Crown of the Continent
Research Learning Center

National Park Service
U.S. Department of the Interior

Glacier National Park

# Resource Hot Topics

# Saving Glacier's Native Fish

## Threats to Aquatic Species and Habitats

Glacier's native fish populations are facing severe threats on several fronts. Introduced species are undermining the health of native aquatic ecosystems through predation, hybridization, and competition for resources. Global climate change is affecting Glacier National Park's aquatic species as alpine glaciers disappear, streams become warmer, and precipitation and runoff patterns change. The delicately balanced ecosystem that has supported bull trout, westslope cutthroat trout, and other aquatic organisms for thousands of years is facing unprecedented changes leading to unknown ecological consequences for many species. In response to these threats, preservation efforts have shifted toward adaptive management strategies (see box on page 2) to reduce these possible negative impacts on aquatic species in the Crown of the Continent.


Gill netting operations performed at Quartz Lake to remove non-native lake trout (above left) are aimed at preserving native bull trout populations.

### The Battle for Bull Trout

Lake trout, which migrated to Glacier's waters after their introduction to Flathead Lake in the early 1900s, adversely affected native bull trout through predation and over-competition for habitat. Non-native brook trout, stocked in Glacier's waters as early as 1914, weakened bull trout populations through hybridization and competition for food and habitat. According to the US Fish and Wildlife Service, bull trout, once abundant in the Columbia River basin, now occur in less than half their historic range. Glacier's western waters constitute an important stronghold for the species, which received federally-threatened designation in 1998 under the Endangered Species Act.

Glacier and the nearby Blackfeet Indian Reservation support the only bull trout populations east of the continental divide in the US. While these numbers appear to be stable, redd counts (monitoring of spawning nests) have shown mixed results on the west side, where only five of the 17 lakes known to contain bull trout are seen as secure from non-native species. In another four west-side lakes, lake trout have replaced bull trout as the dominant aquatic predator, threatening the native fish with functional extinction.

Until lake trout were discovered there in 2005, Glacier's Quartz Lake was the largest natural lake supporting bull trout within the Columbia River drainage without non-native species. The park, in cooperation with the US Fish and Wildlife Service, began construction of a fish barrier on Quartz Creek in 2004 to hinder the influx of non-natives. Work on the barrier was curtailed, however, when lake trout were later discovered there.

Bull trout protection efforts at Quartz Lake have recently shifted toward developing removal methods for invasive lake trout. Park officials are working with US Geological Survey (USGS) staff on an experimental project using radio telemetry

to track adult lake trout to spawning areas where gill nets are used to capture and remove them. In addition, the fish barrier project is being resumed and anticipated to be completed in 2012, helping to reduce the numbers of non-native fish entering Quartz Lake.

"The goal of the experiemental project is to develop effective methods to remove lake trout from Quartz Lake without harming native fish in order to preserve the native fish community for the long term," explained Chris Downs, Glacier's Fisheries Biologist. "If lake trout eradication does not prove feasible, it may lead us to a program of suppression to keep lake trout levels low enough to preserve viable native fish populations."

## Invasive Species: Looming Threats to Native Fish

Glacier's native fish also face potential threats from other aquatic invasive species (AIS), some of which are already present in other Montana waters. Zebra and Quagga mussels, fingernail-size freshwater mollusks, are adept at removing large amounts of phytoplankton from the water, thereby reducing the availability of food for zooplankton and, ultimately, native fish. New Zealand mud snails out-compete native snails and other native invertebrates for food and space, causing their decline. Non-native plant species, particularly Eurasian watermilfoil and purple loosestrife, disrupt water flow, alter habitat, and crowd out other native plants. These aquatic invaders can change how native plants and animals use aquatic systems and impact human use, as well. Introduction of additional aquatic invasive species into park or other regional waters has significant implications not only for native ecosystems, but also for the region's tourism-based economy and local hydropower resources.

## Management Strategy

In addition to direct removal of non-native fish species, Glacier is considering addtional projects to protect habitat from colonization by non-native species as well as establishing new populations of threatened native fish species where they are secure from invasion by non-natives. Fishing and boating regulations have also been modified to protect native species. Park managers have recently taken proactive steps to educate the public on ways to reduce the risk of the unintentional introduction of AIS. A pilot prevention program was initiated in 2010 to provide free AIS inspections for motorized watercraft entering the park, with "clean, drained and dry" boats receiving 14-day launch permits. This program has been enhanced in 2011, requiring inspections of all motorized or trailered watercraft upon each entry into the park. Boats with internal ballast tanks or other enclosed compartments that can't be inspected will be prohibited from launching, while any craft found to contain AIS may be quarantined until it has been properly decontaminated. All boat owners are strongly encouraged to thoroughly clean their boats and trailers, as well as wading and fishing equipment, before their arrival in the park.

In addition to non-native species, climate change looms as a threat to native aquatic ecosystems. As glaciers melt, stream temperatures rise, and precipitation and runoff patterns are altered, sensitive species will be forced to adapt or be lost from the park. For example, some rare alpine invertebrate species with very specific habitat requirements and limited dispersal abilities may be less able to cope with these changes over the long term than more mobile or broadly distributed fish species.

Chris Downs notes that efforts to suppress non-native fish and protect habitats, such as Quartz Lake, are aimed at providing a better chance for bull trout, and other Crown of the Continent species facing a changing climate, to survive.

"We need to understand the potential impacts of climate change, and work to improve resiliency of native fish by improving or protecting other parts of the system for them," he said.

While Glacier's native fish may not have the high-profile presence of fauna such as grizzly bears or mountain goats, they play an important part in the biodiversity, so treasured and protected, in Glacier. Pursuing policies directed at sustaining the integrity of the park's native fish, along with the lakes, rivers, and streams in which they thrive, will fulfill the park's mandate to "preserve and protect" its resources as well as maintain the heritage enjoyed by those who use Glacier's waters for fishing and recreation.

## What is Adaptive Resource Management?

Adaptive Resource Management (ARM) is a system that treats management policies as experiments to test the responses of ecosystems. It recognizes that:

1. Our knowledge of resource systems is imperfect.
2. Constant monitoring is necessary in order to better understand our changing environment.
3. We must continually learn from results and alter our preservation strategies as critical knowledge increases.

ARM works to maintain ecological resilience by helping species to better react to stresses. It is a tool that can be used not only to change a system, but also to learn more about the system under study.

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### Resources For More Information

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Documents and web sites
Glacier National Park Fisheries Inventory and Monitoring Bi-Annual Report: 2009-21=010
http://inpglacsrv3/Resources/Shared%20Documents/Fisheries%20Water%20Air/FishReport.pdf

Action Plan to Conserve Bull Trout in Glacier National Park, Montana
http://www.fws.gov/montanafieldoffice/Fisheries_Research/Fisheries_Files/Fredenberg_et_al_2007_GNP_Action%20Plan.pdf

Clint Muhlfeld's USGS website
http://www.nrmsc.usgs.gov/staff/muhlfeld

US Fish And Wildlife Montana website
http://www.fws.gov/montanafieldoffice