

South Flat Creek Channel Restoration Phase 2

State(s): Wyoming

Managing Agency/Organization: Wyoming Game and Fish Department

Type of Organization: Government (State)

Project Status: Ongoing

Project type: WNTI Project

Project action(s): Riparian or In-Stream Habitat Restoration, Barrier Removal or Construction, and Monitoring. This project will restore 1.2 miles of stream, reconnect an additional 1 mile of stream, and remove 1 barrier to passage.

Trout Species Benefitted: Yellowstone Cutthroat Trout

Population: Flat Creek, Snake River watershed

Project summary: A first-order tributary to the Snake River with pristine headwaters draining the upstream Gros Ventre wilderness and National Elk Refuge, Flat Creek offers habitats vital to spawning and rearing Yellowstone Cutthroat Trout (YCT) as well as ample public access opportunities for anglers. Improvement of stream function throughout the open ranchlands south of town will buffer the negative effects of urbanization (elevated stream temperatures, frazil ice formation, and excessive sedimentation) while also increasing the availability of spawning riffles, nursery habitats, and deep holding water. In 2021, the first restoration phase involving 0.6 miles of the channel was constructed toward the lower end of the 1.2-mile reach. This proposal seeks funding for completing the second and final phase of construction on the upper 0.6 miles, including modifications to a diversion facility to improve Yellowstone Cutthroat Trout passage. A total of 1.2 miles of Flat Creek will be restored to reference conditions. The new channel will be narrower and deeper, have a connection to its floodplain, and have complex added structure in the form of toewood and vegetated soil lifts. The meander pattern dimensions are based on downstream reference conditions. The riparian area will be restored using a combination of grazing enclosure fencing and extensive planting of willows and cottonwoods on stream banks and wetland benches. An existing irrigation diversion and seasonal barrier to upstream fish movement will be retrofitted to allow for year-round passage. All told, this work will increase Yellowstone Cutthroat Trout resiliency by restoring function to degraded instream and riparian habitats, and improving access to high-quality habitat upstream of the project area. The public fishery will benefit through increased spawning and recruitment. Flat Creek holds enormous ecological potential and plays a large role in sustaining a wild, native trout fishery of international repute throughout publicly-accessible sections of the upper Snake River drainage.

Problem the Project Addresses: South Flat Creek restoration will return lost function to 1.2 miles of degraded stream south of the town of Jackson. Flat Creek is an important Yellowstone Cutthroat Trout Spawning Tributary. Unfortunately, it is also a creek that has been impacted by urbanization, rural land development, and water management. Flat Creek willow removal and channelization began in the early 1900s with homesteader activities. These modifications coupled with modern, urban development and stormwater runoff have reduced the ability of Flat Creek to provide high-quality habitat for native fish and riparian obligate communities. Riparian grazing practices and lack of woody vegetation contribute to bank erosion and stream channel widening. As a result, the channel is wide and shallow, hot in the summer, and super cooling to the point of forming frazil ice dams in the winter. Riffles are filled with fine sediment and pools are few and far between. Despite these deficiencies, ample year-round flows and a strong semblance of a natural hydrograph provide a solid basis for invoking natural channel design approaches to bring the system into balance with its flow and sediment supply while creating long-lasting habitat features for Yellowstone Cutthroat trout.

Willow removal, riparian grazing, and flood protection coupled with excessive sediment loading in Flat Creek have resulted in high stream turbidity and poor instream habitat quality. These factors contributed to the creek's listing by the Wyoming Department of Environmental Quality as "Impaired" in 1996. It has since been downgraded in status to "Threatened." Redd counts conducted on upstream Flat Creek on the National Elk Refuge yielded estimates of 172 spawning cutthroat trout per mile. In contrast, similar surveys conducted throughout the project reach only showed 58 spawners per mile. We believe that, with active management, the project reach is capable of supporting spawning densities closer to those observed on the National Elk Refuge. Improving the availability of quality spawning habitat throughout lower Flat Creek will benefit the Snake River fishery as a whole by maintaining recruitment and improving species resiliency.

Objectives: Flat Creek South Channel Restoration is a collaboration between Wyoming Game and Fish Department, local entities, and landowners to improve cold-water stream health. This project targets 1.2 miles of Flat Creek, an important cutthroat trout spawning stream and migratory corridor. Improved stream function will reduce stream bank erosion, restore reference channel dimensions and riparian vegetation, reduce

localized winter icing problems, diversify instream habitat, and address stream warming. Remedying these limiting factors will result in improvements to juvenile, adult, and spawning habitats for native Yellowstone Cutthroat Trout. Project direction is informed by local watershed management planning and the WGFD Statewide Habitat Plan (Girard et al. 2019, WGFD 2020). Both plans identify spawning and rearing habitat improvement goals. Additionally, the watershed management plan focuses extensively on methods to reduce Flat Creek turbidity and nutrient loading.

Project design elements reflect the objectives of local management plans as well as partner goals. Restoring channel pattern, slope and the distribution and dimensions of instream features (riffles, pools i.e.) will greatly improve the habitat for cutthroat trout. Riparian restoration will increase bank stability, reduce erosion and filter overland flows thereby improving water quality. A restored riparian community will also offer a multitude of instream and terrestrial habitat benefits. Improved channel dimensions to narrow and deepen the creek corridor will return Flat Creek's ability to route upstream-sourced sediment to the powerful and sediment-hungry Snake River.

We seek to achieve a channel, riparian zone, and floodplain that provides diverse habitats for Yellowstone Cutthroat Trout and riparian wildlife, and that is in balance with current water and sediment supplies. Project objectives fall into four categories: 1) fish habitat and passage, 2) irrigation water delivery and reliability, 3) reduced project risk, and 4) stable geomorphology. The proposed design for this project includes; increasing sinuosity by 10%, decreasing channel widths by up to 70%, decreasing pool-to-pool spacing by 20% (i.e. increasing the number of pools), and increasing pool depths by 30%. This project also will restore or maintain entrenchment ratios of 2.2 or greater, reconnect and develop floodplain wetlands, and restore stable channel dimensions which are capable of routing sediment. This project will also integrate exclusion fencing in order to maintain 100-ft riparian buffers, integrate points of access for cattle, and implement sustainable riparian grazing practices through rotation grazing management which will incorporate off-channel water and fencing where appropriate. Passage at the Adams Ditch irrigation will also be implemented without impeding water delivery (project phase II).

Partners:

- Wyoming Game and Fish Department
- Lockhart Cattle Company
- Community Foundation Jackson Hole
- Jackson Hole One Fly
- National Resource Conservation Service (NRCS)
- Teton Conservation District (TCD)
- Trout Unlimited Western Watersheds Program
- Trout Unlimited Jackson Hole Chapter
- United States Fish and Wildlife Service (USFWS)
- Wyoming Department of Environmental Quality (WDEQ)
- Wyoming Governor's Big Game License Coalition
- Wyoming Water Development Commission, Water for Wildlife Foundation
- Wyoming Wildlife Natural Resource Trust.
- Western Native Trout Initiative

Project Monitoring: As restoration designs are based in large part on reference reach conditions, detailed surveys of a downstream, relatively-pristine section of Flat Creek were also completed. Reference reach surveys follow the same criteria as the baseline project reach surveys. Post-construction monitoring will be conducted annually for the first three years following construction, and then repeated in later years as needed. A post-project "as-built" survey will be completed to document layout and concurrence with design plans. This survey will establish permanent cross-sections and longitudinal profiles to be revisited in long-term monitoring efforts. Key lateral and vertical stability measurements will be collected on cross-sections to document post-construction erosion rates and to determine if corrective measures are necessary. Post-construction bank erosion and riparian vegetation surveys will be completed following the same protocols referenced for baseline monitoring.

Funding Source(s): National Fish Habitat Action Plan

Project cost: WNTI \$50,000, Total \$1,407,535

Start Date: 10/2022 **Completion Date:** 10/2023

Project Contacts: Holden Reinert, Wyoming Game and Fish Department, holden.reinert@wyo.gov