

Clear Fork of Muddy Creek Cutthroat Restoration Barrier Project

State(s): Colorado

Managing Agency/Organization: Trout Unlimited

Type of Organization: Non-profit

Project Status: Ongoing

Project type: WNTI Project

Project action(s): Barrier Removal or Construction, Monitoring. 13 miles of stream will be enhanced or restored, and one barrier will be installed to prevent the future invasion of non-native Brook Trout.

Trout species benefitted: Colorado River Cutthroat Trout

Population: Clear Fork of Muddy Creek, North Fork of the Gunnison Watershed

Project summary: Green Lineage Colorado River Cutthroat Trout (CRCT) in the Upper Colorado, Gunnison, and Dolores Rivers are now primarily relegated to small headwater drainages where they are susceptible to population loss due to non-native invasion or stochastic events.

The restoration project area encompasses Clear Fork East Muddy Creek (Clear Fork) on the Paonia Ranger District where in the early 2000's non-native brook trout (*Salvelinus fontinalis*) were inadvertently stocked. Brook trout spawn in the fall, with their eggs overwintering in the gravel of the stream bed. Emerging in spring prior to cutthroat trout spawning (early summer), juvenile brook trout exhibit a competitive advantage over smaller cutthroat trout fry. This introduction of brook trout has placed the native CRCT at risk.

Headwater reaches of the Clear Fork contain intact conservation populations of native CRCT that have been isolated from the brook trout invasion by natural barriers. These populations contain the unique "Twin Creek" haplotype as well as strong genetic diversity and create the potential to restore the historic meta-population through the drainage. Meta-populations increase the long-term persistence of CRCT by increasing the population's resiliency to catastrophic environmental events such as severe landslides, drought, and changing climate. The CRCT populations in the Clear Fork drainage are currently isolated by natural barriers that are subject to failure during intense flow events. The Clear Fork drainage is a flashy system, and the risk of these barriers degrading threatens to allow the invasion of non-natives into the isolated reaches, undermining the ability of this restoration to restock the system with fish matching the historic genetic makeup. This threat increases the urgency of completing this project in a timely manner. The non-native trout continue to move higher into the basin impacting CRCT populations and cannot be removed until a barrier has been constructed that prevents continued encroachment.

The project supports the construction of a permanent fish migration barrier which is the first phase of the Clear Fork Cutthroat Trout Restoration Project. The barrier is planned to be located on National Forest Lands at a location selected by partners based on constructability, hydrology, overall benefit, and ability to meet the goals of the restoration project. This barrier will eliminate upstream movement of non-native fishes into the headwaters of Clear Fork. Following barrier construction, the reclamation component of the project will remove brook trout from approximately 13 miles of the Clear Fork Muddy drainage via the application of rotenone, leaving only the tributary CRCT populations that are isolated by natural barriers. Following the reclamation, juvenile CRCT will be relocated from the isolated headwaters to recolonize the mainstem. This approach should lead to the establishment of a genetically pure and diverse population of CRCT that can be used, following the nearest neighbor philosophy, as a stocking source for CRCT restoration projects in the nearby geographical area. In addition to CRCT, mottled sculpin (*Cottus bairdi*) will be restocked from downstream sources to restore the native aquatic community above the barrier after the removal phase. Downstream reaches of Clear Fork Muddy Creek contain native populations of bluehead sucker (*Catostomus discobolus*) and flannelmouth sucker (*Catostomus latipinnis*).

Problem the Project Addresses: Overfishing, agricultural and mining practices, other habitat impacts, and the introduction of non-native fishes, have considerably impacted the green lineage Colorado River Cutthroat Trout (CRCT), the native trout to the Upper Colorado, Gunnison, and Dolores Rivers, causing this native trout to be protected as a Threatened Species under the Endangered Species Act. To protect a robust population of native cutthroat trout on Clear Fork of East Muddy Creek (Clear Fork) within the Paonia Ranger District of the Grand Mesa Uncompahgre and Gunnison National Forest, Trout Unlimited and partners including the Forest Service plan to construct a barrier to prevent future invasion of non-native brook trout and other non-native fish following a rotenone-based reclamation. The barrier is critical to the restoration and isolation of over thirteen (13) miles of native green lineage CRCT habitat that will be repopulated by the genetically diverse

and unique population of CRCT that were historically native to the drainage. Clear Fork East Muddy Creek (Clear Fork) has historically supported a robust meta-population of native green lineage CRCT, which has been impacted by the introduction of brook trout. This introduction resulted in a decline of green lineage cutthroat throughout the Clear Fork drainage with only remnant populations persisting in small, isolated headwater streams in the watershed. These isolated populations are vulnerable to localized stochastic events and the barriers protecting them from brook trout invasion are tenuous, making the completion of this project necessary and urgent. The Clear Fork watershed is composed of multiple stream segments totaling approximately 13 miles of high-quality habitat providing an outstanding opportunity to restore a meta-population of native CRCT.

Objectives: The primary goal of this project is to restore and protect a healthy population of native green lineage Colorado River Cutthroat Trout (CRCT) in the Clear Fork of Muddy Creek and its tributaries. In order to achieve this goal a number of objectives have been identified, including permanently preventing fish from moving up Clear Fork. Construction of a permanent navigation barrier relies on two phases to be completed: The first of these steps is the completion of an engineered design and hydraulic models of a barrier structure. Meeting this objective will allow partners to accurately evaluate how a designed barrier will function in the selected location. The second objective is to complete construction of the barrier. Once the barrier is constructed, the removal of non-native trout can begin, which is the final step in the restoration of a healthy population of CRCT. This restoration will result in securing one of the largest and most robust conservation populations of CRCT in western Colorado that will facilitate future restorations by providing a source for restocking other restored drainages. The barrier will serve to protect the restored populations of CRCT into the future.

Partners: The project was spearheaded by the Grand Mesa, Uncompahgre and Gunnison National Forest (GMUG NF) Forest Service staff who created the initial design and selected a preliminary location for the barrier. Colorado Parks and Wildlife developed a plan for the removal of non-native trout and to bring real funding to the project. Trout Unlimited staff has contributed fundraising support, prepared conceptual designs, assisted in the selection of alternative sites for the barrier, contacted landowners and water users, and evaluated water rights issues. Trout Unlimited in cooperation with GMUG National Forest, with assistance from River Restoration, will provide immediate oversight for the initial phases of the barrier design and construction. Local TU chapters are involved by providing funding for construction and pledging future assistance. The Forest Service has provided much-needed support by surveying barrier location and raising funding. Running Rivers has provided funding and volunteered to assist with restoration efforts. Freshwater Life has secured funding and will assist with public outreach for the project. Neighboring landowners, recreationists, and other public land users will be informed about the project and any needs during or after the project.

- U.S. Forest Service: Grand Mesa, Uncompahgre and Gunnison National Forest
- Colorado Parks and Wildlife
- Trout Unlimited
- Running Rivers
- Freshwater Life
- Trout Unlimited chapter: Gunnison Gorge Anglers
- National Fish and Wildlife Foundation Bring Back the Natives
- Western Native Trout Initiative

Project Monitoring: Performance of the barrier will be monitored by TU and partners through a variety of flow conditions to ensure that it is performing properly and will successfully prevent fish from passing the barrier. In months and years following the barrier construction and removal of non-native fish, TU volunteers and staff, along with Forest Service staff, will assess the barrier and the surrounding areas. Photos of the site will be taken at varying flow levels and damage to the structure or to the surrounding area. Colorado Parks and Wildlife and partners will continue to monitor the population of green lineage CRCT for project success and continue surveys to make sure non-native brook trout have not reentered the system.

Funding Source(s): National Fish Habitat Action Plan

Project cost: \$24,640 WNTI Funds, Total project cost \$287,279

Start Date: 1/2022 **Completion Date:** 10/2023

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