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2023 "Waters to Watch" – Spread Creek (Wyoming) Fish Passage Project, Phase 2

Native Snake River cutthroat trout (Yellowstone Cutthroat Trout) being released back into Spread Creek during the 2021 final fish rescue.

Purpose of the project: Spread Creek, located outside of Jackson Hole, Wyoming, traverses through relatively pristine National Forest and National Park lands before joining the Upper Snake River approximately 15 miles below Jackson Dam. Spread Creek showcases a diversity of life histories for native Snake River Cutthroat (Yellowstone Cutthroat Trout subspecies) trout important to the resilience of the population and species into the future. The lower section serves as a migration corridor for large, fluvial fish, while the upper portion of Spread Creek serves as important spawning and rearing habitat for fluvial fish and year-round habitat for resident fish.

Prior to 2010, the Spread Creek dam, located just outside of Grand Teton National Park (GTNP) on Bridger-Teton National Forest (BTNF) lands, prevented native fish migration to the upper reaches of the drainage. In 2010, the obsolete diversion dam used for irrigation was removed by Trout Unlimited, GTNP, and numerous other partners, opening up over 50 miles of Spread Creek to migratory cutthroat trout for the first time in over 50 years. This structure had been a complete barrier to the upstream movement of native fish attempting to move from the mainstem Snake River to historical spawning and rearing grounds in Spread Creek. The modernized diversion structure that was installed in its place for water users gradually elevates the water to be diverted over a series of weirs and pools and allows for fish passage throughout the year and at varying flows.

Post-dam removal project monitoring by project partners through a PIT tag study and coordinated annual fish salvage efforts demonstrated that the project was highly successful in reconnecting upper and lower Spread Creek and the Snake River. However, it also confirmed that a fish screen was warranted on the Spread Creek irrigation system's ditches. With the increased use of upstream habitat for spawning and rearing, many juvenile and adult Yellowstone Cutthroat Trout and other native nongame fish like bluehead suckers (a Wyoming Species of Greatest Conservation Need) were being swept into the Spread Creek irrigation system's ditches when trying to out-migrate throughout the year. Once entrained, these fish were not able to escape back into Spread Creek.

Concurrent with the fish salvage sampling in the Spread Creek irrigation system, project partners had been monitoring stream stability following dam removal and noted that Spread Creek is a highly unstable, high bedload, high sediment channel. This was evidenced by flooding in 2011, which damaged the diversion structure's rock weirs and led to issues with water delivery and channel scouring, necessitating emergency bank stabilization work and other repairs in 2016. However, continued damage and issues with maintaining water delivery during high flow events in 2017 and 2018 (requiring heavy equipment instream on multiple occasions to clear debris and build a low-flow intake channel), and associated sedimentation and bank instability, indicated that a more stable, long-term solution was needed to establish consistent design flows for the fish screen, re-establish optimal hydraulics for fish passage (there was an 18" drop between structures, which is much greater than the Wyoming Game and Fish Department's recommendation of 4"), and provide reliable water delivery to irrigators. The washout of the Park's access road to the site in 2018, which resulted in 1,200 cubic yards of land loss and erosion, and the observation of a headcut moving upstream in the direction of the diversion by project engineers, further demonstrated Spread Creek's extreme instability and risk to fish habitat, water quality, and irrigation infrastructure.

This final phase of the Spread Creek Fish Passage Project ensured unimpeded migration between the Snake River and Spread Creek through installation of a fish screen that prevents losses of native fish and by stabilizing, improving, and protecting the diversion and irrigation infrastructure. It accomplished this by 1) installing a fish screen designed to eliminate fish entrainment in ditches while continuing to deliver water even if clogged; 2) rehabilitating the diversion structure and changing it from a series of rock weirs to a rock ramp, for long-term stability and improved fish passage; and 3) adding instream structures such as rock barbs, toe rock, and engineered log jams to protect banks, channel, and irrigation infrastructure within the project area and improve local habitat and water quality conditions for native fish. These actions will ensure future water delivery to the irrigation system and fish screen and maintain and improve fish passage for all life stages of native fish to the 50 miles of upper Spread Creek opened up by the dam removal phase of the project. This project was a true win-win for native fish, water users, land managers, and the public.

Project Timeline:

Milestones:

- Stakeholder discussions were first initiated in 2016. Project goals and objectives were defined and alternatives analyses, accompanying reports, and 60% designs were developed from 2017 to 2018. 60% designs and construction budget estimates were completed in 2019. Final 100% design plans were completed in 2020.
- A monitoring plan with the BTNF, GTNP, and WGFD was developed and pre-project monitoring completed in 2020. Post-project monitoring is in progress. The final fish rescue held in September 2022 documented a significantly lower number of cutthroat trout entrained, and primarily young of year native suckers, dace, and sculpin – presumably fish that entered the irrigation ditches prior to the fish screen being installed in mid-July 2022.

- Materials procurement began in summer 2020 and was completed in fall 2021. The majority of the rock for the project was donated by Grand Teton National Park from their RKO rock pit, at a value of more than $300,000. The remainder of the rock was hauled to the project site from the Gros Ventre levee and Pinedale area. The trees for the project were donated by the Bridger-Teton National Forest from near the project area.
- Construction mobilization and implementation began in late October 2021. The diversion, bank, and channel instream work was completed in November 2022. The fish screen construction was postponed due to concrete pricing and contractor availability as well as the onset of cold weather. It was completed from March 2022 to July 2022.
- A film about the Spread Creek project and partnerships was produced. It was distributed through Trout Unlimited's website, TU's social media channels, and by project partners in August 2022, and engaged the local community as well as national audiences with the project. **View online**
- A press release was distributed to regional newspapers and posted online at TU.org, and was covered as follows:

    - An article on Buckrail.com, an online news source based in Jackson, WY. 11/12/21.
    - A radio story on BYU-Idaho Radio. 11/15/21.
    - A story on Jackson Hole Radio. 11/16/21.
    - An article in the Jackson Hole News and Guide. 11/24/21.
    - A story on Wyoming Public Media. 12/14/21.

- Several project tours were held in fall 2022 for TU supporters and partners.
- To further highlight the project's benefits and engage the public, interpretive signage about the project and its partnerships, as well as the importance of the native cutthroat trout fishery in Spread Creek, are being designed. They will be installed across from the irrigation infrastructure at a Bridger-Teton National Forest campsite that overlooks Spread Creek.
- An operations and maintenance plan was developed for the project and transferred to Grand Teton National Park, who will oversee operations and maintenance of the project into the future.

Community Benefit:

Project implementation eliminated the only threat of entrainment for native fish in Spread Creek, the last remaining anthropogenic threat to native fish in this very high conservation priority system. It will also improve local habitat and passage conditions for native fish and water quality (by addressing sediment pollution from bank and channel erosion). It showcases stewardship and improved management of natural resources by the National Park Service and US Forest Service in a publicly accessible area that is visited by the local community and visitors and provide one of the most visible examples of a fish screen in the area. It will also engage community members in the project through volunteer opportunities and potentially through youth education. This project dovetails with the previous dam removal phase of the project by providing a completely reconnected tributary system for migrating native fish accessing spawning and rearing grounds from the Upper Snake River.

Project outcomes:

Project implementation was completed in 2022 by Trout Unlimited and key technical partners including Grand Teton National Park, Bridger-Teton National Forest, and Wyoming Game and Fish Department. The project

was a large-scale collaboration that took many partners and volunteers to complete, including five years of coordination, planning and fundraising from 2016 to 2021.

The project goals and objectives were met. The project addressed the fish passage barrier posed by entrainment into the Spread Creek ditches through the installation of the Corrugated Water Screen type fish screen, which now ensures that native fish can migrate the 5 miles from the Spread Creek irrigation diversion down to the Snake River confluence. It stabilized the irrigation diversion, banks, and channel located on 1,250 feet of stream in the project area (on Bridger-Teton National Forest land), thereby improving passage conditions for native fish, increasing instream habitat, and improving water quality. These improvements will also serve to maintain and protect existing infrastructure and minimize future land loss, including the protection of an established Forest Service campsite. 950 willow stakes were planted in the bank stabilization structures. Volunteers assisted with several aspects of the project, including fish rescues, willow stake harvesting, project film, and youth education. A project film was produced that is being used for additional outreach and engagement.

Economic Calculator results:

Jobs: 32.1141 Total Sales: US $2,883,518.60 Value Added: US $1,721,180.08 Income: US $1,319,504.76

Project Partners: This project was funded by the following partners:

- Trout Unlimited
- Grand Teton National Park
- Bridger-Teton National Forest
- Community Foundation of Jackson Hole
- Desert Fish Habitat Partnership
- Jackson Hole Trout Unlimited
- Jackson Hole One Fly
- National Fish and Wildlife Foundation
- National Forest Foundation
- Patagonia World Trout
- Snake River Fund
- Teton Conservation District
- U.S. Fish and Wildlife Service National Fish Passage Program
- Vail Resorts Epic Promise
- WorldCast Anglers
- Wyoming Game and Fish Department
- Wyoming Department of Environmental Quality
- Wyoming Water Development Commission
- Wyoming Wildlife and Natural Resources Trust
- Western Native Trout Initiative

Project Photos:

Photo 1. Bank stabilization structures using a combination of wood, rock, resloping, and erosion fabric were installed in November 2021.

Photo 2. Large boulders were imported to create a rock ramp diversion structure in November 2021, a design expected to be much more robust than the previous diversion structure.

Photo 3. Volunteers from Jackson Hole Trout Unlimited helped to harvest willows in October 2021.

Photo 4. Volunteers and partners help with the final fish rescue on Spread Creek in September 2021.

Photo 5. Native Snake River cutthroat trout being released back into Spread Creek during the 2021 final fish rescue.

Photo 6: Spread Creek screenshot from TU-produced film released in August 2022.

Photo 7. Spread Creek fish screen.

Photo Set 11. Previous headgate and sediment basin (above), expanded sediment basin and new fish screen at far end (below).