2023 Sport Fish Restoration Project Award – Sport Fishery Development and Management

Project Title: Management of Bonneville Cutthroat Trout in Bear Lake, Idaho

Contact: Joe Kozfkay, State Fisheries Manager, Idaho Department of Fish and Game
Joe.kozfkay@idfg.idaho.gov (208) 287-2777

Need:

Bonneville Cutthroat Trout (BCT) are native to the ancient Bonneville Basin and occur in portions of Idaho, Nevada, Utah, Wyoming, and Utah. This sub-species of cutthroat trout has faced significant declines, was petitioned for ESA-listing in 1998, and is currently a "species of greatest conservation need" in both Utah and Idaho. One the most important populations of BCT occurs within Bear Lake, covering over 70,000 acres and spanning the Utah and Idaho borders. The lake supports Idaho's only adfluvial population of BCT, as well as four endemic species including Bear Lake Whitefish, Bonneville Cisco, Bonneville Whitefish, and Bear Lake Sculpin.

Bonneville Cutthroat Trout began to decline soon after the arrival of European settlers to the Bonneville Basin in the early 1900's. Habitat loss and fragmentation associated with agriculture, grazing and hydropower development combined with overfishing and introductions of non-native salmonids drove BCT near extinction. By the 1950s, the Bear Lake population was considered extirpated, and fishery managers decided hatchery supplementation was needed to sustain the population. During this time, production of wild-origin BCT was minimal. By 1998, all harvest of wild-origin BCT was closed, limiting the sport fishery to only hatchery trout. Important spawning and rearing tributaries to Bear Lake were disconnected by a network of irrigation diversions dams and culverts, blocking much of the natal spawning and rearing habitat needed to sustain wild populations. In addition, non-native Brook and Rainbow trout were common in tributaries, exacerbating impacts to BCT. In the early 2000s, conservation priorities and societal values began to shift. A coalition of local stakeholders and landowners and fishery managers decided it was time to bring back wild BCT to Bear Lake.

Objectives:

- Increase abundance of wild-origin BCT in Bear Lake by restoring tributary connectivity, improving habitat, and reducing non-native trout
- Describe the life history and population rate functions of this unique adfluvial population
- Restore sport fishing harvest opportunities on wild-origin Cutthroat Trout and reduce dependence on hatchery supplementation.

Procedures

Over the past 20+ years, the Idaho Department of Fish and Game – working with an extensive range of partners – implemented stepwise series projects to increase BCT population in Bear Lake. This approach combined tributary habitat restoration, fish passage improvements, irrigation fish screens, non-native trout removal and fishery research projects.

In 2002, a local working group was established to develop a restoration plan for BCT in Saint Charles and Fish Haven creeks – two of the lake's most important spawning tributaries. The working group includes irrigation company representatives, local politicians, private landowners, and government agency biologists. Screening irrigation diversions and improving upstream fish passage were identified as priorities. Idaho Fish and Game, working in coordination with this user working group, Trout Unlimited, and the USFWS, screened multiple diversions in Fish Haven and St. Charles creeks to enhance fish passage and limit entrainment losses, improving survival for BCT emigrating to Bear Lake. Additionally, the USFWS constructed dikes in the Bear Lake Refuge to isolate a branch of St. Charles Creek to prevent Cutthroat Trout from being lost into Mud Lake and the Bear River.

Until recently, Fish Haven Creek flowed through a concrete flume under State Highway 89. The high velocities across the structure prohibited BCT migration from Bear Lake into Fish Haven Creek. Idaho Fish and Game replaced the structure with a fish-friendly design, reconnecting this natal spawning tributary to Bear Lake. The barrier removal was coupled with chemical renovation in 2009 to remove nonnative Rainbow and Brook trout in the system. To date, Fish Haven Creek is absent of nonnative salmonids.

In 2019-2020, Fish and Game funded studies by the University of Idaho to compile a comprehensive assessment of the life history of migratory BCT in these tributaries. The study used a combination of systematic electrofishing, extensive habitat surveys and PIT-tag arrays, to understand both biotic and habitat factors contribution to abundance, distribution, abundance, migration patterns, and survival of adfluvial BCT in three of Bear Lake's major tributaries. Next, this study then evaluated the population dynamics of Bear Lake BCT to model potential changes in fishing regulations to evaluate the potential to support harvest of wild-origin fish. Using multiple years of gill netting data and length/age analysis, a series of Beverton-Holt models evaluated the Bear Lake population's potential to sustain any additional harvest.

Results

Extensive coordinated conservation efforts between federal, state, tribal, non-profits and private companies and landowners have significantly improved BCT population in Bear Lake. Over 30 fish screens on 10 different streams are now in place on irrigation diversions, while 3,800 acres has been protected in conservation easements. Removal of nonnative Rainbow Trout and Brook Trout from Fish Haven Creek has improved productivity of BCT. Redd surveys completed in Fish Haven Creek after the barrier removal project show that hundreds of adfluvial BCT are now spawning in this tributary, and more juvenile migrants are reaching Bear Lake.

In the early 2000s, the population of BCT in Bear Lake was almost exclusively made up of hatchery-raised fish. However, habitat work in St Charles and Fish Haven creeks markedly changed the Bear Lake fishery. In 2002, the proportion of wild-origin BCT Bear Lake in surveys was only 5%, while in 2017 it had increased to 70%. In addition, catch-per-unit-effort of wild-origin BCT has continued to increase.

As a result of these actions and harvest management in the lake, wild-origin BCT in Bear Lake have become increasingly abundant and now make up the majority of BCT in the lake. Subsequently, the Idaho Fish and Game Commission adopted new fishing regulations in 2022, allowing anglers to harvest both hatchery- and wild-origin BCT for the first time in 24 years.

Benefits

The story of Bear Lake Cutthroat Trout is one of community, stakeholder engagement, and partnerships coming together to improve the habitat of a native sport fish. It's a story of community engagement, habitat restoration, and fisheries science and management combining to restore lost fishing opportunities. Decades of restoration, research and fisheries management projects have resulted in tremendous progress in conserving one of the West's iconic native trout species, and restored sport fishing opportunity on this ecologically and culturally important native trout.

Evaluations

The projects described here over the last 20+ years have combined the success of multiple habitat restoration, fish management, and fisheries research efforts to ultimately increase the productivity of wild-origin BCT. Outcomes and data produced from these projects and studies have directly informed the actions of the Idaho Fish and Game Commission in adopting new fishing seasons and bag limits. Additionally, this collection of work has informed changes to Idaho's State Fish Management Plan (IDFG 2019), and Idaho's Bonneville Cutthroat Trout Management Plan (IDFG 2022) and will continue to inform native trout conservation efforts in the Bear River Basin.

References

Heller, M. R., Dillon, J. C., Tolentino, S. A., Watkins, C. J., and M. C. Quist. 2022(a). Population dynamics and

harvest management of the Bonneville Cutthroat Trout fishery in Bear Lake, Idaho-Utah. North American Journal of Fisheries Management: 42: 701-712.

Heller, M. R., Dillon, J.C., and M. C. Quist 2022(b). Occurrence, abundance, movement, and habitat associations of Bonneville Cutthroat Trout in tributaries to Bear Lake, Idaho-Utah. North American Journal of Fisheries Management 42: 684-700.

Idaho Department of Fish and Game. 2022. Management Plan for the Conservation of Bonneville Cutthroat Trout in Idaho. Idaho Department of Fish and Game, Boise, USA.

Idaho Department of Fish and Game (IDFG). 2019. Fisheries Management Plan 2019 – 2024. Idaho Department of Fish and Game, Boise, USA.