Yellowstone Fisheries & Aquatic Sciences

Annual Report 2009–2010

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Yellowstone cutthroat trout

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National Park Service
Yellowstone Center for Resources
Yellowstone National Park, Wyoming
YCR-2011-11

Suggested citation:
Koel, T. M., J. L. Arnold, P. E. Bigelow, P. D. Doepke, B. D. Ertel, and M. E. Ruhl. 2012. Yellowstone Fisheries & Aquatic Sciences: Annual Report, 2009–2010. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2011-11.

Title page art courtesy Mimi Matsuda.
Front cover captions (left to right): Hickey Brothers Fisheries, LLC setting trap nets on Yellowstone Lake; University of North Texas graduate student Joe Skorupski, and fisheries technician Derek Rupert, sampling invertebrates on Specimen Creek (photo by J. Arnold); Fisheries technician Phil Doepke with lake trout removed from Yellowstone Lake.
Back cover captions (left to right): NPS Hammerhead on Yellowstone Lake (credit T. Koel); Public scoping meeting for Native Fish Conservation Plan (photo by NPS); Fisheries technician Kate Olsen and supervisory fisheries biologist Todd Koel stocking westslope cutthroat trout eggs.
Background: Moonlight on Yellowstone Lake (NPS photo by J. Schmidt, 1977).
Opposite page: Grayling Creek (photo by Allison Klein).

Note: Native fishes shown out of water were not injured.

Contents

NPS/A. KLEIN

Grayling Creek.

Background

When Yellowstone National Park was established in 1872, it was the only wildland under active federal management. Early visitors fished and hunted for subsistence, as there were almost no visitor services. Fish were viewed as resources to be used by sport anglers and provide park visitors with fresh meals. Fish-eating wildlife, such as bears, ospreys, otters, and pelicans, were regarded as a nuisance, and many were destroyed as a result (Varley and Schullery 1998).

To supplement fishing and counteract "destructive" consumption by wildlife, a fish "planting" program was established. Early park superintendents noted that many of the park's waters were fishless and asked the US Fish Commission to "see that all waters are stocked so that the pleasure seeker can enjoy fine fishing within a few rods of any hotel or camp" (Boutelle 1889). The first fishes from outside the park were planted in 1889–1890, and included brook trout (*Salvelinus fontinalis*) in the upper Firehole River, rainbow trout (*Oncorhynchus mykiss*) in the upper Gibbon River, and brown trout (*Salmo trutta*) and lake trout (*Salvelinus namaycush*) in Lewis and Shoshone lakes (Varley 1981). The harvest-oriented fish management program accounted for planting more than 310 million native and nonnative fish in Yellowstone between 1881 and 1955. In addition, from 1889 to 1956, 818 million eggs were stripped from the cutthroat trout of Yellowstone Lake and shipped to locations throughout the United States (Varley 1979).

Largely because of these activities and the popularity of Yellowstone's fisheries, recreational angling became an accepted use of national parks throughout the country. In Yellowstone, fisheries management, as the term is understood today, began with the US Army, and was taken over by the National Park Service (NPS) in 1916. Fish stocking, data gathering, and other monitoring activities initiated by the US Fish Commission in 1889 were continued by the US Fish and Wildlife Service until 1996, when they became the responsibility of the NPS.

The stocking of nonnative fishes by park managers has had profound ecological consequences. The more serious of these include displacement of intolerant natives such as westslope cutthroat trout (*O. clarkii lewisi*) and Arctic grayling (*Thymallus arcticus*); hybridization of Yellowstone (*O. c. bouvieri*) and westslope cutthroat trout with each other and with nonnative rainbow trout; and predation of Yellowstone cutthroat trout by nonnative lake trout. Over the years,

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Planting fish in the Bechler River 1936.

NPS management policies have changed to reflect new ecological insights (Leopold et al. 1963). Subsistence use and harvest orientation once guided fisheries management. Now, maintenance of natural biotic associations or, where possible, restoration to pre-Euro-American conditions have emerged as primary goals. Eighteen fish species or subspecies are known to exist in Yellowstone National Park; 13 are considered native (they were known to exist in park waters prior to Euro-American settlement), and 5 were introduced (nonnative or exotic; see Appendix i) (Varley and Schullery 1998). In addition, approximately 48% of Yellowstone's waters were once fishless (Jordan 1891).

A perceived conflict exists in the NPS mandate to protect and preserve pristine natural systems and provide for public use and enjoyment (NPS 2006). Fisheries management efforts in Yellowstone are currently focused on preservation of native species while allowing use of these fisheries by anglers through a catch-and-release requirement. Because the primary mission of Yellowstone's Fisheries and Aquatic Sciences Program (Fisheries Program) is the preservation of natural ecosystems and ecosystem processes, it does not emphasize maintenance of nonnative fish stocks. In fact, harvest regulations have been liberalized to encourage anglers to keep nonnative trout caught in waters where they are harming native cutthroat trout or Arctic grayling. Fisheries Program activities are focused almost exclusively on the preservation of Yellowstone Lake cutthroat trout, the restoration of fluvial (stream-resident) populations of native trout, and the research and monitoring needed to support these critical activities.

2009–2010 Summary


NPS/T. KOEL

Arnica fire near Bridge Bay, Yellowstone Lake in 2009.


NPS/T. KOEL

Hickey Brothers Fisheries, LLC setting a large deep water entrapment net to remove lake trout from Yellowstone Lake in 2010.

Following guidance from an August 2008 scientific panel review of the cutthroat trout conservation program on Yellowstone Lake, the fisheries team moved quickly into a contracting process to incorporate private sector lake trout netters. Under a pilot study, contracts were awarded to Hickey Brothers Fisheries, LLC to assist on Yellowstone Lake by gillnetting (2009–2010) and live entrapment netting (2010). The pilot efforts proved very successful. Contract netters contributed to the increased numbers of lake trout removed in recent years, and impacts to other resources in the lake area were low. In particular, the work demonstrated that large adult lake trout could be removed from shallow water habitats where they co-exist with cutthroat trout. Live entrapment gear, such as trap nets, allow for most cutthroat trout to be released without harm. Additionally, fishing gill nets for a short duration (typically one night) in waters expected to have a high Yellowstone cutthroat trout bycatch, enabled release of many of these fish alive. These pilot efforts laid the groundwork for long-term incorporation of private sector netters into the suppression program.

The need to undertake aggressive conservation actions to restore Yellowstone Lake, and other streams, rivers, and lakes resulted in the development of a programmatic Native Fish Conservation Plan/ Environmental Assessment (EA) for Yellowstone National Park. Public scoping in April 2010 included four open-house meetings in Montana (Bozeman and West Yellowstone) and Wyoming (Cody and Jackson). The impacts of four alternatives were analyzed and included in a document made available for public comment during a 45-day period beginning on December 16, 2010. The EA provides guidance and an adaptive management framework for making decisions regarding fisheries and aquatic resources conservation over the coming decades. Actions are included to reduce the lake trout population in Yellowstone Lake through full incorporation of contracted netters; recover the abundance of Yellowstone cutthroat trout in the lake and maintain their access to lake tributaries for spawning; reconstruct the Clear Creek weir and fish trap; and restore Arctic grayling, Yellowstone cutthroat trout, and westslope cutthroat trout in several drainages throughout the park.

Since their initial discovery in 1994, over 600,000 lake trout have been removed by our suppression efforts, including 100,756 and 146,671 lake trout in 2009 and 2010, respectively, by far the highest annual numbers on record. However, the catch of lake trout in each net set (catch-per-unit-effort) has steadily increased each year. This trend is serious cause for concern and suggests that the lake trout population continues to expand.

Indices of abundance suggest that the cutthroat trout spawning population of Yellowstone Lake has yet to demonstrate a significant positive response to our lake trout suppression efforts. The weir and fish trap at Clear Creek failed during spring flood flows in 2008, precluding further annual assessments of upstream-migrating cutthroat trout. However, conceptual designs have been developed for reconstruction of the structure in the near future. Cutthroat trout abundance has also

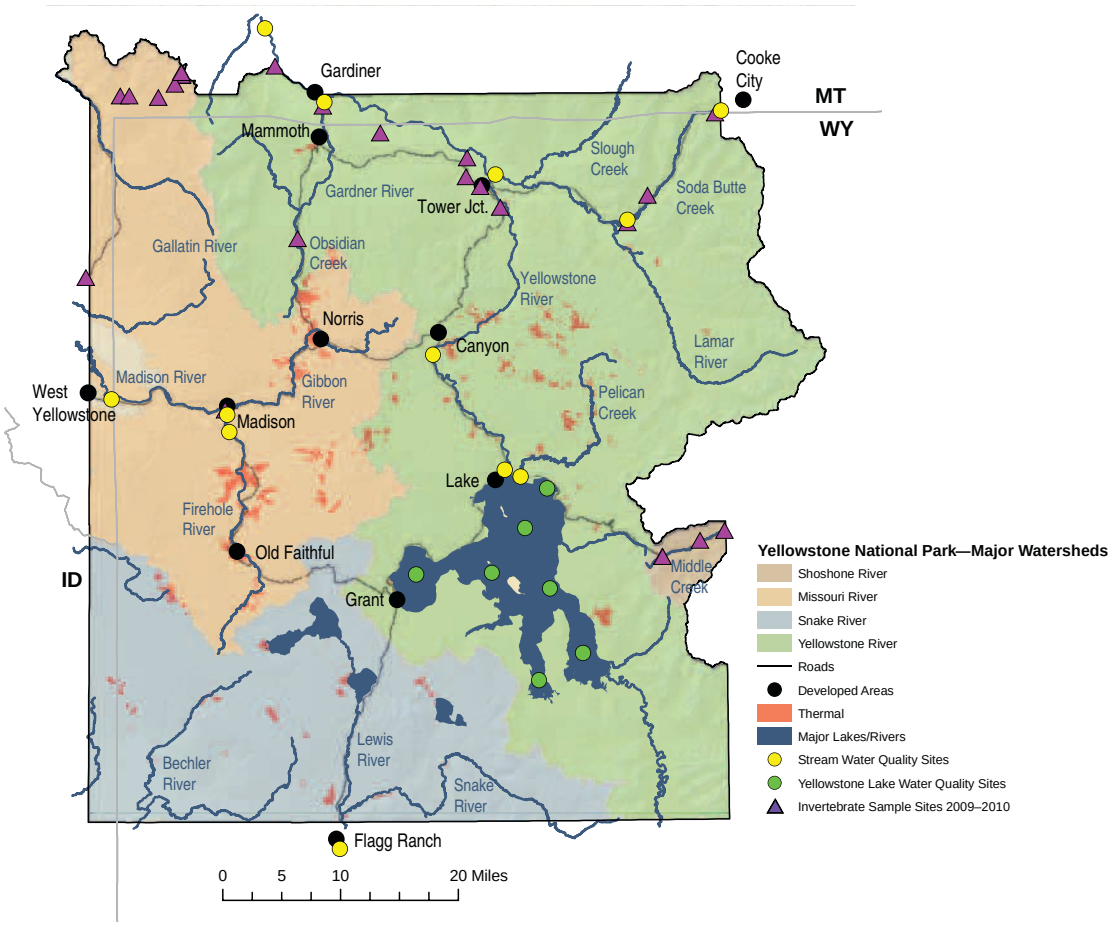

Figure 1. Major watersheds and surface waters of Yellowstone National Park, with sites established for long-term water quality monitoring on streams (12 sites:yellow circles) and Yellowstone Lake (7 sites:green circles). Areas sampled for aquatic invertebrates in 2009–2010 (22 sites:purple triangles) are also shown.

been monitored annually by a fall netting assessment at 11 sites across Yellowstone Lake. In 2009, the average catch per net was 9.5 cutthroat trout, however, in 2010 it was only 5.3, the lowest observed since 1977.

Westslope cutthroat trout recovery efforts focused on East Fork Specimen Creek during 2009 and 2010. Following a successful round of piscicide treatments in 2008, the same treatments were applied again in 2009. Following the two years of treatments and monitoring, the East Fork Specimen Creek was considered free of nonnative fish and restocking efforts proceeded in 2010. Over 4,500 eggs from Geode Creek were placed in remote site incubators throughout the drainage, resulting in the introduction of thousands of fry.

The ecological health of the park's aquatic systems continues to be monitored. The quality of the surface waters is monitored monthly at twelve fixed sites near the confluences of major streams and rivers (fig. 1). The physical and chemical characteristics of Yellowstone Lake are monitored seasonally. Emphasis continues to be placed on the assessment of potential impacts of rotenone on non-target species (amphibians and aquatic invertebrates) during native fish restoration projects.

The Fly Fishing Volunteer Program continues to be an integral mechanism for communicating information and raising public awareness of issues facing Yellowstone's native fishes. Throughout the 2009 and 2010 field seasons, 162 volunteers participated in the program for a total of 3,957 hours. They assisted with the Specimen Creek westslope cutthroat trout restoration and collection of genetic samples from trout in order to document potential introgressions, especially in the Lamar River, Slough Creek, Soda Butte Creek, and Trout Lake. Also, by marking trout, the volunteers are assessing the effectiveness of existing waterfalls and cascades for restricting upstream movement of trout in several streams. This information has been instrumental in guiding native trout restoration in Yellowstone.

The Fisheries Program

Native Fish Conservation Plan

In order to implement aggressive actions that will ensure recovery of native fish and restore natural ecosystem function, a Native Fish Conservation Plan/ Environmental Assessment (EA) was completed and made available for review and comment on December 16, 2010, concluding a year-long internal planning and public participation process. The EA proposes to conserve native fish from threats of nonnative species, disease, and climate-induced environmental change, and it provides guidance and an adaptive framework for managing fisheries and aquatic resources over the next two decades.

The EA recommends addressing the issues by implementing large scale removal of lake trout on Yellowstone Lake via NPS netting crews and the incorporation of private sector, contract netters. It describes in detail the development of benchmarks for lake trout suppression and an adaptive management strategy for actions on Yellowstone Lake and in streams and lakes elsewhere across the park and calls for the development and implementation of robust monitoring and continued scientific review through collaboration with partners.

NPS/B. KLEIN

The interdisciplinary team for development of the Native Fish Conservation Plan/Environmental Assessment included compliance specialists and representatives from all park divisions.

NPS/B. KLEIN

Seasonal staff, such as National Park Service Biological Science Technician Kate Olsen (right), comprise a majority of the workforce for completing native fish conservation actions each year.

NPS/C. BARKER

A native fish restoration field team hiking to a remote reach of upper Grayling Creek, 2009.

Preservation of Yellowstone Lake Cutthroat Trout

JAY FLEMING

Spawning Cutthroat at Clear Creek

The Yellowstone Lake cutthroat trout population is the largest remaining, genetically unaltered population of Yellowstone cutthroat trout (YCT) in the world (Behnke 2002). However, impacts from nonnative lake trout, whirling disease, and extended drought (late 1990s–mid 2000s) have driven this population into decline. The number of upstream migrating cutthroat trout in Clear Creek (fig. 2) declined from 54,928 in 1988 to just 538 in 2007 (fig. 3) and mean total length of upstream migrants increased from 393 mm to 523 mm during the same period. The apparent lack of recruitment and the aging spawning population indicate that this population is at serious risk of extirpation. Unfortunately, high run-off in 2008 damaged the Clear Creek fish weir and trap, rendering it inoperable in 2009 and 2010. The fisheries team is implementing plans to restore the monitoring of YCT spawning at Clear Creek.

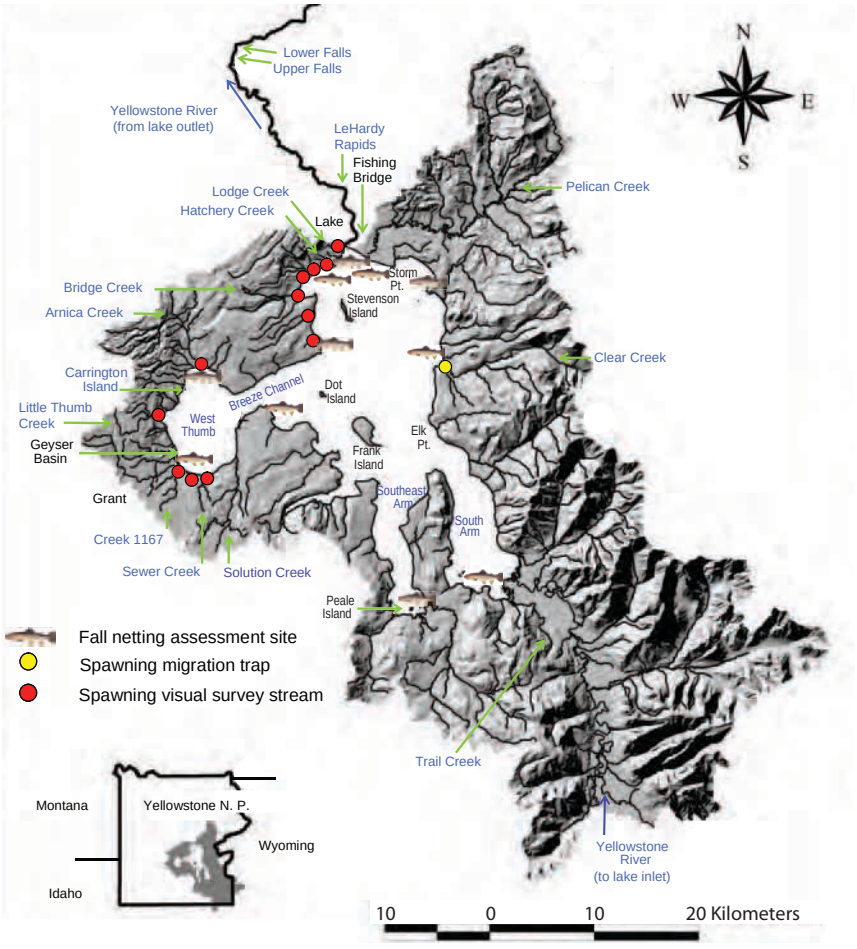

Figure 2. Yellowstone Lake and several major tributary drainages within Yellowstone National Park.