**Salmon Creek Fish Habitat Improvement Project**

**Scope of Work**

 This document outlines the general roles and responsibilities of current and potential project partners, as well as the anticipated timeline for fundraising, permitting, monitoring, and construction of the Salmon Creek Fish Habitat Improvement Project located near Kelletville, Pennsylvania.

**General Description**

This project will install 30 stone and log fish habitat improvement/bank stabilization structures on Salmon Creek, between its confluence with The Branch and its mouth on Tionesta Creek. Actual construction on site is anticipated to last for three weeks (15 business days).

**Current Project Partners**

 -Roles and Responsibilities

**United States Army Corps of Engineers-Tionesta Lake (USACOE-TL)**

 -Friends of Reservoirs Grant Application to fund construction

 -Ensure NEPA Compliance

 -Partner and Project Coordination as necessary and available

**Western Pennsylvania Conservancy (WPC)**

 -Forest County Conservation District (or other) funding application(s) for permitting, monitoring, construction

 -PA DEP Chapter 105 Permitting (in coordination with USACOE-TL)

 -Fish monitoring and site photo monitoring

 -Secure materials and heavy equipment contractor

 -Construction oversight and labor

 -Seeding/mulching/E&S Control

 -Woody revegetation of site (live staking, riparian planting)

-Partner and Project Coordination as necessary and available

**Potential Project Partners**

 -Roles and Responsibilities

**United States Department of Agriculture-Forest Service-Allegheny National Forest (ANF)**

 -Potential to supply rootwad trees and logs through diverse partner network

 -Coordination of projects and partners on adjacent lands

**Forest County Conservation District**

 -Potential funding source

 -Assist in community partnership building

**PA Fish and Boat Commission**

 -Potential fish monitoring

 -Provide scientifically based information to support/guide the project

**Kelletville Sportsmans Club, Trout Unlimited Chapters**

 -Potential source of volunteers; local contacts for materials, contractors, etc.

 -Assist in public outreach and education about the project

**Anticipated Project Timeline**

 This project is anticipated to take 3-7 years to complete, from fundraising through the third bi-annual year of post construction monitoring. The calendar year (i.e. 2022, 2023, etc.) of Year One in regards to the project will be determined by securement of funding for the project, as well as any potential delays (permitting, etc.).

Year One (2022/2023)- Fundraising, NEPA and PA DEP Chapter 105 Permitting

Year Two (2023/2024)- Pre-construction monitoring (backpack electrofishing, drone flight for aerial imagery); Materials procurement and contractor selection; Construction

Year Three (2024/2025)- Woody re-vegetation of site via live staking and riparian planting; First year of post-construction monitoring.

Year Five (2026/2027)- Second bi-annual post construction monitoring

Year Seven (2028/2029)- Third/final bi-annual post construction monitoring

**Permitting**

 USACOE-TL will ensure that this project is in compliance with National Environmental Policy Act regulations as applied to the unique project type. WPC will coordinate with PA Department of Environmental Protection (PA-DEP) and PA Fish and Boat Commission (PFBC) to ensure the correct in-stream and riparian earth disturbance permits are secured prior to construction. A PA General Permit-01 for Fish Habitat Enhancement Structures will be required for this project.

**Construction Details**

 Pending legal requirements and the partners in charge of funding sources, WPC and USACOE-TL will work together to bid and secure a competent excavation contractor to complete the project. Construction duties required by the project include excavation and re-grading disturbed banks in the areas of fish habitat structure installations, as well as hauling materials from a staging area at the rear of the Kelletville Campground parking lot (near the pavilion) to the project site. Equipment and materials will access the project site along the current walking path, as well as the relic railroad grade. Access to each structure will be along the streambank and avoiding any wet or soft areas. Construction will commence at Structure 1 and proceed downstream to the relic rail grade. Downstream of the grade, construction will commence at Structure 30 and proceed upstream. The equipment access path will be reclaimed, seeded, and mulched in accordance with Erosion and Sedimentation control plans as well as USACOE-TL site management. It is anticipated this work will require two 160 series tracked excavators with hydraulic thumbs and a 5-10 ton capacity tracked dump truck. One excavator will be used to work on and in the stream, with one being used to transport materials and/or load the track truck. See the Excavation/Earth Disturbance Details as well as the Proposed Erosion and Sedimentation Control Plan for further construction specifications.

Excavation/Earth Disturbance Details

Maximum area of earth disturbance for this project is anticipated to be 12,500 square feet (0.287 acres). Maximum volume of excavations may be up to 62,500 cubic feet (2,315 cubic yards).

*Random boulder clusters* require minimal excavation of the stream bed, which usually entails a small hollow dug by the excavator bucket, settling the boulder(s) in place, and returning excavated bed material around the boulder to secure it.

*Rootwad deflectors* and *revetments* require trenches excavated into the streambanks to secure tree and log boles. Each individual trench will vary in width, depth, and length according to the bank condition and logs/rootwads required at each structure site. Trenches are anticipated to extend no further than 20 feet landward from the stream bank, will be 3-5 feet deep, and may extend the length of the structure along the bank. *Deflectors* include logs with the rootfan attached excavated into the banks at varying angles (depending on specific site) and secured with boulders and excavated materials. *Revetments* includetree stems 20-25+ foot long with the rootfan attached placed parallel to flow direction at the bank edge, and secured with tree stems with rootfans and boulders in trenches excavated perpendicular to flow direction.

**Proposed Erosion and Sedimentation Control Plan**

1. All work will be done during low-flow conditions, avoiding periods during or immediately following heavy precipitation.

2. Where practical, equipment work will be done from the stream bank, or shoreline, unless entry into the channel is determined necessary and appropriate by the site Project Manager. This will be considered appropriate only with minimal disturbance (hard bottom, limited area of travel, etc). Other factors to be considered for in-channel work include a heavily wooded bank, riparian areas (i.e. buffers) or wetlands on or near the bank. Certain Fluvial Geomorphic (FGM) structures such as rock vanes and cross vanes may require in-stream work for efficient and optimal project construction. Equipment should be inspected to ensure that there is no leaking of lubricants, fuel, hydraulic fluids, etc.

3. Excavation of waterway banks and/or bottom for the purpose of keying in stone and/or timbers, will be restricted to work that can be completed that same day.

4. Upon final completion of the earth disturbance activity, or any stage or phase, all disturbed areas will be immediately stabilized with rock, seeding, and mulching, or other suitable material, during the same day. Newly vegetated areas will be inspected and repaired (as needed) until riparian vegetation is well established. E&S BMPs shall be implemented and maintained until permanent stabilization is completed/stabilized.

5. Native herbaceous riparian seed mixtures will be used for permanent stabilization, along with native woody riparian plantings (live stakes, potted stock, and/or bare root seedlings. Hand broadcasting of herbaceous riparian seed will average six pounds per 1,000 sq. yds. Mixtures must exclude Reed Canary grass or other known or potentially invasive plants.

6. Straw mulch will be placed by hand to produce a loose layer three-fourths to one inch deep. (3 Tons/Acre)

7. Only clean, nonpolluting materials shall be used as fill, which should be shingled or keyed into the structures for longevity. Minimum stone size should be R-4, as rated by the National Stone Association.

8. Any material excavated during the installation of the structures should be deposited in a suitable site away from the floodplain or wetlands, and stabilized within 24 hours of initial excavation.

9. Enhancement structures shall be maintained in a safe and functional condition.

10. Additions to the E&S plan may be requested by DEP for atypical situations.

**Habitat Benefits**

Random Boulder Clusters

Typically, a scour hole will develop around the boulders, providing deeper water and areas of reduced turbulence (eddies) adjacent to areas of increased stream velocity. Fish may rest in the eddies and wait for food to pass by in the main flow, while enjoying overhead protection from aerial predators due to surface turbulence. Placing random boulders in riffle sections preserves the riffle habitat feature of the stream while allowing more age classes of a greater diversity of aquatic species to more easily traverse shallow riffle habitats.

Rootwad Revetment

Rootwad Revetments provide bank stabilization and overhanging cover for a diversity of aquatic species. Interstitial spaces created by the use of rootwads and slash far exceed those created by using logs and stone alone. Rootwad revetments also provide light, thermal, and velocity refugia.

Rootwad Deflector

Rootwad Deflectors manipulate the channel’s thalweg to direct high velocities away from eroding banks and towards the channel’s center. A scour hole develops along the edge and out into the channel, with benefits similar to those noted in the Random Boulder Clusters description. Additionally, fine sediment accumulates in the less turbulent water downstream of the deflector, and eventually aids in building streambank and wetland type habitat.

**Contact Information**

This Scope of Work was compiled by Luke Bobnar, Watershed Scientist, Western Pennsylvania Conservancy. For questions, information, and further project coordination, please contact him at:

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