a period of approximately six to eight years).

The occurrence of a dark purple color to the water during detoxification from the application of potassium permanganate could be visually disruptive to opportunities for solitude but is likely to go largely unnoticed given the separation of the stream and the trail and because the color to the creek usually dissipates in a few hundred yards. When application of the potassium permanganate ends, the purple color dissipates in approximately 30 minutes. The presence of project personnel could have the potential to interfere with opportunities for solitude, but these impacts would not differ noticeably from the existing effects of campers, hikers, and anglers.

Alternative 1 would benefit recreation by providing an opportunity to fish for native fish.

Natural Quality. Alternative 1 would benefit the natural quality by preserving and protecting indigenous species and ecological processes that are integral to wilderness character and essential to the value, integrity, and quality of Glacier's recommended wilderness. Benefits would extend regionally, since removing non-native rainbow trout would reduce the overall risk of hybridization in the broader St. Mary system, and because translocation would expand the distribution of native species. These benefits would

be permanent because the Gunsight Lake is secure against reinvasion of non-native fish and would provide a refuge from the detrimental habitat effects of climate change.

Alternative 1 would have adverse impacts to the natural quality from the mortality of aquatic invertebrates, amphibians, and other gill breathing organisms, and from the collection and handling of fish from donor populations. Impacts to the natural quality from mortality of other aquatic species would be temporary since populations are anticipated to recover in one to three seasons. Introducing the three native fish species to Gunsight Lake would cause site specific impacts to the natural quality at Gunsight Lake because it would represent a change in the biophysical elements; however, to manage wilderness holistically, introducing these species would have a positive impact to wilderness character and the natural quality of recommended wilderness as a whole within Glacier and the wider St. Mary River drainage. Impacts to the natural quality through translocation of three native fish species would be site specific to Gunsight Lake, and not ecologically different than what is already occurring at the lake since rainbow trout were introduced in the 1930s and share similar life histories to westslope cutthroat trout.

Other Features of Value. Alternative 1 would benefit this quality since it would have long-term benefits to the conservation of bull trout and westslope cutthroat trout, which are both identified as iconic natural resources that contribute to the other features of value quality of Glacier's wilderness. Removing non-native rainbow trout under Alternative 1 would reduce the overall risk of hybridization in the broader St. Mary system, and translocation would expand the distribution of native fish species and provide cold water habitat that is secure from effects of climate change. This would protect species that are fundamental to Glacier's designation as a biosphere reserve and World Heritage Site, have long been integral to the culture of native peoples, the park, and surrounding communities, and are an important focus for native fish restoration and science in the park and regionally.

ACTION ALTERNATIVE 2

Remove non-native rainbow trout from Gunsight Lake using rotenone, followed by translocation of native westslope cutthroat and bull trout and mountain whitefish to the Lake

Methods:

- **Use non-motorized boats (e.g., human-powered canoes, rafts, kayaks) for rotenone application to the lake**
- **Use motorized equipment (gas-powered generators and water pumps) for rotenone application and detoxification**
- **Use helicopters and pack stock to transport equipment and translocate native fish to the project area**

Under this alternative, rotenone application, detoxification, donor fish collection, and translocation methods would be completed as described for Alternative 1 above, but rotenone treatment would be applied to the lake using non-motorized, human-powered boats (such as rafts and canoes). Gas-powered water pumps and generators would still be used to help distribute the rotenone to the lake and potassium permanganate to the stream during detoxification. Helicopters would still be used for gear and non-motorized boat transport and native fish translocation as described for Alternative 1.

Non-motorized boats would be used to apply rotenone to the lake. Rotenone would be applied from hand-propelled watercraft, drip stations, backpack sprayers, and a slow-release agent. One boat would contain a gas-powered water pump, if possible, to pump rotenone beneath the thermocline, deep into the lake. Depending on the model of boat available, transporting a water pump on a non-motorized boat may not be possible. Water pumps allow rotenone to be pumped below the thermocline of the lake; without pumps, it is difficult for rotenone to penetrate the temperature differences within the lake and deeper areas could be missed, allowing some rainbow trout to survive. Due to the time that would be required

to distribute the rotenone with non-motorized boats, application would begin as early in the season as possible after the peak runoff period (likely August 1). The duration of the application period using non-motorized boats would be approximately two to four weeks to apply the rotenone followed by an estimated three to four weeks of detoxification with potassium permanganate. This would result in a total project timeframe of approximately 6-8 weeks (compared with the 3 to 4-week project timeframe for Alternative 1).

Given the increased chance of incomplete rainbow trout removal, multiple follow-up treatments would likely be needed for Alternative 2. Even with multiple applications, a sufficient kill of non-native rainbow trout may not be possible. Rotenone and potassium permanganate applications would be underway until monitoring determines that enough non-native rainbow trout have been removed to reduce risks to native fish conservation populations downstream and to enable the establishment of translocated westslope cutthroat and bull trout and mountain whitefish in the wider St. Mary River drainage. Given the likelihood of multiple treatments to remove non-native rainbow trout, translocation of westslope cutthroat trout may be delayed or not be possible under this alternative, especially if a sufficient number of non-native rainbow trout are not removed (translocation of bull trout and mountain whitefish would still be possible, because non-native rainbow trout do not present hybridization, predation, or competition risks to bull trout).

Since rotenone is required to be securely stored according to the MSDS label, this alternative would require the construction of a temporary fenced enclosure or other securable area at Gunsight Lake to store the rotenone for the duration of treatment and/or require personnel to be present on-site full time (24 hours per day/7 days a week) to monitor the rotenone storage area throughout the project.

Untrammelled Quality. Alternative 2 would generally impact the untrammelled quality as described for Alternative 1 but impacts would likely be prolonged due to the increased likelihood of multiple rotenone treatments.

Undeveloped Quality. Using non-motorized boats would minimize impacts to the undeveloped character of recommended wilderness by reducing the use of motorized equipment and creating less associated noise. The undeveloped quality would still be impacted by helicopter operations, generators, and water pumps, and because remote incubators, signs along the trail, and fish monitoring devices would still be present as installations, as described for Alternative 1. Alternative 2 would have additional adverse impacts to the undeveloped quality because of the storage requirements of rotenone, which would necessitate the construction of a temporary fenced enclosure to store the rotenone for the duration of treatment. Hand propelled watercraft would be stored at Gunsight Lake for two to four weeks, for the duration of the rotenone application period.

Solitude and Unconfined Recreation. Impacts to opportunities for solitude and unconfined recreation (noise, purple coloration, etc.) would include those described under Alternative 1. But the Gunsight trail would be closed for a longer period of time under Alternative 2 because of the need for longer initial rotenone application (about two to four weeks). The Gunsight wilderness campground would be closed earlier, in peak season of the summer for the duration of the project (likely August 1) until spring. Given the increased chance of multiple treatments becoming necessary, the trail and/or wilderness campground could be closed again in years following initial application, further impacting opportunities for unconfined recreation.

Natural Quality. Impacts to the natural quality for Alternative 2 would generally include those described for Alternative 1, but Alternative 2 would have additional, longer term adverse impacts to non-target species. The longer application period of rotenone combined with the increased chance of multiple treatments would cause greater impacts (mortality) to non-target species and make recovery of these

populations lengthy and more difficult. Alternative 2 would also negatively affect the natural quality if an insufficient number of rainbow trout are removed, since non-native rainbow trout would continue to hybridize and compete with native westslope cutthroat trout downstream. This would jeopardize westslope cutthroat populations in downstream tributaries, resulting in the continued loss of the few remaining westslope cutthroat conservation populations in the St. Mary River drainage, and put genetic lineages of the species at risk of permanent loss.

Other Features of Value. Impacts to this quality would be beneficial if non-native rainbow trout could be successfully removed. If the non-native rainbow trout cannot be successfully removed, then Alternative 2 would adversely affect westslope cutthroat trout by allowing the risks of hybridization and competition to continue. Since westslope cutthroat trout are identified as an iconic natural resource that contributes to the other features of value quality, this quality would be negatively affected.

ACTION ALTERNATIVE 3

Remove non-native rainbow trout from Gunsight Lake using rotenone, followed by translocation of native westslope cutthroat and bull trout and mountain whitefish to the Lake

Methods (fully non-motorized methods of implementation):

- **Use non-motorized boats (human-powered canoes, rafts, kayaks) for rotenone application to the lake**
- **Use only non-motorized equipment (backpack sprayers, drip stations, and slow-release agents) for rotenone application and detoxification**
- **Use pack stock only to transport equipment and translocate native fish to the project area**

Alternative 3 would be a completely non-motorized alternative eliminating helicopter, motorboat, generator, and water pump use. Rotenone application and detoxification and native fish translocation would be implemented using non-motorized boats and equipment, and pack stock instead of helicopters. Rotenone treatment of the lake would only be completed with non-motorized, human-powered boats (such as rafts and canoes) and drip stations, backpack sprayers, and slow-release agents (as described in Alternative 2). No water pumps would be used to distribute rotenone and generators would not be used during detoxification with potassium permanganate. Gear and native fish transport would only occur by foot or pack stock.

Non-motorized boats would apply rotenone to the lake as described for Alternative 2; as with Alternative 2, Alternative 3 would necessitate the construction of a temporary fenced enclosure to store the rotenone for the duration of treatment (two to four weeks), and hand propelled watercraft would have to be stored at Gunsight Lake for the duration of the rotenone application period.

Under this alternative, water pumps would not be used. Water pumps allow rotenone to be pumped below the thermocline of the lake; without pumps, it is difficult for rotenone to penetrate the temperature differences within the lake and deeper/colder areas could be missed, resulting in an insufficient removal of rainbow trout. Given the decreased chances of successfully removing non-native rainbow trout, this alternative would increase the chances of multiple repeat treatments. Translocation of westslope cutthroat may be delayed or not be possible if a sufficient number of non-native rainbow trout are not removed (translocation of bull trout and mountain whitefish would still be possible, because non-native rainbow trout do not present hybridization, predation, or competition risks to bull trout).

It is estimated that approximately 12,000 pounds of rotenone and approximately 2,500 pounds of potassium permanganate would need to be transported to Gunsight Lake in addition to the other gear required for application and detoxification. Rotenone is supplied in 300-pound barrels, which is well over

the weight mules can carry. Putting rotenone into smaller containers to be of a weight that pack stock could carry was considered but it is not feasible, safe, or in compliance with product packaging requirements. Moving rotenone to other containers would not follow chemical regulations, would increase chances of spills, and increase the risk of workers coming into direct contact with the undiluted product. Safety planning requires risk to workers be minimized, and this alternative would increase that risk. Even if rotenone could be placed in smaller containers, which is unlikely, based on the amount and weight that would need to be carried, an estimated 20 to 25 mule strings of six head each would be required to get the supplies to Gunsight Lake. Pack animals would also be required to move project materials out of the site. Packing rotenone on stock would also increase the risk of spilling the undiluted product should a mule lose or throw its load, which does occur infrequently.

The application of potassium permanganate to neutralize the rotenone would be done without a generator or auger dispenser (which is powered by the generator). The potassium permanganate would be applied to the stream from a drip station consisting of a large, 50-gallon bag with a hose extending into the stream. Due to its size and weight, the bag would need to be placed on flat terrain, such as a large, flat gravel bar, or on vegetation. If the bag was placed on vegetation, because of its weight and the duration of placement, vegetation would likely be damaged. Also, without a generator and auger dispenser, dispensing potassium permanganate at the correct concentrations through a bag method becomes more difficult because it is not as precise as an auger dispenser. This could lead to over detoxification or under detoxification of the stream environment.

Alternative 3 would not use helicopters to transport native fish to Gunsight Lake. After hatchery rearing, fish would be transported back to the project area on foot or with pack stock and released into the lake from the shoreline. Westslope cutthroat and bull trout and mountain whitefish may also be moved directly from source waters to the lake without hatchery propagation or gametes (eggs and sperm) may be collected from spawning adults, fertilized, and reared naturally in stream-side incubators in the new habitat, whereby the fish could swim into the lake from the stream. The time required for ground transport and the jostling from pack stock or backpacks would increase the likelihood of injury and mortality to fish during transport, requiring even more time and trips to translocate fish. As with Alternatives 1 and 2, translocated native fish would be monitored, which would require marking them with tags, fin clips, or other means and tracking them using fixed-location remote stations.

Untrammelled Quality. Alternative 3 would generally impact the untrammelled quality as discussed for Alternatives 1 and 2; the impacts would likely be prolonged given the increased likelihood of multiple rotenone treatments and the risk of over or under detoxifying the stream without the aid of an auger dispenser.

Undeveloped Quality. Alternative 3 would minimize impacts to undeveloped quality of recommended wilderness by eliminating motorized use. As with Alternatives 1 and 2, remote incubators, signs along the trail, and fish monitoring devices, such as tags and fixed-location remote sensors, would still adversely impact this quality because they would be installations on an otherwise undeveloped landscape. As with Alternative 2, constructing an enclosure for the rotenone would further impact the undeveloped quality with an installation.

Solitude and Unconfined Recreation. This alternative would have a negative impact on opportunities for solitude and unconfined recreation as discussed in Alternative 2, including likely impacts from multiple closures given the increased likelihood of multiple rotenone treatments. Alternative 3 would have additional impacts from the extended and more frequent use of pack stock. As the Gunsight trail would remain open as far as the St. Mary River from the east, visitors would encounter far higher than normal amounts of stock traffic, animal waste, and potential trail damage. The trails would be noticeably impacted by the more intense stock use under Alternative 3 and additional rutting, trail tread damage in

softer areas, and more animal waste on the trail would occur. This would adversely impact visitor solitude and detract from an unconfined recreational experience. Impacts would be further increased if a spill occurred while attempting to pack rotenone on livestock.

Natural Quality. Under Alternative 3, impacts to the natural quality of recommended wilderness would be similar to those described under Alternative 2. But the chances of sufficiently removing non-native rainbow trout from Gunsight Lake would be further reduced under this alternative, since water pumps would not be used to help distribute the rotenone. This would result in a longer application period and a greater chance of multiple treatments, which would increase the potential for mortality of non-target organisms and further challenge the recovery of their populations. Westslope cutthroat trout populations in downstream tributaries would also continue to be jeopardized, leaving genetic lineages of the species at continued risk of permanent loss. There would also be negative effects to the natural quality under Alternative 3 from prolonged vegetation trampling and soil compaction during the extended and frequent use of livestock, and if the stream environment is over or under detoxified without the aid of an auger dispenser during detoxification.

Other Features of Value. Similar to Alternative 2, impacts to this quality would be beneficial if non-native rainbow trout could be successfully removed. But the chances of sufficient removal under Alternative 3 would be notably reduced without the use of water pumps. If the non-native rainbow trout cannot be successfully removed, then Alternative 3 would adversely affect westslope cutthroat trout by allowing the risks of hybridization and competition to continue. Since westslope cutthroat trout are identified as an iconic natural resource that contributes to the other features of value quality, this quality would be negatively affected.

PART B DECISION: WHAT IS THE MINIMUM ACTIVITY?

State the Alternative and rationale. Describe monitoring efforts and mitigations to minimize impacts to wilderness character.

Alternative 1 is the minimum activity necessary to preserve native westslope cutthroat trout and bull trout and meet the rationale for taking action by preserving the natural quality and other features of value of wilderness character. Alternative 1 would secure native westslope cutthroat trout and bull trout against the threats of non-native fish and climate-related habitat degradation and support native trout genetics throughout the St. Mary River drainage while minimizing negative impacts to wilderness character as a result of the intervention. The selection of Alternative 1 is based on minimizing the intensity and degree of negative impacts to wilderness character.

Comparison of impacts to wilderness character from Alternatives 1, 2, and 3:

Untrammelled Quality. Negative effects to the untrammelled quality of wilderness character would be similar under all three alternatives because each would include intentional manipulation of the biophysical environment. But due to the increased chances of incomplete rainbow trout removal and, consequently, an increased potential for multiple applications of rotenone, Alternatives 2 and 3 would likely prolong the duration of the impact to the untrammelled quality. The absence of an auger to dispense potassium permanganate during detoxification under Alternatives 2 and 3 would also prolong impacts to the untrammelled quality if the stream environment is under or over detoxified.

Undeveloped Quality. Motorized use under Alternative 1 would negatively affect the undeveloped quality; effects from motorized use under Alternative 1 would be temporary, ending once the project concludes. Alternatives 2 and 3 would have less impact from motorized use than

Alternative 1. But Alternatives 2 and 3 would increase the scale and duration of negative effects to the natural quality, opportunities for solitude and unconfined recreation, and other features of value (see below). Alternatives 2 and 3 would also increase the degree of impact occurring from installations, as both alternatives would require a temporary fenced enclosure to store rotenone.

While transporting rotenone to the project area with pack stock under Alternative 3 (instead of a helicopter in Alternatives 1 and 2) would reduce impacts to the undeveloped quality, it would require transferring the rotenone into containers that are small enough for pack stock to carry. Handling the rotenone to this degree would not be feasible, safe, or consistent with product packaging requirements.

Natural Quality. Effects to the natural quality of wilderness are most beneficial under Alternative 1, since Alternative 1 has the highest probability of a complete removal of non-native rainbow trout. Benefits to the natural quality under Alternative 1 will be long-term, because downstream westslope cutthroat trout populations will be protected from hybridization and a successful removal of rainbow trout will provide the best chances of establishing a secure population of native fish.

Since Alternatives 2 and 3 have an increased chance of incomplete removal of rainbow trout, the risk of hybridization with native westslope cutthroat trout downstream would likely persist. This would continue to jeopardize westslope cutthroat populations in downstream tributaries, resulting in the continued loss of the few remaining westslope cutthroat conservation populations in the St. Mary River drainage, and put genetic lineages of the species at risk of permanent loss. This would perpetuate an ongoing, long-term, negative effect to the natural quality of wilderness character.

Alternative 1 will have less impact to the natural quality because it involves only one or two rotenone applications in a single season, allowing amphibian, zooplankton, and aquatic insect populations to recover in two to three seasons. Alternatives 2 and 3, in comparison, risk impacting these non-target organisms over longer durations of time and likely during repeated applications, causing increased mortality, risking permanent decreases in amphibian, zooplankton, and aquatic insect abundance and distribution, and thus, causing long-term negative effects to the natural quality.

Alternative 3 would require a large 50-gallon bag of potassium permanganate to be placed next to the St. Mary River, which could cause vegetation damage due to the weight of the bag and duration of its placement, versus smaller barrels applied by a generator-powered auger dispenser under Alternative 1. Detoxification of the rotenone under Alternative 3 would be uneven and imprecise without a generator to power an auger dispenser, leading to over detoxification or under detoxification of the stream environment. By comparison, Alternative 1 would distribute potassium permanganate concentrations accurately to the stream, ensuring no rotenone travels below the station.

Increased pack stock use to transport equipment and materials without a helicopter under Alternative 3 would impact the natural quality due to prolonged vegetation trampling and soil compaction. Project personnel would also be onsite for longer periods of time for Alternatives 2 and 3, further increasing the potential for impacts to vegetation and soils, including social trails.

Alternative 3 would have a greater impact on individual donor fish because of the increased time required for ground transport and the jostling from pack stock or backpacks that would increase the likelihood of injury and mortality to fish during transport. Ground transport under Alternative 3 would also create more personnel time and trips required to translocate fish. In contrast,

Alternatives 1 and 2 would use a helicopter to directly transport the fish to the lake, minimizing transport time and risk of injury or mortality to fish.

Introducing the three native fish species to Gunsight Lake under all three alternatives would cause site specific impacts to the natural quality at Gunsight Lake from a change in the biophysical elements (change in fish species). Impacts from translocation would be site specific to Gunsight Lake for each alternative and not ecologically different than what is already occurring at the lake, since rainbow trout have been present since the 1930s and share similar life histories to westslope cutthroat trout.

Solitude and Unconfined Recreation. Although Alternatives 2 and 3 would eliminate noise from motorized boats (Alternatives 2 and 3) and helicopter use (Alternative 3), they would increase negative effects to unconfined recreation because they would require longer, and likely more, area closures. The rotenone application period would need to begin earlier than for Alternative 1, and Alternatives 2 and 3 would likely require additional closures around multiple rotenone treatments due to an increased risk of insufficient removal of rainbow trout. The Gunsight Pass Trail and wilderness campground would need to close about two to four weeks earlier than for Alternative 1 because rotenone application with non-motorized boats would take longer.

Alternative 3 would also require increased livestock use on trails to transport equipment and materials without a helicopter, with two to three weeklong periods of stock use on the trail. This would require earlier closures to allow pack stock to deliver the rotenone to the project area. Recreational closures would occur during peak season in a popular wilderness campground.

Impacts to solitude and unconfined recreation are minimized under Alternative 1 due to the shorter closure timeframe for initial treatment, and because multiple reapplications that could result in multiple closures are not anticipated (while not expected, a second application may be necessary).

Other Features of Value. Effects to this quality are most beneficial under Alternative 1, since Alternative 1 has the highest probability of a complete removal of non-native rainbow trout. Benefits will be long-term, because westslope cutthroat trout will be protected from hybridization and a successful removal of rainbow trout will provide the best chances of establishing a secure population of westslope cutthroat trout as well as bull trout, both identified as iconic natural resources that contribute to the other features of value quality. Alternatives 2 and 3 have a decreased chance of completely removing the rainbow trout from Gunsight Lake. Consequently, the risk of hybridization with native westslope cutthroat trout downstream would likely persist, perpetuating an ongoing risk to westslope cutthroat populations in the St. Mary River drainage and, thus, to the other features of value quality.

Alternative 1 will have the lowest intensity and shortest duration of impacts to wilderness character, and the most potential for long term benefit. As explained above, Alternatives 2 and especially 3 would increase the degree and intensity of impacts and/or prolong impacts to the untrammeled and natural qualities, opportunities for solitude and unconfined recreation, and other features of value. While motorized use under Alternative 1 will have the greater degree of impact to the undeveloped quality compared with Alternatives 2 and 3, the effects will be short term, ending when the project is complete.

Gunsight Lake presents a unique opportunity to establish native fish habitat that is secure against hybridization, since downstream waterfalls prevent upstream fish migration. And given its high elevation, Gunsight Lake also has a high likelihood of sustaining the cold-water habitat necessary for native fish to persist in a changing climate. To manage wilderness holistically, removing non-native rainbow trout from Gunsight Lake followed by the introduction of native fish will have a positive impact to wilderness

character as a whole within the wider St. Mary River drainage and the park. Alternative 1 best meets the rationale for taking action, as it provides the best chance of successfully removing non-native rainbow trout and eliminating the threat they pose to downstream native westslope cutthroat trout populations. Because Alternative 1 is the most effective approach for removing non-native rainbow trout, it is most likely to enable the establishment of secure habitat for westslope cutthroat trout and bull trout in the St. Mary River drainage.

The risks of no action in Gunsight Lake and the greater St. Mary River drainage are unacceptable due to the resource value at risk.

ADDITIONAL ALTERNATIVES CONSIDERED BUT DISMISSED

Remove non-native trout but do not translocate native trout in Gunsight Lake. Returning Gunsight Lake to its historically fishless state was considered but dismissed because it would fail to secure native fish habitat, or habitat refugia where westslope cutthroat trout and bull trout would be protected from both non-native fish and climate-related habitat degradation. Returning the lake to a fishless state would not establish a reserve population capable of providing a genetic refuge aiding in the preservation and protection of genetically unaltered populations of bull trout and westslope cutthroat trout. This action would also negatively impact recreational opportunities by removing a popular visitor activity and historical use of fishing at Gunsight Lake. Therefore, this alternative would not fully meet the need for action described in Part A of this analysis.

Remove rainbow trout manually (i.e., electrofishing, gill nets, and/or trap nets) instead of rotenone. Gill netting rarely achieves complete removal of the target fish population and is generally more useful for suppressing non-native fish numbers versus complete removal. To have any chance of removing enough of the rainbow trout population, gill netting from motorboats would need to be underway as early in the spring and as late in the fall as possible (i.e., as soon as crews can access the lakes and until winter weather prohibits access or operations) for at least five years, if not longer. Electrofishing and angling the stream would need to be underway for similar periods of time, and possibly also during winter months for any meaningful reduction in rainbow trout. Even with intensive removal efforts every year for multiple years, enough rainbow trout could not be removed and would still pose a threat to downstream populations of native fish. Therefore, following the first few years of intensive removal, punctuated removal efforts every few years using the same methods just described would likely be necessary for the foreseeable future. While there would be some benefit to the natural quality of wilderness character through the removal of some non-native rainbow trout, effects would also be negative since many rainbow trout would likely remain, perpetuating hybridization risks to downstream native westslope cutthroat trout populations.

This alternative would also have negative effects to the undeveloped quality from the multi-year, year-round deployment of nets and electrofishing, especially in winter when the nets would be unattended, which would put terrestrial animals that prey on aquatic organisms at an increased risk of mortality. Work lights would be necessary during nighttime operations for the safety of personnel, causing impact to the undeveloped quality and solitude and unconfined recreation. Motorboats would need to be stored on site for the multi-year effort; a ramp and/or temporary shelter may need to be constructed to protect the boats during winter, thus impacting the undeveloped quality with installations. Because the exclusive use of manual means such as electrofishing, angling, gill, or trap netting to remove rainbow trout from the project area would not result in the complete removal of rainbow trout, the park would be unable to secure translocated westslope cutthroat from the threats non-native fish. Therefore, this alternative has been dismissed because it would not meet the need for taking action described in Part A and would be too impactful to wilderness character overall.

Swamp Gunsight Lake with genetically pure westslope cutthroat trout without removing rainbow trout with rotenone. Only stocking genetically pure westslope cutthroat trout on top of a well-established and healthy rainbow trout population would likely result in a hybrid swarm of hybridized trout. This alternative would also be limited by the availability of donor fish and would cause greater impacts to donor source populations from annual long-term removal of sub-adult fish to provide spawning stock. The number of donor fish that would be required for a treatment area of this size and the logistics of transporting the high number of fish is prohibitive. This alternative was dismissed because it would not remove the threat of hybridization, would have long-term negative effects to the natural quality of wilderness, is not feasible, and would not resolve the need for taking action identified in Part A.

Use electric trolling motors on boats Each barrel of rotenone weighs almost 300 pounds, and rotenone is dispersed through a venturi type pump off a moving boat, powered by a small outboard motor. An electric trolling motor would not have sufficient power to accomplish this in a timely fashion and battery life would not be sufficient. A helicopter would need to continually shuttle batteries to the project site; this would not be feasible, and the number of helicopter landings would be more impactful to wilderness character.

EVALUATION OF ECOLOGICAL INTERVENTION IN WILDERNESS

Under NPS policy, recommended wilderness in Glacier National Park is managed as though formally designated. This project has been evaluated in accordance with current guidance, RM 41, 6.8, Guidelines for Evaluating Ecological Intervention Proposals In NPS Wilderness (2022). The evaluation framework in the table below was designed to comprehensively and systematically evaluate proposals for ecological intervention in wilderness. The framework is composed of eight factors, each with accompanying text to guide thought and deliberation to ensure that projects are truly necessary and viable and are completed with the minimum possible adverse impacts. The project is consistent with guidelines that favor intervention.

Factor to Consider	Favors Intervention	Does NOT Favor Intervention
1. Cause of Degradation	<i>If the ecological degradation was primarily caused by human action as opposed to natural causes:</i> Invasive rainbow trout were stocked into Gunsight Lake, introducing the risk of hybridization to the system, creating the current problem.	<i>If the ecological degradation was primarily caused by natural forces as opposed to human action</i>
2. Timing of Degradation	<i>If the cause of the ecological degradation occurred in the past and will not potentially compromise the success of the intervention:</i> The historical stocking of non-native rainbow trout occurred prior to current awareness of how non-native fish affect native fish. These efforts have ceased, and management agencies are now focused on the conservation of native species. Given this, it is highly unlikely that rainbow trout or other non-native fish would be stocked into Gunsight Lake again. There is natural waterfall in place serving as a fish barrier keeping additional hybrids/rainbow trout from moving upstream.	<i>If the cause of the ecological degradation is ongoing and will potentially compromise the success of the intervention</i>

Factor to Consider	Favors Intervention	Does NOT Favor Intervention
3. Origin of Degradation	<i>If the origin of the ecological degradation occurs in a location where the agency has authority to act:</i> Yes, the project occurs on NPS lands.	<i>If the origin of the ecological degradation is regional or global, or occurs outside the wilderness with little chance for a successful outcome within wilderness</i>
4. Urgency of Degradation	<i>If the degradation warrants a need to intervene quickly to prevent the degradation from becoming worse:</i> Yes. Without action over time hybridization will continue to corrupt the native genome and native species will continue to be impacted by climate change and habitat degradation.	<i>If the degradation does not warrant a need to intervene quickly to prevent the degradation from becoming worse</i>
5. Sustainability of Intervention	<i>If climate-driven or other broad-scale, persistent ecological drivers will not interfere with correcting the degradation:</i> Climate change favors the invasive species by warming the water, so we need to remove them now. Climate change will not affect the potential success of the translocation; translocating the non-hybridized bull trout and westslope cutthroat trout to secure habitat will bolster the population's ability to persist in a changing climate.	<i>If climate-driven or other broad-scale, persistent ecological drivers will likely interfere with correcting the degradation</i>
6. Outcome of Intervention	<i>If the intervention has a clear and identifiable point at which an achievable outcome is reached:</i> Yes. Hybrids will be removed using proven methods, resulting in conservation of the unique genetic material of this population, enhancing the ability of the species to adapt to climate change. The population will establish additional pure populations necessary to secure the species east of the Continental Divide and within the St. Mary River drainage.	<i>If the intervention does not have a clear and identifiable point at which an achievable outcome is reached</i>
7. Intensity of Intervention	<i>If the intervention is a less intense undertaking due to the size of the area trammled, tools used, number and frequency of interventions:</i> Yes. The project has been designed and methods selected for a less intense undertaking, to achieve success in the shortest period of time possible with the least impact to park resources and wilderness character.	<i>If the intervention is a more intense undertaking due to the size of the area trammled, tools used, number and frequency of interventions</i>

Factor to Consider	Favors Intervention	Does NOT Favor Intervention
8. Experience with Intervention	<p><i>If the intervention has been successfully conducted previously and has low risk of unintended consequences:</i></p> <p>Well established, proven methods will be used to implement the project. The project team has decades of experience implementing these actions.</p>	<p><i>If the intervention has not been successfully conducted previously or has unknown or high risk of unintended consequences</i></p>

MITIGATIONS:

- Motorized equipment will not be used for overland transport.
- Project personnel will enter the project area on foot or by livestock.
- Project personnel will practice principles of “Leave No Trace” outdoor ethics in order to minimize impacts to park resources and visitor experiences.
- Project personnel will report all Section 4(c) prohibited uses including motorized or mechanical use, helicopter landings, trammeling actions, and installations to the park’s Wilderness Coordinator for purposes of wilderness character monitoring.
- The following conservation measures as agreed to with the USFWS in Glacier’s programmatic BA for administrative flights (NPS 2023) are required for all park administrative flights and will be followed for any flights associated with this action:
 - Flights will follow suggested flight paths away from sensitive areas. Where possible, flight paths will follow road corridors and occur over developed areas. The flight manager will be responsible for coordinating with the park biologist to identify sensitive sites prior to the flight.
 - Flights will occur one hour after sunrise and one hour before sunset from 1 May to 1 October to minimize impacts to grizzly bears. Grizzly bear denning activity peaks during den emergence from 15 March to 15 May and during den construction from 15 October to 15 November. No flights will occur over known dens or potential den habitat during den emergence and den construction. In order to conserve prey species, flights will avoid ungulate winter range from 15 January to 1 May when wintering ungulates are most vulnerable.
 - The helicopter will fly at a minimum of 2000 feet AGL over the park whenever possible, depending on mountainous topography, weather, and except when it is landing or taking off or when it is delivering supplies via long line or during fish planting operations.
 - To minimize impacts on denning Canada lynx, no flights will be permitted over known den sites from 1 May to 30 Aug.
 - Flight paths will be designated so as to avoid open alpine meadows, talus slopes, or other areas where grizzly bears congregate but do not have access to cover. If a low-level flight or landing is needed in an alpine area and a bear is seen, the flight will be postponed. If the flight cannot be postponed, the flight will keep a maximum distance from the bear(s).
- Additional impact mitigation measures listed in the EA and FONSI for the project will be followed.

APPROVALS

Project Title:

Westslope Cutthroat and Bull Trout Preservation at Gunsight Lake
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Refer to agency policies for the following signature authorities:

Reviewed by:

Name Paul Austin

Position Chief, Visitor and Resource Protection

Signature _____

Date _____

Reviewed by:

Name Phil Wilson

Position Chief, Science and Resources Management

Signature _____

Date _____

Approved by:

Name David M. Roemer **Position** GLAC Superintendent

Signature _____

Date _____

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