

Eagle Creek Yellowstone Cutthroat Trout Connectivity Project

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1) Project Summary

Eagle Creek is a small second-order stream located near Gardiner Montana that flows from its headwaters on the Custer Gallatin National Forest to its confluence with the Yellowstone River in Yellowstone National Park. It is one of just four Yellowstone River tributaries in the Gardiner Basin that support Yellowstone cutthroat trout (YCT) conservation populations secure from competition and hybridization with nonnative fish. An in-channel pond and five road culverts that have limited the upstream distribution of nonnative fish species have simultaneously fragmented YCT habitat along Eagle Creek's 6.6 stream miles (including Davis Creek, its primary tributary). Environmental DNA sampling and electrofishing have confirmed that there are only 1.9 stream miles occupied by YCT upstream from a culvert that has thus far served to exclude nonnative brook trout. By replacing two upstream perched culverts located on upper Eagle Creek and Davis Creek with aquatic organism passage (AOP) culverts, this project increased secure YCT habitat by an additional 2.8 stream miles (147% increase) for a total of 4.7 secure stream miles (147%). Assuming that YCT become established in the newly accessible habitat, the long-term persistence of the Eagle Creek YCT population will be increased by reducing potential for inbreeding depression and by providing refugia from disturbance such as wildfire.

This project replaced one undersized, perched culvert on upper Eagle Creek and one undersized perched culvert on Davis Creek with 10-foot wide AOP pipe arches meeting Forest Service stream simulation criteria (Photos 1-3). These criteria are met by accommodating discharge up to the 100 flood event, spanning the bankfull channel, and by having streambed and banks constructed through the crossing (Figure 2; Photo 3). Because these large culverts often pass flood flows unscathed, they require minimal maintenance and have a longer life span than smaller culverts that do not span the bankfull channel.

In order to ensure that the newly connected YCT habitat will remain secure from nonnative fish invasion, the perched culvert located upstream from the Eagle Creek Camp Ground (Middle Eagle Creek in Figure 1) was modified to increase its effectiveness as a fish barrier (Photo 4). This included excavating the streambed downstream from the culvert to increase the vertical drop from the culvert outlet to the streambed. It also included armoring the channel to prevent a jump-pool from forming at the culvert outlet.



Figure 1. Comparison of Eagle Creek secure YCT habitat before (left) and after AOP installation (right).

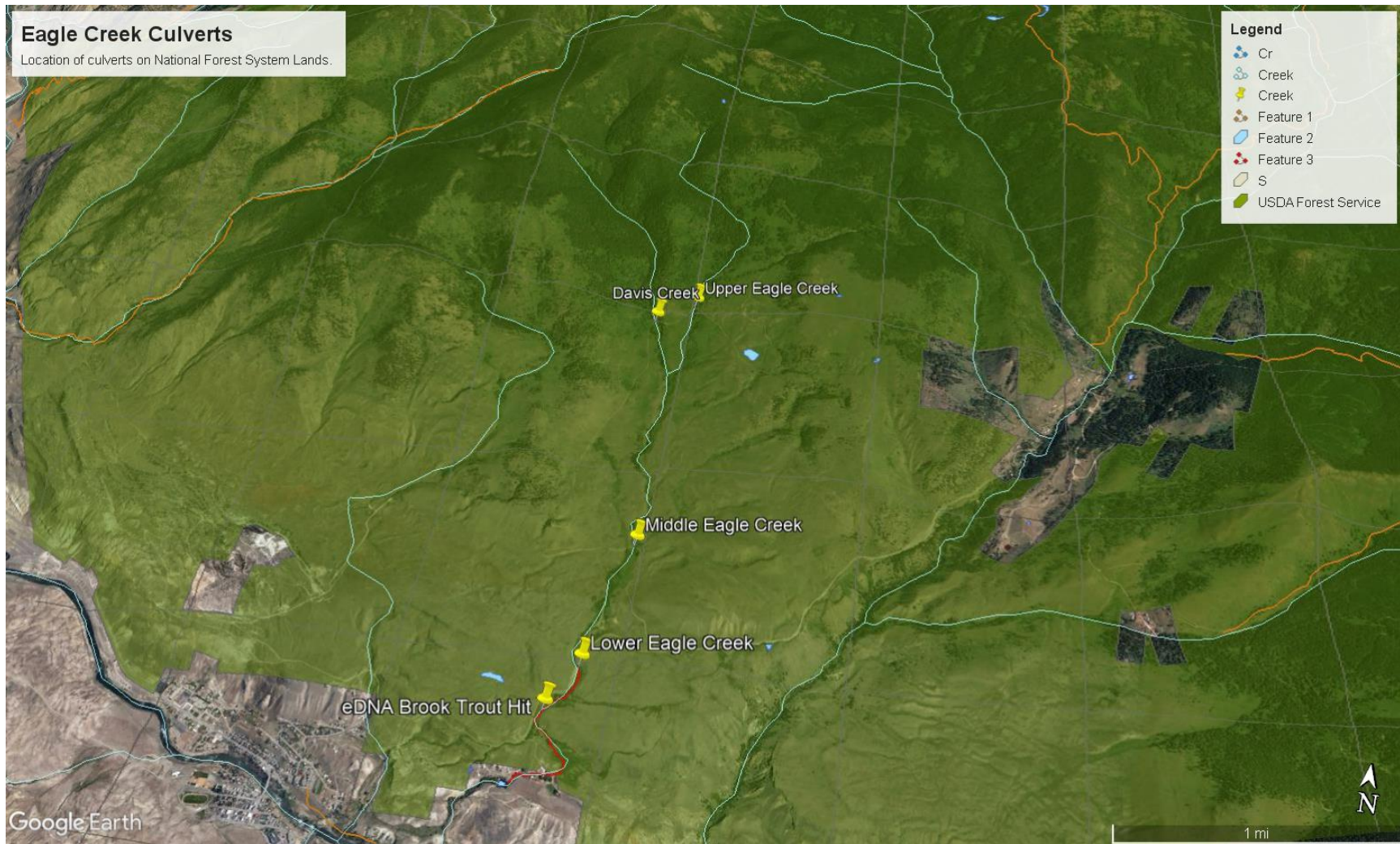


Figure 2. Map of Eagle Creek showing locations of culverts and eDNA brook trout DNA detection. The community of Gardiner Montana is in the lower left side of the satellite photo.

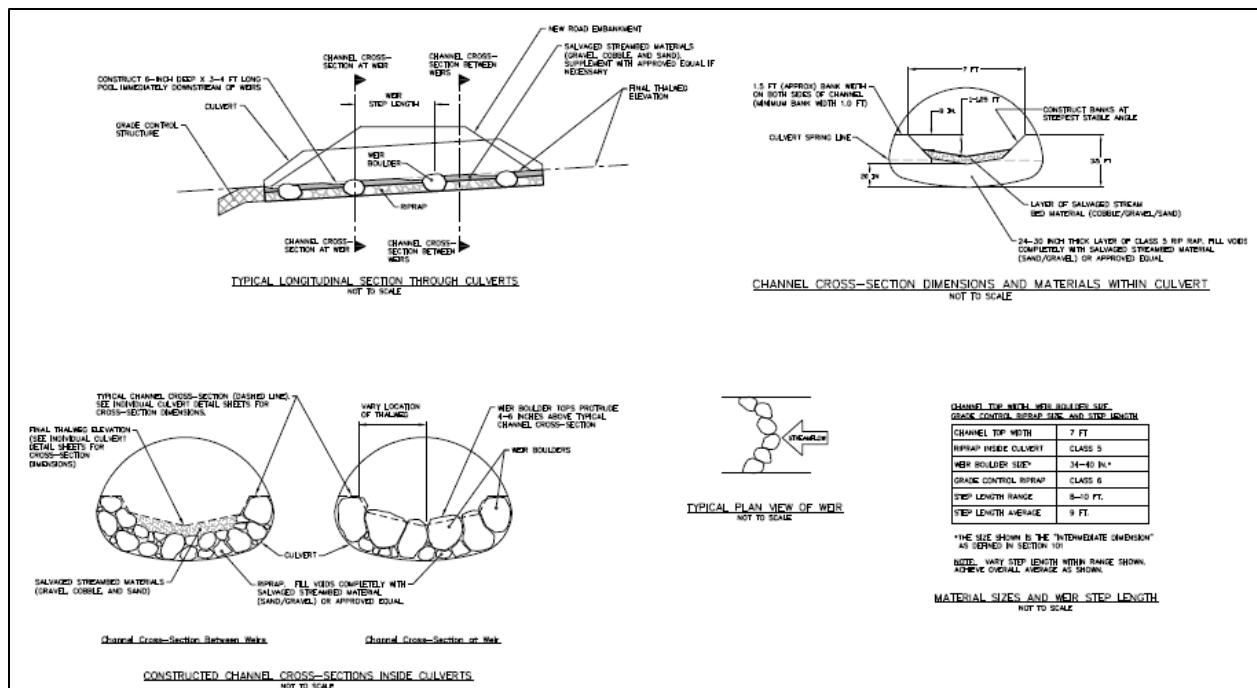


Figure 3. Typical drawings of longitudinal and horizontal cross sections through AOP culverts.

2) Problem the Project Addresses:

The Custer Gallatin National Forest, Montana Fish, Wildlife and Parks, and Yellowstone National Park are working collaboratively to conserve Yellowstone cutthroat trout populations in the upper Yellowstone River drainage. YCT conservation in the Upper Yellowstone requires a two pronged strategy comprised of maintaining connectivity to spawning tributaries for fluvial YCT (migratory fish inhabiting the Yellowstone River) while securing resident YCT (tributary stream-dwelling) populations from competition and hybridization with nonnative salmonids. Eagle Creek supports one such resident population identified as a conservation population in the Yellowstone Cutthroat Trout Conservation Strategy for Montana (<http://fwp.mt.gov/fishAndWildlife/management/yellowstoneCT/#montana>) and the YCT status assessment (<http://fwp.mt.gov/gis/maps/yctAssessment/>). According to the Strategy (page 35), conservation planning for Eagle Creek should include improving connectivity by replacing perched culverts. Simultaneously replacing two undersized perched culverts in the Eagle Creek drainage with AOP culverts meets interagency conservation objectives thus increasing the viability of a resident YCT conservation population. Geographically, this project is important because Eagle Creek is only one of four Yellowstone River tributaries in the Gardiner Basin with headwater resident populations secure from competition and hybridization with nonnative fish.

3) Objectives.

Through partnership with the USFWS, MFWP, and the USFS, this project replaced two undersized and perched culverts with aquatic organism passage culverts thus reconnecting 2.8 miles of stream habitat on Eagle Creek secure from nonnative fish invasion for YCT. Its proximity to the community of Gardiner Montana creates a unique opportunity for place-based education about native trout conservation in the Gardiner School system as part of the Watershed Warriors Program.

The Yellowstone Cutthroat Trout Conservation Strategy for Montana (<http://fwp.mt.gov/fishAndWildlife/management/yellowstoneCT/#montana>) and the YCT status assessment (<http://fwp.mt.gov/gis/maps/yctAssessment/>) identify Eagle Creek as supporting a conservation population of YCT. According to the Strategy (page 35), conservation planning for Eagle Creek should include improving connectivity by replacing perched culverts. The Strategy lists Habitat restoration action 4.4 Connectivity (page 17): Fragmentation of habitats presents a significant threat to the persistence of isolated populations of Yellowstone cutthroat trout. Features that limit connectivity include impassable culverts at road crossings and irrigation diversions. Eliminating these fish passage barriers, where warranted, will be an important component of Yellowstone cutthroat trout conservation in the planning area.

4) Project Methodology:

The Custer Gallatin National Forest completed survey and design for the project and administered grants, agreements, and the construction contract. CGNF personnel are also responsible for ongoing revegetation of areas disturbed by construction activities.

5) Project Monitoring Evaluation:

The CGNF will be working cooperatively with MFWP on a Passive Integrated Transponder (PIT) study in the spring and summer of 2021 to evaluate movement of YCT through the new AOP culverts and colonization of newly accessible upstream habitat. PIT tags, are tracking tags that do not require power. Instead, they have an internal microchip that is activated when it passes close to a special antenna. The antenna is connected to a computer that records the identity of the tag and the time that it passed by the antenna. The PIT tags that will be used to track YCT in Eagle Creek are only about 0.47 inch long and will not affect the movement or behavior of tagged fish.



Photo 1. Typical PIT tag and injection needle. Small 0.47 inch (12 mm) long PIT tags will be used to monitor fish passage in Eagle Creek due to the relatively small size of fish to be tagged (4-10 inches long).

6) Partners

This project is a partnership between the Western Native Trout Initiative, U.S. Fish and Wildlife Service, Montana Department of Fish, Wildlife and Parks, and the Forest Service. The Custer Gallatin National Forest was responsible for project survey and design, contract administration, revegetation, and monitoring. Region 1 of the Forest Service contributed \$50,603 in cash for the construction contract. The Western Native Trout Initiative granted \$48,476 toward project implementation. The U.S. Fish and Wildlife Service committed \$32,500 for project implementation through its fish passage program. The Montana Department of Fish, Wildlife and Parks (MFWP) contributed \$43,780 through its Future Fisheries Improvement Program. MFWP will also provide assistance with the PIT tag monitoring effort by providing equipment, field support, and technical expertise.

Entity	Cash	% contribution
USFS R1	\$50,603	28.8%
CGNF	\$476	0.3%
FFIP	\$43,780	24.9%
USFWS	\$32,500	18.5%
WNTI	\$48,467	27.6%
Total	\$175,359	100.0%

7) Project Timeline:

This project was completed on August 25th, 2020. Disturbed sites were seeded on this date. However, supplemental seeding may be required. In the spring of 2021, streambanks will be planted with dormant willow cuttings. Fish passage monitoring will occur in 2021.

8). Environmental Compliance:

Environmental compliance for Forest Service AOP projects is covered programmatically under a NEPA Categorical Exclusion: Categories of actions for which a project and case file and decision memo are not required: Repair and maintenance of roads, trails, and landline boundaries...36 CFR 220.6(d)(4). See http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?1909.15 Because this project required ground disturbance, an archaeology survey was conducted and clearances acquired prior to awarding the contract.



Photo 2. The Eagle Creek crossing before (left and middle) and after being upgraded to provide for aquatic organism passage (right).



Photo 3. Davis Creek culvert outlet prior to (left) and after upgrading to AOP (right).



Photo 4. View looking into the Davis Creek culvert prior to (left) and after upgrading to AOP (right). The series of rock weirs and step pools allow fish to pass upstream through this relatively steep culvert.



Photo 5. The middle Eagle Creek culvert located upstream from the Eagle Creek Camp Ground before beaver dam removal (left), after beaver dam removal (middle), and after excavation and armoring to prevent upstream invasion of nonnative fish (right).