

National Park Service  
U.S. Department of the Interior

Glacier National Park  
Waterton-Glacier International Peace Park  
Montana



## QUARTZ CREEK FISH BARRIER MODIFICATION AND IMPROVEMENT FINDING OF NO SIGNIFICANT IMPACT

### Background

In compliance with NEPA, the National Park Service (NPS) prepared an environmental assessment (EA) to examine alternatives and environmental impacts associated with a proposal to modify and improve the existing fish passage barrier on Quartz Creek.

Non-native fish are imperiling populations of bull trout (*Salvelinus confluentus*), which are federally listed as threatened, and the native westslope cutthroat trout (*Oncorhynchus clarkii lewisi*), a state listed Species of Concern. Of the seventeen lakes on the west side of Glacier National Park that support bull trout, nine have been compromised by non-native lake trout (*Salvelinus namaycush*) and a tenth has been compromised by the non-native brook trout (*Salvelinus fontinalis*). In lakes that have been monitored over time, data show that lake trout have largely replaced bull trout as the top level aquatic predator (Downs et al. 2011). Bull trout populations in some lakes appear to be at imminent risk of functional extinction.

Quartz Lake, located in the North Fork of the Flathead River drainage, is a stronghold for native fish, including bull trout. Until recently, it was believed to be the largest lake on the west side of the park accessible to lake trout but not yet colonized by them. In 2004, the park prepared an environmental assessment to analyze the impacts of installing a fish passage barrier in Quartz Creek. A Finding of No Significant Impact was issued in September, 2004. In 2005, while the barrier was under construction, lake trout were detected in Quartz Lake. Completion of the barrier was suspended until options to control lake trout, including an experimental lake trout population suppression program, could be reviewed. The NPS has since collaborated with the U.S. Geological Survey (USGS) and others in an ongoing experimental program to remove lake trout from Quartz Lake and suppress the population. Experimental suppression has so far been promising; data suggests that the project is successfully removing a high percentage of spawning adults, which is expected to eventually reduce the lake trout population over time.

Modification and improvement of the existing Quartz Creek fish barrier is needed to better protect native fish populations in the upper Quartz drainage from invasion by non-native fish species. The project will support lake trout suppression efforts on Quartz Lake by reducing the potential for additional lake trout to enter the lake, and will reduce the potential for other non-native fish, including brook and rainbow trout (*Oncorhynchus mykiss*), to access the system.

## **Selected Action**

Alternative B, improvement and modification of the Quartz Creek fish barrier, is the National Park Service's preferred alternative because it best meets the purpose and need for the project as well as the project objectives to:

1. Protect the integrity of native fish populations in the upper Quartz drainage.
2. Support lake trout suppression efforts on Quartz Lake by reducing the potential for additional lake trout to enter the lake.
3. Reduce the potential for other non-native fish, including brook and rainbow trout, to access the upper Quartz drainage

Under Alternative B, the NPS will modify, improve, and complete the existing fish passage barrier on Quartz Creek approximately 100 yards below Middle Quartz Lake. The modified barrier will be approximately 1 to 2 feet taller than the existing barrier; it will extend across the floodplain into the stream channel from both sides of the creek and will funnel flows through a narrow passage in the center of the channel at increased velocities. A heavy-duty screen will be added to the barrier and cantilevered over the channel in a downstream direction to block fish from swimming or jumping upstream while allowing debris or downstream migrating fish to pass. The modified barrier has been designed to eliminate upstream passage of fish during non-flood periods and greatly reduce the likelihood of upstream passage during flood flows. Downstream fish passage will not be impeded.

The improved barrier will consist of naturally occurring boulders and gabions (metal cages) filled with available rocks and boulders found onsite; approximately 672 cubic feet of stone will be required to assemble the gabions, and approximately 28 gabions (each about 2 ft. x 2ft. x 6 ft.) will be installed. A downstream splash pad will be created using large rock or additional gabions to prevent a jump pool from developing below the structure. Large logs (approximately 250 linear feet of 12-24 inch dbh log) will be used to increase the height of the barrier across the floodplain and across the center where the screen will be installed. The logs will be obtained from a combination of downed and standing dead timber and live trees. Approximately 5 to 10 trees should supply the necessary logs; downed timber will be collected first, followed by standing dead timber, and then live trees if necessary. The logs will be collected and/or cut onsite with chainsaws and dragged to the work area with a come-along. To minimize ground disturbance, smaller diameter "roller logs" will be placed across the path of the log that is being hauled, and the logs would be rolled over the ground. The removal will occur well away (approximately 400 yards) from the Quartz Lake Trail. After the addition of the logs, the completed barrier will be approximately 75 ft. long x 6 ft. wide x 5 ft. high.

A temporary, inflatable bladder dam approximately 4 ft. high x 10 ft. wide x 80 ft. long may be used to temporarily dewater the work area during construction, or a non-inflatable barrier may be used if available. A short bypass channel will be constructed around the work site and lined with plastic, and one or two small water pumps may be used to help divert water around the work area and/or inflate the bladder dam with creek water. The bladder dam or non-inflatable barrier will be removed after the work is completed. Backpack electrofishing will be used as necessary to remove any fish from the small section of dewatered stream prior to diverting the water. Any disturbance to physical stream habitat will be repaired upon completion of the project.

In addition to chainsaws and one or two small water pumps, other motorized equipment that will be used onsite during the project include a rock drill, a small gas-powered portable

generator, and other mechanized hand tools as necessary. The rock drill will be required to anchor the screen to boulders and the log sill spanning the center of the barrier, and the generator will be needed to power the drill and the water pumps. Traditional hand tools will be used whenever possible.

Up to three helicopter flights will be required to haul the bladder dam, fish screen, generator, water pumps, rock drill, and other materials that cannot be packed into the work site and to remove equipment that cannot be packed out after the project is complete. Only a small sized helicopter will be used, and equipment and materials will be transported and delivered to the work site as long-line sling loads. The helicopter will fly 2,000 feet above ground level from West Glacier to a staging area along the Inside North Fork Road, where it will pick up the equipment sling loads. The helicopter will then fly northeast along the Quartz drainage to the work site. The helicopter will fly between 500 feet and 2,000 feet above ground level during long line operations, except when landing or taking off. Emergency helispots for possible emergency evacuation of project personnel will be near the Middle Quartz Lake inlet. Flight times are not anticipated to exceed 30 minutes one way between West Glacier and the staging area, and 30 minutes round trip between the staging area and the work site. Other equipment, supplies, and materials will be packed in via livestock to a location along the trail near the outlet of Middle Quartz Lake and carried to the worksite by the work crews. If a non-inflatable water barrier is available, it may be packed in on livestock, reducing the number of helicopter flights that are necessary.

The project will be completed by NPS crews with oversight from the park's engineer and fisheries specialist. The work crew (estimated at 6) will likely hike to the project area from Bowman Lake, following the route over Cerulean Ridge. Crews will likely stay at the Quartz Lake NPS backcountry cabin about 1.5 miles east of the work site. Some downed logs or brush may be cut or moved to facilitate off-trail access from the Quartz Lake Trail to the worksite. The project will take approximately ten days to two weeks to complete and will occur during the low flow period of late summer-early fall to avoid impacts to spawning bull trout and other wildlife. Work will begin each day no earlier than one hour after sunrise and will stop no later than one hour before sunset. Prior to implementation, the park will continue to revise the barrier design and implementation logistics toward minimizing the use of helicopters and mechanical equipment.

The completed Quartz Creek fish barrier may require maintenance following the first spring runoff after construction. Future maintenance of the barrier is expected infrequently (approximately every 7-10 years), and is not anticipated to require helicopter use.

## Mitigation Measures

The following mitigation measures were developed to minimize the degree and/or severity of adverse effects and will be implemented:

### Fisheries

- Electrofishing will be conducted to remove fish in the project vicinity immediately prior to commencement of work.
- Work will occur during low water periods to minimize sediment generation and physical habitat disturbance.

### Wildlife and Threatened and Endangered Species and Species of Concern

- Helicopters will avoid flying directly over Lower Quartz or Middle Quartz Lake, and will avoid the foot of Quartz Lake and other sensitive locations. Flight paths will be

designated so as to avoid open alpine meadows where grizzly bears that are present do not have access to cover.

- The helicopter will fly at a minimum of 500 feet above ground level except when landing or taking off or when delivering supplies on a long-line.
- Helicopter flights will occur between one hour after sunrise and one hour before sunset to mitigate disturbance to wildlife.
- Work will begin no earlier than one hour after sunrise and will stop no later than one hour before sunset to minimize disturbances to foraging or migrating bald eagles, common loons, and other wildlife.
- Work crews will be trained on appropriate behavior in the presence of wildlife and on proper storage of food, garbage, and other attractants.
- Work will be temporarily suspended should a grizzly bear be observed in the project area.
- The work will not occur until late summer or early fall, when the critical nesting, denning, and brood rearing periods are over.
- If standing dead and live trees are required for the project, they will first be assessed for wildlife use. Trees showing signs of foraging or that have cavities, sloughing bark, or broken tops will be avoided if possible.
- Any amphibians encountered will be moved out of the immediate work area.

#### Vegetation

- All equipment and materials used at the site will be cleaned and inspected prior to transport to prevent the spread of non-native invasive plants and aquatic invasive species.
- Glacier National Park's Best Management Practices will be implemented to minimize the extent of impacts.
  - Disturbance to vegetation will be avoided as much as possible and contained to as small a footprint as possible while meeting project objectives.

#### Soils

- Glacier National Park's Best Management Practices will be implemented to minimize the extent of impacts.
  - Disturbance to the ground will be avoided as much as possible and contained to as small a footprint as possible while meeting project objectives.
- Erosion control measures that provide for soil stability and prevent movement of soils into waterways will be implemented.

#### Recommended Wilderness

- Non-electric tools will be used as much as possible to reduce artificial noise.
- The backcountry patrol cabin at Quartz Lake will house workers during the installation phase to avoid construction of additional camping or food storage areas.
- Administrative helicopter flights will be coordinated with other projects in the area and hauling needs will be combined to minimize administrative flights over recommended wilderness. Construction debris, equipment, and garbage that could not be packed out will be flown out on back-hauls of incoming flights.
- The staging area for helicopter flights will be located outside the North Fork's Wild and Scenic River Corridor.
- Work will be conducted during the late summer-early fall to minimize impacts to

- visitors, the sense of solitude, and the overall wilderness experience.
- Logs will be collected well away from the trail where evidence of their removal is not visible to hikers.
  - Once the project is completed, brush, logs, and forest debris will be used to naturalize the immediate work site and the trail to the work site.

#### Natural Soundscapes

- Non-electric tools will be used as much as possible to reduce artificial noise.

#### Visitor Use and Experience

- Notifications of the proposed project will be posted at Quartz drainage trailheads on the Inside North Fork Road and at Bowman Lake for the duration of the project.
- All overnight visitors will be advised in advance about potential noise and activity in the area.

### **Alternatives Considered**

The EA evaluated two alternatives, including the no action and one action alternative. Under Alternative A, no action, there will be no change to current conditions; the National Park Service will not complete construction of the existing fish barrier on Quartz Creek, and non-native lake trout will continue to move freely into the upper Quartz Lake system and augment the existing population of lake trout in Quartz Lake. Rainbow trout will likely continue to enter the drainage and will eventually threaten the remaining genetically pure populations of westslope cutthroat trout that exist in Middle Quartz and Quartz lakes. Alternative B, modification and improvement of the Quartz Creek fish barrier, is the preferred alternative, as described in the previous section. Three other alternatives and two alternative methods for implementing the project were considered but dismissed.

### **Environmentally Preferable Alternative**

According to the CEQ regulations implementing NEPA (43 CFR 46.30), the environmentally preferable alternative is the alternative “that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative.”

Alternative B (Modification and Improvement of the Quartz Creek Fish Barrier) is the environmentally preferable alternative for several reasons: 1) Native fish populations and native fish habitat in the upper Quartz drainage will be protected for the long-term; 2) one of the last remaining strongholds in the entire Flathead Basin for bull trout, a threatened species, will be protected for the long term; 3) a top aquatic predator, the bull trout, will continue to play a significant role in the predator-prey dynamics of the upper Quartz system; 4) the long-term persistence of native fish species will help reflect the overall ecological integrity of the upper Quartz drainage and the park; 5) an area that may provide an ecological refugium for native fish in the face of climate change will be protected; 6) valuable opportunities for scientific research of an ecologically sound aquatic system will be maintained; 7) outdoor educational opportunities inherent within a unique and increasingly rare aquatic ecosystem will endure for future generations; and 8) backcountry angling opportunities will remain undiminished by

significant changes to fish species composition and abundance.

By contrast, Alternative A (No Action) is not the environmentally preferable alternative because, although there will be no activities that will disturb elements of the biological and physical environment, 1) the integrity and persistence of native fish populations in the upper Quartz system will be permanently compromised by non-native fish species accessing the drainage; 2) the effects to native fisheries will be adverse, major and long-term; 3) bull trout, a threatened species and top aquatic predator, will be significantly, adversely affected and at risk of functional extinction; 4) the overall ecological integrity of the Quartz drainage and the park as a whole will be diminished; 5) scientific research, outdoor education, and angling opportunities within the upper Quartz drainage will be permanently compromised.

## **Why the Selected Action Will Not Have a Significant Effect on the Human Environment**

As defined in 40 CFR §1508.27, significance is determined by examining the following criteria:

***Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.***

Implementation of the preferred (selected) alternative will result in some adverse impacts; however, the overall benefit of the project, particularly to fisheries and aquatic threatened and species of concern, outweighs these negative effects. The adverse effects are summarized as follows: disturbances to the stream bed during project implementation will have negligible to minor, adverse, short-term and site-specific impacts to fisheries and aquatic threatened species and species of concern, including bull trout (federally listed as threatened under the Endangered Species Act) and westslope cutthroat trout (a state listed Species of Concern). Negligible to minor, adverse, site-specific, and long-term impacts to floodplains will occur from the localized redirection of some water into the channel during high water events. There will be minor adverse, site-specific and local, and short and long-term impacts to recommended wilderness from disturbances to solitude and the undeveloped, natural character of the wilderness resource during the two-week work period, and from the semi-permanent presence of a manmade structure on the landscape. Noise from helicopter flights and mechanized equipment and tools will have minor, adverse, short-term, site-specific and local impacts on natural soundscapes.

The project will have moderate, site-specific, local, and regional beneficial impacts on fisheries and aquatic threatened species and species of concern for the long-term due to a greatly reduced potential for non-native fish to enter the upper Quartz system. Moderate beneficial, site-specific and local, and long-term impacts to the natural condition and unique ecological and scientific value of recommended wilderness will also result from the protection of native fish populations.

***The degree of effect on public health or safety:*** The preferred alternative will not affect public health and safety.

***Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas:*** Quartz Creek is a tributary of the North Fork of the Flathead River, a designated Wild and Scenic River. The project site is over 12 stream miles from the North Fork and is outside the Wild and Scenic River Corridor; the outstanding, remarkable

values (ORV's) that led to the North Fork's designation as a Wild and Scenic River Corridor will therefore not be affected. The project area is within recommended wilderness, characterized by rugged, remote, and wild country, spectacular scenery, and a diverse assemblage of native plants and animals. The Quartz drainage provides valuable habitat for several species of wildlife, including federally and state listed species such as grizzly bears, Canada lynx, wolverines, and bald eagles. Quartz Creek is part of an important aquatic ecosystem that supports native fish, including federally and state listed species such as bull trout and westslope cutthroat trout. The upper Quartz drainage is Critical Habitat for bull trout (USFWS 2010) and Quartz Lake is an important remaining stronghold for bull trout within Glacier National Park. The preferred alternative will impact recommended wilderness, federally and state-listed wildlife species, and native fisheries as discussed previously and later in this document. There are no historic buildings and structures or cultural landscapes in the project area; the area of potential effect has been surveyed, no historic properties or archeological resources were identified, and therefore no historic or cultural resources will be affected. No wetlands or prime farmlands will be affected by the project.

***The degree to which effects on the quality of the human environment are likely to be highly controversial:*** The proposal to modify and improve the fish barrier on Quartz Creek was not highly controversial during the environmental process. Fifteen comment letters were received and all supported the project except for one, which stated in their opinion that the effort was not worthwhile and urged the park instead to protect other remaining native fish communities in the park. The effects of the project are not expected to generate any future controversy.

***The degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risks:*** The environmental process has not identified any effects that are highly uncertain or may involve unique or unknown risks.

***The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration:*** Fish passage barriers are being widely employed as a management strategy to conserve native fish across the nation, including within the NPS, at Crater Lake National Park and Yellowstone National Park, for example. The preferred alternative will complete the construction of an existing fish passage barrier (2004 EA and FONSI). Therefore, the preferred alternative does not set a precedent for future actions with significant effects, nor does it represent a decision in principle about a future consideration.

***Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts:*** Cumulative effects were analyzed in the EA and no significant cumulative impacts were identified.

***The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed on National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources:*** There are no historic buildings and structures or cultural landscapes in the project area, the Area of Potential Effect has been surveyed for archeological resources and none were identified, and no historic

properties or ethnographic resources will be affected. The NPS documented the “no historic properties affected” finding in our EA transmittal letter to the SHPO dated February 14, 2012. The 30-day review period concluded on March 19, 2012 and no comments were received.

***The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973:*** Under Section 7, the determination for bull trout (*Salvelinus confluentus*) is “may affect, not likely to adversely affect”. A fisheries biological assessment prepared for the initial barrier project was approved in April 2003. On November 16, 2011, the U.S. Fish and Wildlife Service (USFWS) informed the park that the 2003 concurrence remains in effect for the current project, so long as the project occurs in 2012.

The Section 7 determination for grizzly bears (*Ursus arctos*) is “may affect, not likely to adversely affect”, and the determination for Canada lynx (*Lynx Canadensis*), water howelia (*Howellia aquatilis*), and Spalding’s catchfly (*Silene spaldingii*) is “no effect”; the park’s determination for wolverine (*Gulo gulo*) and meltwater stonefly (*Lednia tumana*), both Candidate Species, is also “no effect”. On April 20, 2012, the USFWS concurred with the park’s determination that the project *may affect but is not likely to adversely affect* grizzly bears.

Both bull trout and westslope cutthroat trout are state-listed species of concern; the project will temporarily adversely affect bull trout and westslope cutthroat trout, but will benefit both species over the long-term. The project will not measurably affect other state-listed species of concern; the work will be of short duration and localized to a small area after the sensitive nesting and denning period, and mitigation measures will be implemented to protect sensitive habitat. No state-listed rare plants are known to be located in the project vicinity. The *Montana Natural Heritage Program* website, which is part of Montana’s official state website and describes the range and distribution of state-listed species of concern, was accessed on July 20, 2011 and January 12, 2012.

***Whether the action threatens a violation of Federal, state or local law or requirements imposed for the protection of the environment.*** The action will not violate any federal, state, or local laws or environmental protection laws. Permits required under the Clean Water Act will be obtained.

## Public Involvement and Agency and Native American Consultation

The environmental assessment was made available for public review and comment during a 30-day period ending March 19, 2012. The announcement was also posted on the National Park Service’s public comment website. Letters were sent to recipients on the park’s EA mailing list and various federal, state, and local agencies, including the U.S. Fish and Wildlife Service (USFWS), Montana Fish, Wildlife and Parks, the Montana State Historic Preservation Officer (MTSHPO), the Advisory Council for Historic Preservation (ACHP), the Blackfeet Tribal Business Council, and the Confederated Salish and Kootenai Tribe. Fifteen comment letters were received during the EA review period. Fourteen letters expressed support for the proposal and one expressed disagreement. The USFWS informed the park on November 16, 2011 that the 2003 concurrence for bull trout remains in effect and concurred on April 20, 2012 with the park’s determination of *may affect but is not likely to adversely affect* grizzly bears. The Blackfeet Tribe did not comment on the EA; the park’s Cultural Resource Specialist discussed the project with the Confederated Salish and Kootenai Tribal Historic Preservation Department staff on January 24, 2012, and no objections or concerns were raised. On February 14, 2012, a



determination of "no historic properties affected" was transmitted to the Montana State Historic Preservation Office along with a copy of the EA. The SHPO did not respond during the 30 day comment period which concluded March 19, 2012. Substantive comments addressed the use of helicopters, the protection of native fish elsewhere in the park, and monitoring the success of the project; one substantive comment suggested another alternative. These comments are addressed in the Errata Sheets attached to this FONSI. The FONSI and Errata Sheets will be sent to all commenters.

## References

Downs, C.C., H. Langner, C. Stafford, and C.C. Muhlfeld. 2011. Glacier National Park Fisheries Inventory and Monitoring Annual Report, 2009-2010. National Park Service, Glacier National Park, West Glacier, Montana.

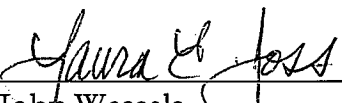
U.S. Fish and Wildlife Service (USFWS). 2010. Bull trout final critical habitat. <http://www.fws.gov/pacific/bulltrout/CriticalHabitat.html>. Accessed October 3, 2011.

## Conclusion

As described above, the preferred alternative does not constitute an action meeting the criteria that normally requires preparation of an environmental impact statement (EIS). The preferred alternative will not have a significant effect on the human environment. Environmental impacts that could occur are limited in context and intensity, with adverse and beneficial impacts that range from negligible to moderate, short to long-term, and site-specific to regional. There are no unmitigated adverse effects on public health, public safety, threatened or endangered species, sites or districts listed in or eligible for listing in the National Register of Historic Places, or other unique characteristics of the region. No highly uncertain or controversial impacts, unique or unknown risks, significant cumulative effects, or elements of precedence were identified. Implementation of the action will not violate any federal, state, or local environmental protection law.

Based on the foregoing, the National Park Service has determined that an EIS is not required for this project and thus will not be prepared.

Approved:

  
John Wessels  
Regional Director, Intermountain Region  
National Park Service

5/8/12  
Date

## ERRATA SHEETS

### QUARTZ CREEK FISH BARRIER MODIFICATION AND IMPROVEMENT GLACIER NATIONAL PARK

According to NPS policy, substantive comments are those that 1) question the accuracy of the information in the EA, 2) question the adequacy of the environmental analysis, 3) present reasonable alternatives that were not presented in the EA, or 4) cause changes or revisions in the proposal.

Four comments received during public review of the EA were considered substantive and are addressed below in the *Responses to Comments* section. Substantive comments addressed the use of helicopters, the protection of native fish elsewhere in the park, and monitoring the success of the project; one comment suggested a new alternative.

#### TEXT CHANGES

A few text changes were made to the EA to address the need to begin work before September in order to avoid impacts to spawning bull trout. Other text changes address minor technical errors, an additional mitigation measure for grizzly bears, and another reason why the preferred alternative is also the environmentally preferable alternative. One text change addresses a new alternative suggested during the public comment period. Italicized and underlined text indicates the section in the EA that has been corrected or altered. Strikeout is used to show text that has been struck from the EA. Bold text is used to show new text and text that replaces stricken text.

pp. 11-12, *Impact Topics Dismissed from Further Analysis, Soils and Vegetation.* But several plant species would be nearing their dormancy stage by the time the project is underway in ~~September~~ **late summer-early fall**, and would therefore be less vulnerable than in the spring.

p. 12, *Impact Topics Dismissed from Further Analysis, Wild and Scenic Rivers.* The project site is over 12 stream miles from ~~the~~ North Fork and is outside the Wild and Scenic River Corridor. . . .

p. 14, *Impact Topics Dismissed from Further Analysis, Visitor Use and Experience.* The fish barrier modification project would occur in ~~September~~ **late summer-early fall** after the peak visitor use period and would not permanently alter the way visitors use the area.

p. 16, *Alternatives Considered.* An interdisciplinary team of Glacier National Park staff originally identified ~~four~~ **five** alternatives, including a no action alternative.

p. 18, *Alternatives Carried Forward, Preferred Alternative.* . . . The project would take approximately ten days to two weeks to complete and would occur during ~~September~~ **the low flow period of late summer-early fall** to avoid impacts to spawning bull trout and other wildlife.

p. 19, *Mitigation Measures, Wildlife.*

- Work would be temporarily suspended should a grizzly bear be observed in the project area.
- The work would not occur until ~~September~~ **late summer or early fall**, when the critical nesting, denning, and brood rearing periods are over.

p. 20, *Mitigation Measures, Recommended Wilderness.*

- Work will be conducted during the **late summer-early fall** to minimize impacts to

visitors, the sense of solitude, and the overall wilderness experience.

*pp. 20-21, Alternatives Considered but Eliminated from Detailed Study.*

**Introduce a forage fish species such as cisco to Quartz Lake.** Cisco (*Coregonus artedii*), a salmonid species, is not native to Montana but was introduced into some state waters (such as Fort Peck Reservoir, for example) as a forage fish for walleye and lake trout. The well-intended introduction of non-native fish species are at the root cause of many of the problems native fish face across western North America, including Glacier National Park. Introducing new species to Quartz Lake as a biological control comes with the potential for significant negative unintended consequences. These consequences include competition for food and space with native fish (i.e. mountain whitefish, sculpin, redbside shiner, westslope cutthroat trout) in relatively unproductive environments like Quartz Lake. Quartz Lake is not a closed system and any fish species introduced into Quartz Lake could migrate downstream and colonize other waters in the Flathead Basin. Additionally, introducing a forage fish such as cisco to the upper Quartz system would support lake trout, thereby potentially increasing the size of the lake trout population in Quartz Lake as well as the potential for lake trout to invade other park waters. Supporting the non-native lake trout population would contradict the park's commitment to preventing the establishment of the species to the maximum extent possible. This alternative was therefore dismissed.

*p. 27, Alternative Summaries, Table 2.*

Impact Topic	No Action Alternative	Preferred Alternative
Fisheries/Aquatic Threatened Species and Species of Concern (including bull trout and westslope cutthroat trout)	Moderate to major adverse, long-term, and local and regional effects on native fish populations in the Quartz drainage and the Flathead Basin would occur from the diminished integrity of native fish populations.	Moderate, long-term, site-specific, <del>and</del> local, <del>and</del> regional beneficial impacts on native fish populations in the Quartz drainage would occur due to a greatly reduced potential for non-native fish to enter the upper Quartz system.  Negligible to minor, adverse, short-term and site-specific impacts to aquatic resources would occur from disturbances to the stream bed during project implementation.  Under Section 7, the determination for bull trout would be "may affect, not likely to adversely affect".
Natural Soundscapes	None.	Minor to moderate, adverse, short-term, site-specific and local impacts would occur from noise produced by mechanized equipment and tools, and helicopter flights.

*p. 28, Environmentally Preferred Alternative.* ... The environmentally preferable alternative is identified after consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts and in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative."

Alternative B (Modification and Improvement of the Quartz Creek Fish Barrier) is the environmentally preferable alternative for several reasons: 1) Native fish populations and native fish habitat in the upper Quartz drainage will be protected for the long-term; 2) one of the last remaining strongholds in the Flathead Basin for bull trout, a threatened species, will be protected for the long term; 3) a top aquatic predator, the bull trout, will continue to play a significant role in the predator-prey dynamics of the upper Quartz system; 4) the long-term persistence of native fish species will help reflect the overall ecological integrity of the upper Quartz drainage and the park; 5) **an area that may provide an ecological refugium for native fish in the face of climate change will be protected**; 56) valuable opportunities for scientific research of an ecologically sound aquatic system will be maintained; 67) outdoor educational opportunities inherent within a unique and increasingly rare aquatic ecosystem will endure for future generations; and 78) backcountry angling opportunities will remain undiminished by significant changes to fish species composition and abundance.

*p. 42, Affected Environment and Environmental Consequences, Floodplains, Impacts of Alternative B – Preferred.* Additionally, since the work would be completed during the **late summer-early fall** at low water times, any impact to the floodplain during construction would be remediated by spring flows.

*p. 63, Minimum Requirement Decision Guide, Step 2: Determine the minimum activity, Alternative #1.* The project would take approximately ten days to two weeks to complete and would occur during September **late summer-early fall**.

*p. 67, Minimum Requirement Decision Guide, Step 2 Decision: What is the Minimum Activity, Mitigations.*

- Work would be conducted during the **late summer-early fall** to minimize impacts to visitors, the sense of solitude, and the overall wilderness experience. All overnight visitors would be advised in advance about potential noise and activity in the area.

*Statement of Findings, Floodplains, p. 3, Proposed Action.* The project would take approximately ten days to two weeks in September **late summer-early fall** to complete.

*Statement of Findings, Floodplains, p. 10, Mitigation.*

- Work would be completed during the **late summer-early fall** at low water times such that any impact to the floodplain would be remediated by spring flows.

## RESPONSE TO COMMENTS

Responses are in bold italics.

1. **COMMENT:** The problem is that lake trout eat bull trout. Consider introducing a deep water food fish like cisco every year and give both the lake trout and bull trout something else to eat.

**RESPONSE:** *This alternative has been added as a text change on pp. 20-21 of the EA, under Alternatives Considered but Eliminated from Detailed Study.*

2. **COMMENT:** I question the use of helicopters, and it seems like they are being used more frequently these days.

*RESPONSE: Three helicopter trips are necessary to bring in equipment in order to improve the barrier as explained on page 18 of the EA. As stated on p. 32 under Cumulative Actions Scenario, Future Actions, the park closely manages the use of administrative flights and has determined that approximately fifty flights per year will not result in measurable effects to park resources (NPS 2003). Glacier National Park conducts an aviation meeting each year with park staff to review and approve or deny flight requests for park projects. Information from this meeting is used to combine flights and or find other ways to reduce the total number of administrative flights. If more than approximately 50 flights are required in a given year, an environmental assessment or impact statement is prepared. The helicopter flights for this project will be included in the park's 2012 administrative flight restrictions of approximately 50 park-wide flights. The park has been using this process to manage and control administrative helicopter flights since 1999. Since that time there has only been one year when administrative helicopter flights exceeded 50. An EA was prepared for the flights that year.*

3. COMMENT: If lake trout that are already in Quartz Lake cannot be removed, efforts would seem better spent elsewhere in the park. Consider directing efforts toward protecting the remaining native fish communities that remain intact.

*RESPONSE: The park is committed to protecting intact native fish communities throughout the park and is considering installing fish barriers in other waters. The Quartz Creek barrier will protect Quartz Lake but also will reduce the threat of lake trout accessing Cerulean Lake, one of the other lakes in the park that is not compromised by lake trout. Preventing additional lake trout from entering the upper Quartz system, combined with a successful lake trout suppression program, will prevent the lake trout population from increasing to the point that bull trout are displaced as the top level aquatic predator. A self-sustaining, functional bull trout population will maintain the overall ecological integrity of the native fish community in the upper Quartz drainage, which will provide a refugium for native fish whose habitat and survival are threatened by climate change.*

4. COMMENT: Consider measuring the success of the project.

*RESPONSE: NPS fisheries specialists will monitor the effectiveness of the barrier through periodic netting efforts to assess fish community structure in Quartz Lake, and through annual bull trout redd count surveys to monitor the strength of bull trout populations.*

## REFERENCES

National Park Service (NPS). 2003. Environmental assessment to conduct additional administrative helicopter and fixed wing flights in 2003. U. S. Department of the Interior, National Park Service, Glacier National Park, West Glacier, MT.

## Appendix – Non-Impairment Finding

National Park Service's *Management Policies* 2006 require analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values.

However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to pursue or restore the integrity of park resources or values and it cannot be further mitigated.

The park resources and values that are subject to the no-impairment standard include:

- the park's scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;
- appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and

- any additional attributes encompassed by the specific values and purposes for which the park was established.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. The NPS's threshold for considering whether there could be impairment is based on whether an action will have significant effects.

Impairment findings are not necessary for visitor use and experience, socioeconomics, public health and safety, environmental justice, land use, and park operations, because impairment findings relate back to park resources and values, and these impact areas are not generally considered park resources or values according to the Organic Act, and cannot be impaired in the same way that an action can impair park resources and values. After dismissing the above topics, topics remaining to be evaluated for impairment include fisheries and aquatic threatened species and species of concern, floodplains, recommended wilderness, and natural soundscapes.

Fundamental resources and values for Glacier National Park are identified in the 1999 *General Management Plan*. According to that document, all of the impact topics carried forward in this EA are necessary to fulfill specific purposes identified in the establishing legislation of the park; are key to the natural or cultural integrity of the park; and/or are identified as a goal in the park's *General Management Plan* or other relevant NPS planning document.

- **Fisheries/Aquatic Threatened Species and Species of Concern.** Short-term disturbances to the stream bed during implementation of this project will temporarily affect fisheries and aquatic threatened species and species of concern, resulting in negligible to minor adverse impacts. Although fisheries and aquatic threatened species and species of concern are a fundamental resource at the park, the preferred alternative will only result in negligible to minor, short-term, site-specific adverse impacts to fisheries and aquatic threatened species and species of concern; therefore, there will be no impairment to fisheries and aquatic threatened species and species of concern.
- **Floodplains.** The project will cause the localized redirection of some water into the channel during high water events, resulting in negligible to minor adverse impacts to floodplains. Although floodplains are a fundamental resource at the park, the preferred alternative will only result in negligible to minor, long-term, site-specific adverse impacts to floodplains; therefore, there will be no impairment to floodplains.
- **Recommended Wilderness.** The park's areas of recommended wilderness are key repositories of ecological and geological processes; provide essential habitat for the park's native flora and fauna; offer opportunities for solitude and recreation; and contain other features that contribute scientific, educational, scenic, or historical value to the wilderness landscape. Disturbances during the work period and the semi-permanent presence of a manmade structure on the landscape will result in minor adverse impacts to recommended wilderness. Although recommended wilderness is a fundamental resource at the park, the preferred alternative will only cause minor, short and long-term, site-specific and local adverse impacts to recommended wilderness; therefore, there will be no impairment to recommended wilderness.
- **Natural Soundscapes.** The park's natural soundscapes have intrinsic value as part of the unique environment of the park. Noise produced by mechanized equipment and tools and by helicopter flights will result in minor adverse impacts to natural soundscapes.

Although natural soundscapes are a fundamental resource at the park, the preferred alternative will only result in minor, short-term, site-specific and local adverse impacts to natural soundscapes; therefore, there will be no impairment to natural soundscapes.

In conclusion, as guided by this analysis, good science and scholarship, advice from subject matter experts and others who have relevant knowledge and experience, and the results of public involvement activities, it is the Superintendent's professional judgment that there will be no impairment of park resources and values from implementation of the preferred alternative.



National Park Service  
U.S. Department of the Interior

Glacier National Park  
Waterton-Glacier International Peace Park  
Montana



## STATEMENT OF FINDINGS FOR FLOODPLAINS

### *Quartz Creek Fish Barrier Modification and Improvement*

Glacier National Park, Montana

Recommended: Kym W. Dell  
ACTING FOR Chas Cartwright  
Superintendent, Glacier National Park

4/10/12  
Date

Concurred: Gary W. Rosenthal  
~~Bill Jackson~~ Chief, Water Resources Division

04/27/12  
Date

Approved: John Wessels  
for John Wessels  
Intermountain Regional Director  
National Park Service

5/8/12  
Date

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## INTRODUCTION

Glacier National Park (GNP) has prepared and made available an Environmental Assessment (EA) analyzing alternatives for improving and completing a fish passage barrier on Quartz Creek, approximately 100m downstream of Middle Quartz Lake. Construction on the structure was initiated in 2004 in order to prevent lake trout from colonizing the upper Quartz Lake system, a regional stronghold for both ESA listed bull trout as well as westslope cutthroat trout. However, lake trout were subsequently discovered upstream of the barrier construction site, and the project was not completed. In 2009, the NPS along with the US Geological Survey initiated a lake trout suppression program in Quartz Lake. The NPS is proposing to complete and improve the barrier in support of this effort. Completion of the barrier would make it more difficult for additional lake trout to enter the system and would reduce the likelihood of other non-native fish (i.e. rainbow and brook trout) to enter the system.

In addition, Executive Order 11988 ("Floodplain Management") requires the National Park Service and other agencies to evaluate the likely impacts of actions in floodplains. NPS Director's Order #77-2: Procedural Manual 77-2: Floodplain Management provides NPS policies and procedures for complying with EO 11988. This Statement of Findings (SOF) has been prepared in accordance with the NPS wetland and floodplain management procedures.

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## PROPOSED ACTION

Under the preferred alternative, the NPS would modify, improve, and complete the fish passage barrier in Quartz Creek approximately 100m below Middle Quartz Lake. The barrier would funnel flows through the center of the channel over a screen structure in order to prevent fish from swimming/jumping upstream through the area. This would generate peak estimated velocities in the center of the structure of approximately 12 feet per second for a 2-year recurrence interval flow event. The structure should eliminate upstream passage of fish during non-flood periods, and significantly reduce the likelihood of upstream passage during flood flows. Downstream passage of native fish would not be impeded. This project would entail the enhancement of an existing barrier structure extending across the floodplain and into the stream channel from both sides of the creek. This would direct more water through a narrow passage, increasing water velocities in the center of the channel. A heavy-duty steel or aluminum screen would be added to the structure and cantilevered over the channel in a downstream direction to block fish from swimming or jumping upstream through the center of the channel, while allowing debris or downstream migrating fish to pass over the screen. The barrier would consist of gabions (metal cages) filled with available rocks and boulders found on site (approximately 672 ft<sup>3</sup> of stone required). These porous structures would still allow some water to flow through the creek edges without allowing the passage of fish. Approximately, 28 gabions (each 2' x 2' x 6') would be installed. The structure will be raised approximately 1 to 2' over the existing condition. In addition, the project's location would continue to be advantageous due to naturally occurring boulders that would form part of the barrier. A small amount of excavation along the creek bank may be necessary to ensure no openings are left that fish could fit through. Large logs would be used to increase the height of the barrier across the floodplain, and also to raise the elevation of the barrier across the center of the structure where the screen would be installed. The logs would be obtained from a combination of downed and standing dead timber and live trees. Approximately 5 to 10 trees (approximately 250 linear feet of 12-24 inch dbh log)

should supply the necessary logs; downed timber would be collected first, followed by standing dead timber, and then live trees if necessary. The final barrier would be approximately 75'L x 6'W x 5'H. A downstream splash pad would be created using large rock, wood, or additional gabions to prevent jump pool development below the structure.

A temporary, inflatable bladder dam approximately 4 ft. high x 10 ft. wide x 80 ft. long may be used to temporarily dewater the work area during construction or a non-inflatable barrier may be used. A small bypass channel would be constructed around the work site and lined with plastic, and one or two small water pumps would be used to divert the water around the work area and/or inflate the bladder dam with creek water. The bladder dam or non-inflatable barrier would be removed after the work is completed.

Up to three helicopter flights would be required to haul the bladder dam, fish screen, generator, water pumps, rock drill, and other materials that cannot be packed into the work site and to remove equipment that cannot be packed out after the project is complete. Only small sized helicopters would be used, and equipment and materials would be transported and delivered to the work site as long-line sling loads. The work crew (estimated at 6) would hike in and camp in/near the patrol cabin on Quartz Lake or at the campground. Other equipment, supplies, and materials would be packed in to a trail location near head of Middle Quartz Lake and carried to the worksite. Some logs or brush may be cut or moved from off-trail areas to facilitate access from the Quartz Lake Trail to the worksite. The project would take approximately ten days to two weeks in late summer-early fall to complete. Work would begin no earlier than one hour after sunrise and would stop no later than one hour before sunset.



Figure 1. Existing conditions at barrier site.



## SITE DESCRIPTION

### Physical Setting

The project area is located in the North Fork of the Flathead River drainage in Glacier National Park (Figure 3). Quartz Creek drains a series of four glacially carved lakes before entering the North Fork of the Flathead River approximately five miles south of Polebridge, Montana. Middle Quartz, Quartz, and Cerulean lakes are found upstream of the proposed barrier site. Lower Quartz Lake is located approximately one mile downstream of the barrier site. NPS infrastructure in the drainage downstream of the project site is limited and consists of a footbridge and small backcountry campground near the outlet of Lower Quartz Lake, as well as the Quartz Creek Campground and the bridge along the Inside North Fork Road over Quartz Creek, both located approximately seven miles downstream of the outlet of Lower Quartz Lake.

Middle Quartz Lake is 47 acres in size and has a maximum depth of 41 feet. Quartz Lake has a surface area of 869 acres and a maximum depth of 273 feet. The upper-most lake, Cerulean Lake, is 49 acres in size and has a maximum depth of 118 feet. Quartz Creek flows approximately 8.8 miles from the outlet of Lower Quartz Lake to the confluence with the North Fork Flathead River south of Polebridge. The existing fish exclusion barrier is located at the upper end of a confined valley type characterized by steep valley walls, a narrow valley bottom, and coarse bed sediments derived from glacial and fluvial processes. The site was chosen due to its physical setting as well as for its accessibility. The stream channel through the project area has been classified as a Rosgen B2 channel type. Bankfull width ranges from 50-60', the average channel slope is 4-5%, and the D50 of the channel bed is 300 mm (River Design Group 2009).

### Fisheries

Native species in the Quartz Creek drainage include bull trout, a federally listed threatened species; westslope cutthroat trout, a Montana Species of Special Concern; mountain whitefish; longnose sucker; largescale sucker; sculpin; and reidside shiner. The only known nonnative fish is lake trout, which were documented in Quartz Lake in 2005. A single westslope / rainbow trout hybrid was captured upstream of the project site in Cerulean Lake in 2004.

### Hydrology

Hydrology in the Quartz Creek basin is snowmelt driven with peak flows typically occurring between April and June, although mid-winter rain-on-snow events can occur and produce floods of significant magnitude. For design and evaluation purposes, a flood frequency analysis was conducted for the Quartz Creek watershed (Table 1). The analysis was performed based on methods outlined in the United States Geological Survey Water Resources Investigations Report 03-4308. Contributing drainage area was estimated at 24.8 mi<sup>2</sup>, mean (weighted) annual precipitation was estimated at 75.7 inches, and a mean watershed elevation of 6,151 ft. was used in the analysis (River Design Group 2009).

Table 1. Flood frequency analysis results for the Upper Quartz Creek watershed (River Design Group 2009).

Recurrence interval (years)	Discharge (cfs)
2	770
10	1,232
50	2,250
100	3,150



National Park Service  
U.S. Department of the Interior  
Glacier National Park  
Montana

# Quartz Creek Fish Barrier Modification and Improvement Environmental Assessment Project Area

December 2011

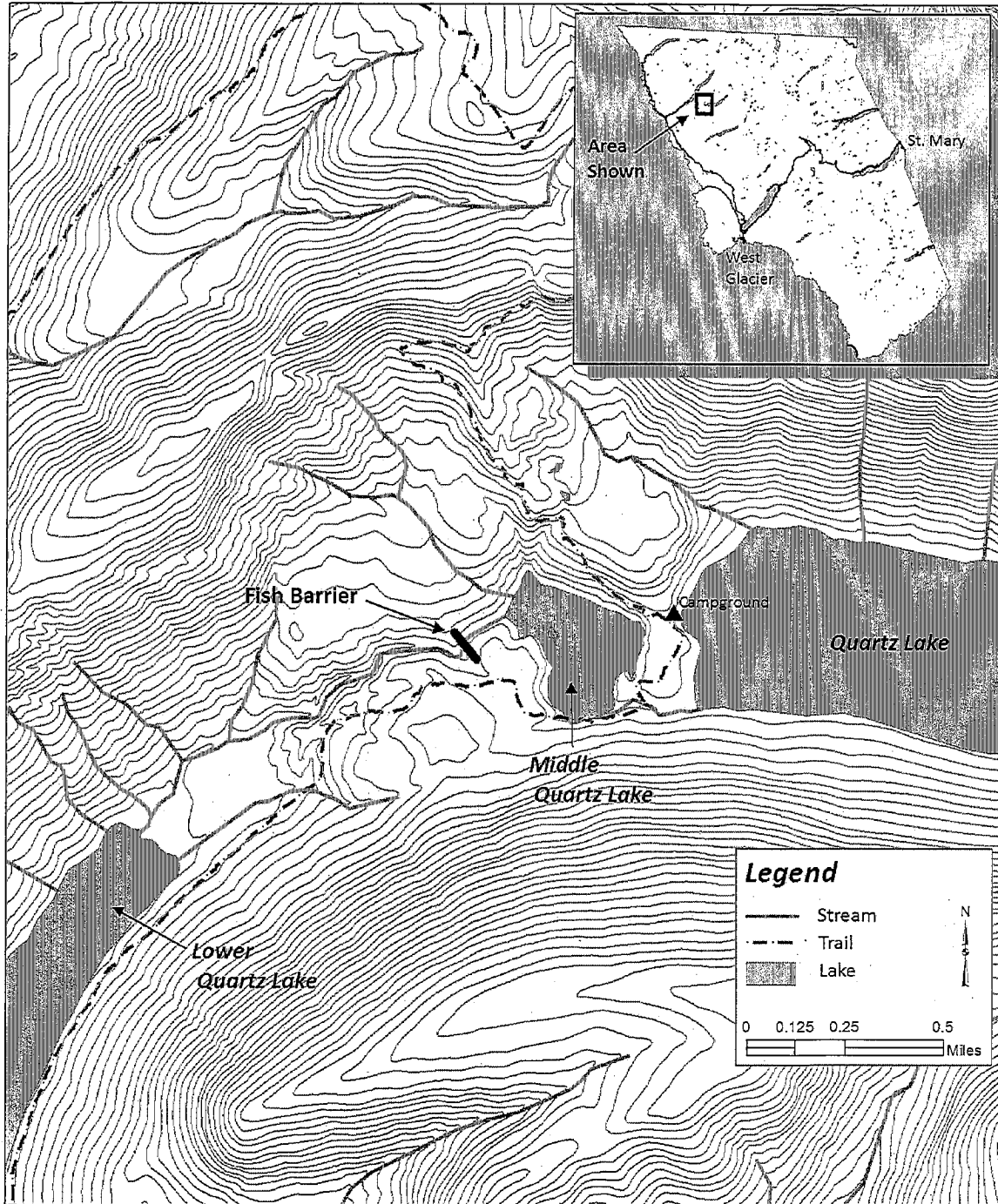


Figure 3. Map of Quartz Creek fish passage barrier location, Glacier National Park, Montana.

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## JUSTIFICATION FOR USE OF THE FLOODPLAIN

By nature of the intent of the project (fish passage barrier), the structure must be located in the floodplain. In addition, in order to construct a reasonably effective fish passage barrier, the structure must extend out onto the floodplain. The structure was designed to balance effectiveness, constructability, wilderness values, and resource impacts. As designed, it would have negligible to minor impacts to floodplains, in a very localized area of Quartz Creek. At most, the structure would impact floodplain function over perhaps 200' of stream channel out of an estimated 45,000 feet of stream channel, extending from the project area downstream to the bottom of the drainage.

In practice the structure would funnel water to the center of the channel over a screen that would prevent fish from passing upstream during most flows. During flows in excess of bankfull, some water that would normally be up on the floodplain would be directed back into the channel due to the presence of the 3-4' tall gabion structure extending out onto the floodplain. However, immediately downstream of the structure, the stream would have unimpeded access to the floodplain once again. No floodplain dikes or similar water control structures would be involved in this project. Hydraulic model results indicate that both the existing and proposed structures would be overtopped with a 2-year recurrence interval flow, which is similar to the typical bankfull flow for the stream (Tables 2 and 3, Figures 4 and 5). Hydraulic conditions on the floodplain may be slightly different due to the new height of the floodplain sill (an additional 1-2'), but access to the floodplain would essentially be similar under existing and proposed conditions. Under both conditions, the stream has access to its floodplain through the project area. In addition, a splash pad would be constructed on the downstream side of the structure to reduce any erosion potential.

Table 2. HEC-RAS model output for Quartz Creek barrier project site under existing conditions.

Flow Recurrence Interval	Discharge (cfs)	Water Surface Elevation (ft.)	Average Channel velocity (fps)	Maximum channel velocity (fps)
2-year	770	1003.0	5.3	6.5
50-year	2,250	1005.4	8.4	9.6
100-year	3,150	1006.4	9.7	10.9



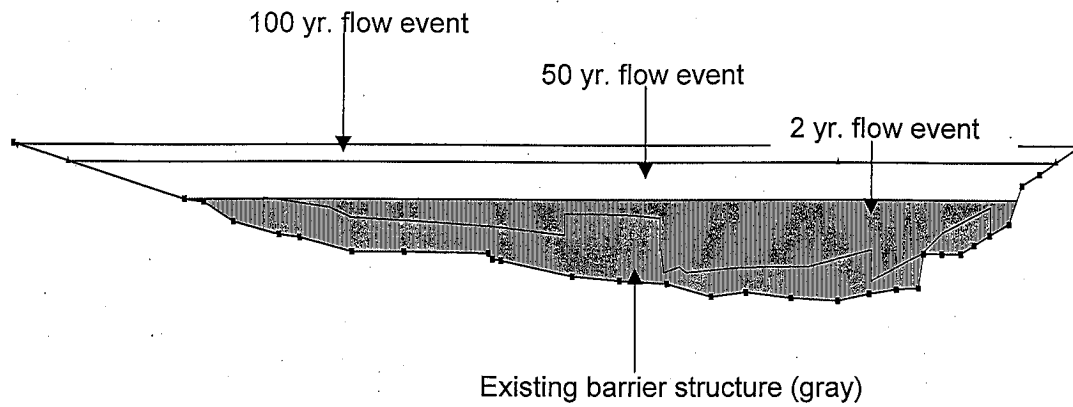


Figure 4. HEC-RAS modeled cross section of water surface elevations for existing barrier site conditions.

Table 3. HEC-RAS model output for Quartz Creek barrier project site under proposed conditions.

Flow Recurrence Interval	Discharge (cfs)	Water Surface Elevation (ft.)	Average Channel velocity (fps)	Maximum channel velocity (fps)
2-year	770	1004.9	8.5	11.9
50-year	2,250	1007.0	11.8	16.9
100-year	3,150	1007.9	13.2	18.6

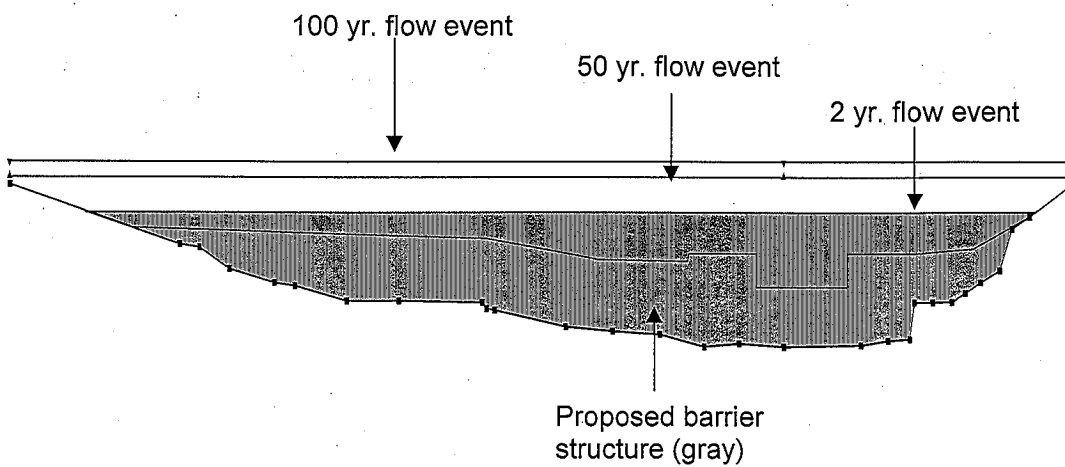


Figure 5. HEC-RAS modeled cross section water surface elevations for proposed barrier site conditions.

## INVESTIGATION OF ALTERNATIVE SITES

Prior to initiation of construction of the existing barrier in 2004, an alternative location to construct the barrier was considered. Locating the barrier below Lower Quartz Lake was considered but rejected due to the size, depth, and topography of Quartz Creek below the lower lake. The existing barrier site was selected due to topography, as well as biological and logistical considerations. The site has already been substantially modified by the partial construction of a barrier, and the reasonable and prudent course of action is to proceed with completion of the barrier in its current location.

Such a barrier is not necessarily a permanent fixture on the landscape, and could be removed in the future if the NPS determined the barrier is no longer needed.

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## SITE-SPECIFIC FLOOD RISK

The November 2006 flood exceeded the 100-year flood levels, and the park must take into consideration all reasonable scenarios as weather patterns might become more sporadic and severe. During high-water events, water would access the floodplain and flow over or around the structure. There are no site-specific flood risks, as the project is located in the backcountry and well away from any developed areas. Any flood risk associated with potential structure failure would be attenuated immediately downstream of the structure in Lower Quartz Lake.

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## MITIGATION

Actions proposed in the floodplain would not affect the flood storage capacity of the floodplain. The natural floodplain value would not be reduced but slight alterations would be expected. Alterations would not influence the overall dynamics of the floodplain. The remote backcountry project location would further minimize potential hazards to human life and property.

- The project is located about one mile upstream of Lower Quartz Lake. Any risk associated with flooding would be attenuated in the lake. There are no structures or other developments between the project site and Lower Quartz Lake.
- Work would be completed during the late summer-early fall at low water times such that any impact to the floodplain would be remediated by spring flows.

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## SUMMARY

The preferred alternative was designed to achieve project objectives, considering the wilderness and floodplain values of the area, as well as construction limitations. Despite occupying a small part of the stream's floodplain, it would largely allow normal floodplain function while reducing the ability of fish to pass upstream past the structure. Due to the nature of the project (fish passage barrier), placement of the structure in the floodplain is unavoidable.

Therefore the NPS finds this proposed action is consistent with the policies and procedures of NPS Director's Order #77-2: Procedural Manual 77-2: Floodplain Management, which provides NPS policies and procedures for complying with Executive Order 11988.

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## REFERENCES

Atkins. 2011. Final design plan set for modifications to the Quartz Creek fish passage structure. Report to the NPS from the Atkins engineering and design consulting firm, Bozeman, MT.

National Park Service (NPS). 2003. United States Department of Interior. 2003. Director's Order 77-2. Floodplain Management. Washington D.C.

River Design Group, Inc. 2009. Quartz Creek fish exclusion barrier project conceptual design alternatives report. Whitefish, Montana.

