

Pennsylvania Coldwater Habitat Program Annual Report 2021



Over 360,000 Pounds of Sediment Reduced

2021 was another busy field season for the Coldwater Habitat Program and resulted in another astonishing reduction in sediment and nutrients across PA's waterways. In total, an estimated 360,062 pounds of sediment were reduced through the completion of 23 projects on nearly 13 miles of trout streams by the Coldwater Habitat Program crew. Projects completed include stream stabilization and fish habitat improvement projects, as well as stream crossing replacements. An estimated 410 pounds of nitrogen and 189 pounds of phosphorus were also reduced through the projects. Improvements came in many forms and were due to collaboration with many partners. Specifics about some of the projects completed and partnerships strengthened to improve the future of our coldwater resources in Pennsylvania are contained throughout this report so enjoy!

Unassessed Waters Program

Since 2011, TU has been involved in the Pennsylvania Fish and Boat Commission's effort to document naturally reproducing wild trout in streams that were previously unassessed. Partners of the Unassessed Waters Initiative have been successful in documenting 100s of trout streams since 2011. In 2021, TU's Coldwater Habitat Program field crew worked in the Delaware River, North Branch Susquehanna River, and West Branch Susquehanna River basins to complete 169 surveys on previously unassessed streams. Wild trout were documented in 37 of the 169 streams surveyed in 2021. Over TU's long involvement with the Unassessed Waters Initiative, TU staff surveyed 1,295 streams. Of these streams, 519 contained wild trout, which equates to about 40% of total streams surveyed to date. Native brook trout were documented in 409 streams, 228 contained brown trout, and 22 streams had rainbow trout. Sympatric populations of trout, in which more than one species of trout are present, were documented at multiple sites. TU continues to support these wild trout listings through the comment and approval process. This program has been a tremendous success for identifying and protecting wild trout in Pennsylvania.

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Project Spotlight: Slab Cabin Run Streambank Stabilization and Habitat Improvement Project

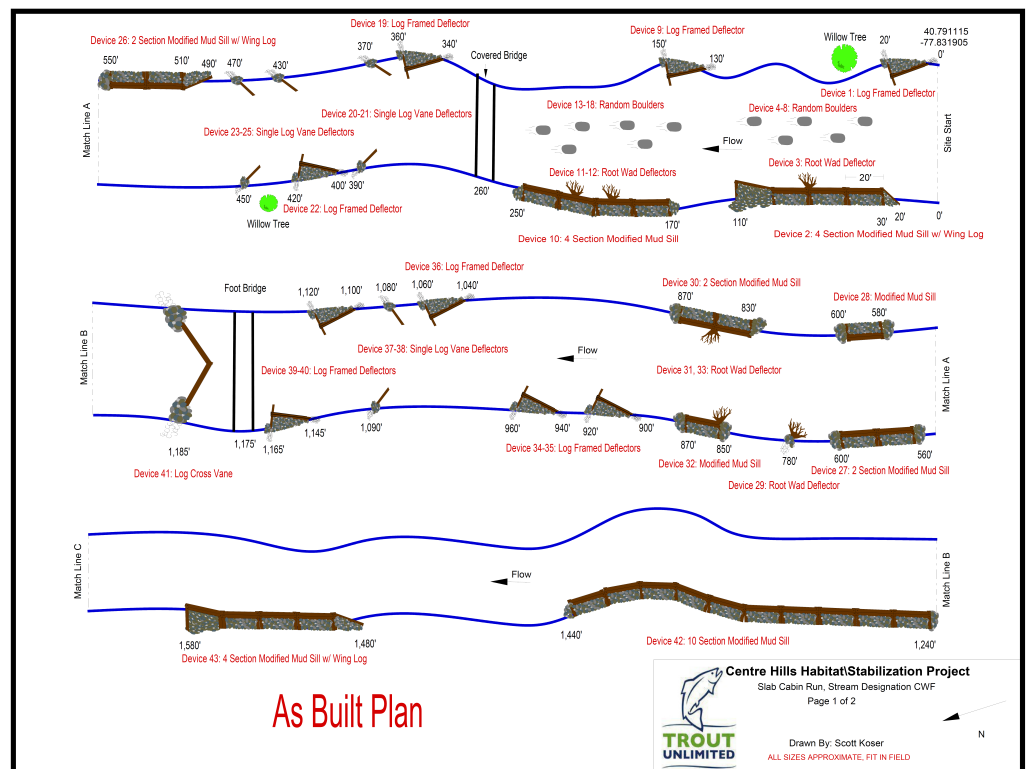


Slab Cabin Run is a Class A brown trout stream located in Centre County, PA. The Centre Hills Country Club is a large property owner along the stream through the State College area and partnered with TU on the design of a project in 2019. Since then, lots of fundraising and interest in the project led to momentum for implementation in 2021. During the week of August 2nd, this project was completed. In just

one week, TU Coldwater Habitat Program staff, the grounds crew for the Centre Hills Country Club, and Earth Shapers LLC constructed a total of 59 habitat enhancement and stabilization structures. Altogether, these devices stabilized approximately 3,200 feet of streambank and reduced an estimated 14,974 pounds of sediment, 17.1 pounds of nitrogen, and 7.9 pounds of phosphorus.

During one week of construction, 59 devices were installed to stabilize 3,200 feet of streambank reducing an estimated 14,974 lbs of sediment per year from the watershed. Below is one of the as-built plans that represent the structures used to stabilize the eroding streambanks and improve fish habitat.

The design, permitting, and construction oversight of this project was made possible by **TU's Nonpoint Source Technical Assistance Program**. The goal of TU's Nonpoint Source Technical Assistance Program is to provide rapid, individualized, free technical assistance with project planning/prioritization guidance, BMP design, permitting, and construction oversight to address nonpoint source sediment and nutrient pollution across the Chesapeake Bay watershed in Pennsylvania. If you have a similar project in mind that is in need of design, permitting, or construction oversight, contact Jake Tomlinson at: jacob.tomlinson@tu.org for an easy to fill out assistance request form.





Photos of Aikey Road stream crossing replacement during and after construction.

Pictured to the left is an example of the many stream crossing projects that TU partners with conservation districts and the Center for Dirt and Gravel Road Studies to construct. The Aikey Road project in Union County involved replacing an existing metal pipe 2' wide with a 10' wide concrete open bottom box culvert. Severe inlet drop was caused by large rocks greatly reducing the old pipe's capacity which was also undersized. Water had been over-topping the old pipe and running down the ditch to a cross pipe. TU staff assisted with assuring proper structure elevation, inspecting material used to create streambed, and assisted with re-establishing the stream channel through the new structure.

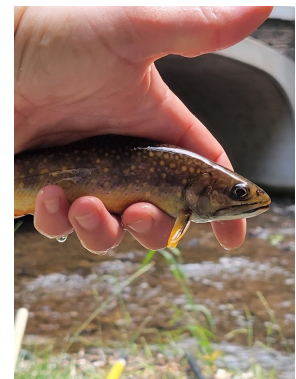
TU's Assistance for Stream Crossings

Trout Unlimited, the Center for Dirt and Gravel Road Studies, and the PA State Conservation Commission share a long-standing and active partnership. Through this partnership, Trout Unlimited provides technical resources and staff to assist and support conservation districts and municipalities with the planning, preparation, permitting, administration, and construction oversight of stream crossing replacements in association with Dirt, Gravel, and Low Volume Roads projects.

In 2021, TU's Coldwater Habitat Program staff provided 31 technical assistance site visits in 18 counties. These included visits for design, planning, and construction oversight for stream crossing replacements. Of those potential projects, 17 went to construction in 2021 resulting in 31.5 miles of streams reconnected. An estimated 35,980 pounds of sediment were reduced as a result of those projects and 805 feet of stream were improved.

AMD Technical Assistance

TU remains committed to working in watersheds and with communities impacted by abandoned mine drainage (AMD) through our AMD Technical Assistance Program and continued monitoring of impaired and recovering streams. In 2021, biological and water chemistry surveys, AMD assessments, and remediation treatment recommendations were completed in 12 watersheds in 9 counties across Pennsylvania. TU works closely with conservation districts, state agencies, volunteers, landowners, engineers, and other professionals to remediate and monitor watersheds impacted by AMD. Benthic macroinvertebrate and fishery communities were surveyed to determine the health of the stream ecosystem in response to remediation efforts. Water quality samples were collected to determine effectiveness and potential maintenance needs for AMD passive treatment systems that reduce toxic metals and return once AMD impaired water to streams. If you are interested in TU's AMD technical assistance, contact Allison Lutz at allison.lutz@tu.org for an easy to fill out assistance request form.



Outreach

Coldwater Habitat Program staff regularly perform trainings, provide technical assistance, and provide instruction at workshops on aspects of TU and its mission. In 2021, staff provided 9 training opportunities to 327 participants statewide. The following is a list of trainings completed in 2021.



| Description | Participants | Training Type | Audience | Location |
|--|--------------|----------------------|-------------------------------|-------------------|
| Streambank Stabilization | 68 | Presentation | Conservation Districts | Virtual |
| NAACC training | 1 | Technical Assistance | PSU PhD student | Huntingdon County |
| Large Wood Additions | 103 | Presentation | DEP Staff | Virtual |
| Potter County Municipal Meeting | 29 | Presentation | Potter CD and Municipal Staff | Coudersport, PA |
| LWA Chop and Drop structures | 4 | Technical Assistance | Moshannon DCNR | Penfield, PA |
| Wildlife Leadership Academy (PA Brookies, Watersheds 101) | 34 | Presentation | High School Academy Students | Virtual |
| Wildlife Leadership Academy (PA Brookies, Dirt Roads and Trout) | 34 | Presentation | High School Academy Students | Virtual |
| Habitat Improvement Streambank Stabilization | 24 | Workshop | Districts and Local Townships | Knox, PA |
| Habitat Improvement Streambank Stabilization and Large Wood Addition | 30 | Workshop | DCNR | Huntingdon County |

Habitat Diversity at the Farnsworth Habitat and Stabilization Project

A mix of diverse habitat in our coldwater streams stabilizes ecosystems and their services. The PA Coldwater Habitat Program has always looked at ways to incorporate complexity into the stream system. Mixing conventional habitat structures with the addition of large wood structures helps to create diversity that trout and coldwater organisms may need more in the future than ever before. These great improvements occurred at several stream sites this past construction season. An example of this is the Farnsworth Project located on Farnsworth Branch in the Allegheny National Forest near Clarendon, PA. This project resulted in 7,920 feet of improvement and 31,780 pounds of sediment reduction with the use of large wood and traditional structures.



Pictured above is an example of a chop and drop



Pictured above is an example of a traditional habitat structure

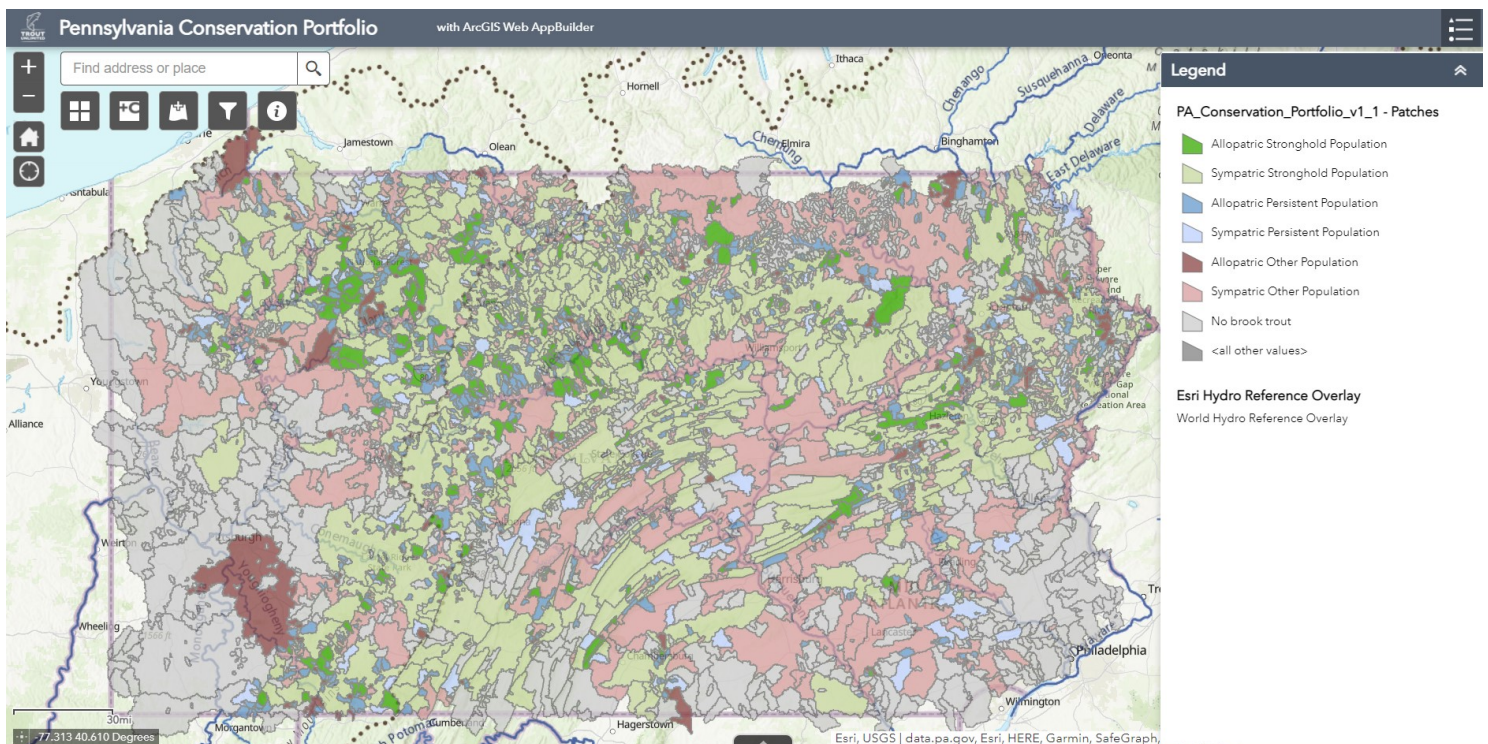
Climate change is predicted to impact our coldwater resources in a variety of different ways. TU is mindful of this when planning conservation efforts. Diverse and complex habitat in streams will lead to greater long-term stability for trout and other aquatic organisms.

Conservation Portfolio Update for Pennsylvania

Trout Unlimited developed the Conservation Portfolio and Range-wide Habitat Analysis for the eastern portion of the brook trout's range in 2017. These products characterize the key elements of population diversity and the continuum of viability, habitat condition, and vulnerability present in brook trout populations from Maine to Georgia. These products are available online at: <https://www.tu.org/science/conservation-planning-and-assessment/conservation-portfolio/eastern-brook-trout-conservation-portfolio/>.

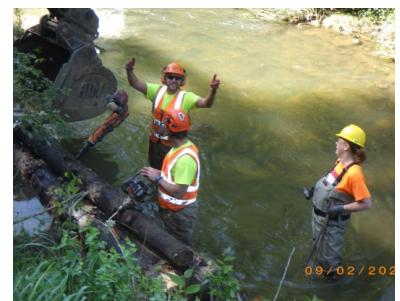
In 2021, TU completed an update to this analysis for Pennsylvania. To date, all iterations of the Conservation Portfolio have relied on trout presence/absence data from the Eastern Brook Trout Joint Venture.

The updated portfolio builds upon the original Conservation Portfolio through the incorporation of new and/or updated datasets for Pennsylvania (e.g. North Atlantic Aquatic Connectivity Collaborative culvert assessments, unassessed waters, etc.) and the inclusion of trout biomass and abundance data from the Pennsylvania Fish and Boat Commission. The inclusion of these data allowed for a much more detailed analysis and finer-scale interpretation of the data that will lead to more effective conservation planning, additional metrics and baseline data for monitoring the success for restoration/conservation projects, and enhanced management of brook trout resources in Pennsylvania. The new portfolio tool will be available soon on www.tu.org.



Who's Who with TU's Coldwater Habitat Program in PA

- Scott Koser – Project Coordinator, PA Coldwater Habitat Program
- Kathleen Lavelle – Field Coordinator, PA Coldwater Habitat Program
- Allison Lutz – Science Coordinator, Northeast Coldwater Habitat Program
- Shawn Rummel, PhD – Lead Science Advisor, Northeast Coldwater Habitat Program
- Kyle Schlittler – Stream Restoration Technician, PA Coldwater Habitat Program
- Phil Thomas – Stream Restoration Specialist, PA Coldwater Habitat Program
- Jake Tomlinson – Manager, PA Coldwater Habitat Program
- Amy Wolfe – Director, Northeast Coldwater Habitat Program



West Branch Susquehanna Recovery Benchmark II

Trout Unlimited developed the West Branch Susquehanna Recovery Benchmark Project in 2009 for the purpose of documenting and quantifying the results from dozens of abandoned mine drainage (AMD) remediation projects and millions of dollars that had been invested in abandoned coal mine cleanup across the watershed. The 2009 project indicated significantly better water quality and biological conditions compared to historical conditions.

Since the completion of the initial project in 2009, AMD remediation efforts have continued across the watershed, including the construction of new passive and active treatment systems and abandoned mine land reclamation. In 2017, TU began work to replicate and expand the 2009 project. The objective of this repeat study – the West Branch Susquehanna Recovery Benchmark II – was to document current water quality and biological conditions and identify changes through time in response to the continued efforts to restore the West Branch Susquehanna River to its full potential.

This study was completed in 2020 and a summary report and detailed technical report of the results were released in early 2021. In brief, the results from the water quality, aquatic insects, and fishery surveys indicate continued improvements throughout the watershed. The mainstem of the river has maintained a net alkaline condition from its headwaters downstream to Lock Haven. The upper 26 miles of the river was recently designated as supporting naturally reproducing trout populations, an impressive accomplishment for a section of the river that had been ravaged by AMD pollution for so many years.

Water quality in the tributaries also continued along a trajectory of improvement, although improvements between 2009 and 2017 were less dramatic than those reported between 1984 and 2009. Aquatic insects and fish continue to improve throughout the watershed. Several sites throughout the watershed, based on water quality, aquatic insects, and/or fish surveys may warrant further consideration for delisting from Pennsylvania’s list of impaired streams.

Although many of the results of this project were encouraging, comparisons with reference sites revealed that most of the historically impaired sites do not approach the water quality and biological communities observed in the reference sites. In addition, there are several tributaries that continue to disproportionately contribute acidity to the river. These issues need to be further addressed in order to continue to see improvements in water quality and biological communities throughout the watershed.

More information can be found at www.wbsrc.org.



Current and Beyond

The PA Coldwater Habitat Program is looking forward to 2022 and will continue to build on these great efforts from 2021

Brook Trout Conservation Planning and Restoration Response Monitoring

In the spring of 2021, protocols were chosen to evaluate in-stream habitat structure, culvert replacement, dirt and gravel road improvement, and streambank stabilization projects in the Kettle Creek watershed with a focus in the Cross Fork Creek subwatershed. The main goal of this study is to establish a restoration response monitoring protocol. Long-term effectiveness and impacts of in-stream habitat improvements were assessed by looking at structures built in years ranging from 1999-2020. Sediment impacts were also assessed after dirt and gravel road improvements were completed using embeddedness measures. Culvert replacement projects will be assessed for fish passage via longitudinal profiles and North Atlantic Aquatic Connectivity Collaborative assessment protocol. Trout populations were measured at all sites, other fish species present were recorded. Our seasonal interns helped us iron out the methods early in June, and then helped us complete the surveys at the majority of sites over the course of the summer. Redd surveys were completed in the fall at all sampling streams within the Cross Fork Creek subwatershed except in the main stem of Cross Fork Creek due to visibility issues. Currently the only monitoring remaining for this project is completion of fishery surveys at two sites, embeddedness at two sites, and longitudinal profiles of the three culvert replacement projects.



PACBS1 Project

PACBS1 is a short code for the longest project title in the history of project titles: *“Strengthening Stronghold Brook Trout Patches and Improving Water Quality through Stream Restoration, Habitat Improvement, and Nonpoint Source Sediment Reduction Projects in Pennsylvania Focal Geographies.”* When the title says it all! This project has been underway for some time but will also be a focus for 2022. In short, when completed this project will have achieved 12.9 miles of stream restoration, reduced 246,500 lbs. of sediment, 281 lbs. of nitrogen, and 129 lbs. of phosphorus in the Chesapeake Bay watershed. Other accomplishments will include 20 new design plans developed under TU’s Nonpoint Source Technical Assistance Program, 3 workshops, and "behavior changes" for at least 10 people who adopt the conservation tools and practices presented through this project in their own watershed restoration planning and practices.

Work under this project has and will continue to increase Eastern brook trout populations while simultaneously improving water quality through large wood additions in stronghold brook trout watersheds. The projects are designed to increase trout biomass, available complex woody cover, available pool habitat, and decrease sediment pollution and associated nitrogen and phosphorus loading.

