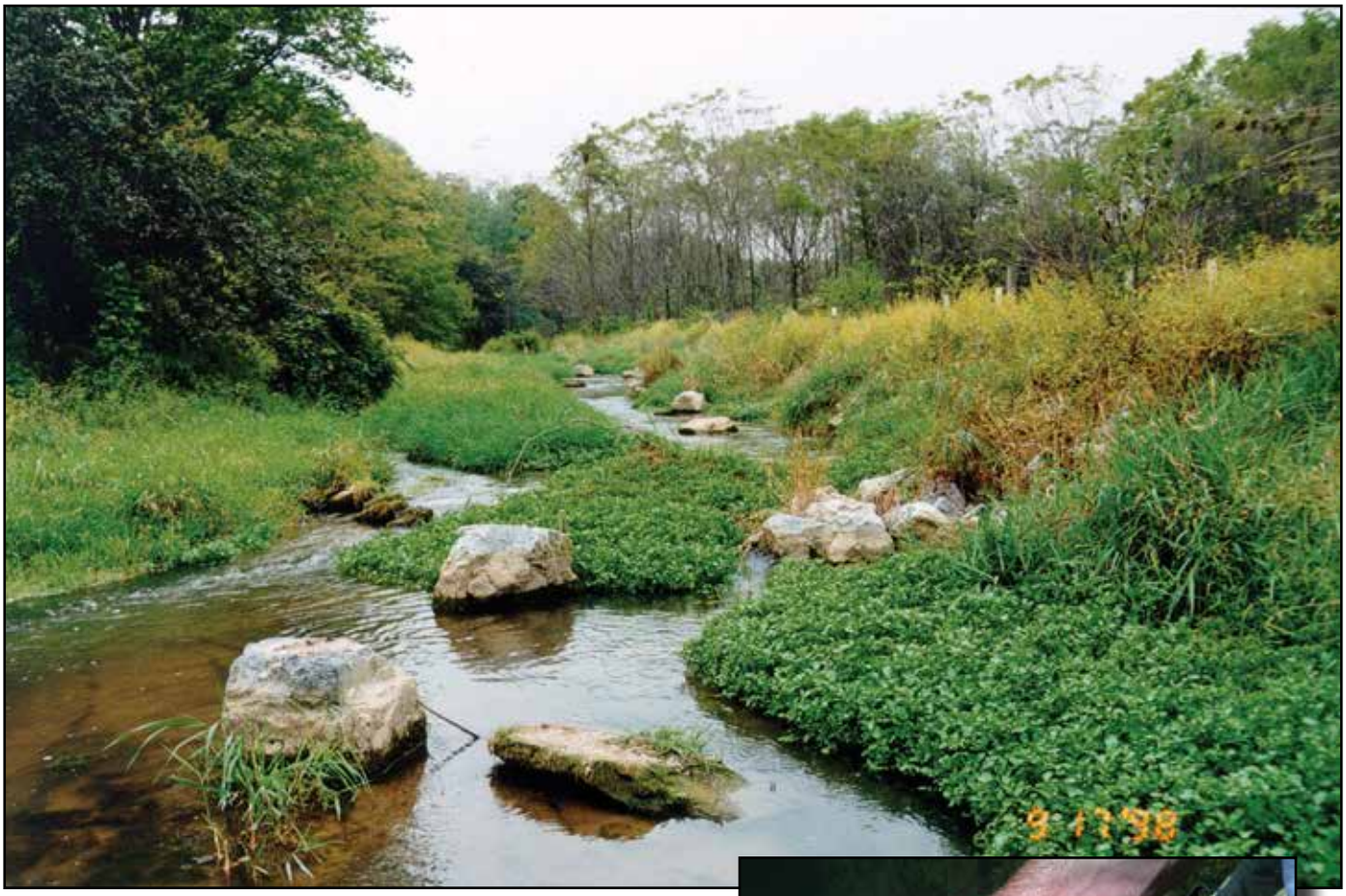
Fixing a Broken Trout Stream



Conowingo Creek Stream Restoration following installation of its Total Maximum Daily Load plan. Inset: Adult brown trout electro-fished from under installed mudsill.

Memories from youth of tramping through fields and streams, hunting, and fishing might have a golden tint now, as if everything was perfect. While a bubbling stream, a breeze sweeping over a meadow, and the skittering of small animal feet might seem natural and good to many, those educated in natural sciences and the environment know that when all seems well, it might not be. In places like South Central Pennsylvania, things were not necessarily "natural." In an area long affected by agriculture and land development, miles of streams and acres of watersheds

were and remain heavily impacted by sediment and nutrient pollution and a lack of stormwater management.

Muddy Boots

Many of those today involved in watershed and stream restoration are the same ones with memories of growing up with muddy boots and fishing poles. They never outgrew their love of the outdoors, and in some cases have made serious hobbies and full-time careers of restoring their local watersheds and streams.

Stream restoration isn't accomplished merely armed with an education in fisheries management and a love for the outdoors; it also requires seeking out funding and securing permission from property owners. Grants or other means of paying expenses such as a contractor and his backhoe, as well as salesmanship to gain permission from landowners, are all requirements of the typical stream restoration project. And then there is the necessity of securing a stream encroachment permit and coordination with regulatory agencies – all of which take time, finesse, and patience.

Skipping Stones

Historically in Lancaster County, Pennsylvania, the installation of best management practices (BMPs) generally occurred in any watershed where a willing landowner could be found. But in the mid-1990s, efforts to focus BMP installations in specific, planned watersheds came into vogue. Concentrating restoration efforts, time, and funding on a particular watershed by following a targeted restoration plan became the norm. This approach enabled local organizations to secure grant funding at the state and federal level for their streams.

During that time period, the U.S. Environmental Protection Agency (EPA) was working with the Pennsylvania Department of Environmental Protection (PADEP) to both identify and make more direct plans to improve impaired waters within the state. The EPA had begun requiring all states to submit lists of impaired waters to create a master reference, known as a 303(d) list. Waterways on the 303(d) list required the timely completion of a Total Maximum Daily Loads (TMDL). As a result, the PADEP began to work with watershed groups to implement TMDL planning at the community level.

Donegal Trout Unlimited (Donegal Trout), a Lancaster County, PA nonprofit conservation group, integrated itself into the TMDL planning process. The group's goal is to protect and enhance local cold water resources, including county trout streams. They pursue state, federal, and private funding and work with area natural scientists to restore stream habitats and watersheds.

With technical help from RETTEW, an experienced environmental consultant, Donegal Trout prepared a TMDL Implementation Plan for the Conowingo Creek in April 2005 and submitted it to the U.S. DEP and PAEPA for approval, and soon after began to receive funding to restore its first portions of Conowingo Creek. In the ensuing years, Donegal Trout continued to secure funding and implementation of the plan.

Conowingo Creek Stream Restoration project before plan implementation, showing stream bed erosion.

Restoration Compass

Donegal Trout worked with RETTEW to prepare a site-specific TMDL Implementation Plan for the 34 square miles of the Conowingo Watershed. The consultant collected real-time data of land use within the watershed, scaling the information to feet and acres. That data enabled proper modeling of pollutant loading, as well as anticipated removal of certain pollutants with a variety of applied BMPs.

RETTEW used a helicopter and a GPS-linked video camera to record land use conditions throughout the watershed. The video linked with GPS enabled their team members to quickly discover problem areas, which in turn enabled specific scale drawings, resulting in practical identification of the exact size of each area. Once those were known, links to GIS parcel data revealed the landowners for each troubled spot. They also assigned particular BMPs and anticipated pollutant reductions for each problem area. The natural scientists used Penn State's Pollution Reduction Impact Comparison Tool (PREDICT) for modeling anticipated pollutant reductions.

The end result of those steps was a restoration roadmap, complete with landowner-specific issues and solutions. Now they were ready to educate its community about the importance of stream restoration and their detailed action plan, as well as secure funding.

Hold Your Horses

With the newly approved, government-certified restoration plan, RETTEW and Donegal Trout personnel set out on their mission of restoration. Rather than generically going door-to-door in the community and talking with landowners, the group employed a specific project strategy that grew out of earlier investigative steps.

During the TMDL planning process, those involved also researched the whereabouts of trout in the stream. The team electro-fished several farm properties within the watershed to determine the status of wild brown trout and the carryover of stocked trout farther downstream in the watershed. During that process, scientists from RETTEW and members of Donegal Trout met many landowners and shared their intentions to restore the creek. As many farmers and their families fish and hunt on their land and in the community, conversations centered around common goals of keeping the land at its best. Discussing stabilization of eroding stream banks and providing better habitat for fish led to building relationships and opportunity to further plan site-specific restoration work with the landowners.

Sparkling Reputation

In 2007, Donegal Trout received a Section 319 Grant to design, permit, and construct five different restoration projects on five different properties. Those pieces of land included two farms, two residential properties with large back yards, and one golf course.

Since 2009, the organization has received other grants, combined material donations, partnered with businesses in need of mitigation sites, and collectively tackled another six properties with various ailments. One of those sections of land was an Amish-owned farm with more than two miles of stream running through it. All told, nearly $1 million has been spent so far in design, permitting, construction, and maintenance of Conowingo Creek.

Conowingo Creek Stream Restoration after Total Maximum Daily Load plan installation, showing restored flow and reinforced banks.

After several years of successful projects and solid relationships with land owners, Donegal Trout has earned a reputation in the community as an organization interested in working with property owners to better the natural environment. The community members are tightly connected, and word has spread about the work that's been completed, with conversations at the local churches, feed mills, and township meetings.

Getting Your Feet Wet

The design and process of restoring the Conowingo Creek involves much contact with farmers, as 83 percent of the watershed is in some form of agricultural production. Before implementing state and federally funded BMPs on a farm site, the farmer's conservation and manure management plans must be up-to-date and complete. Sometimes, discussing proposed BMPs for stream restoration with a farmer is a catalyst to bring a farm operation into compliance with its own regulatory requirements. Local agricultural consultants are hired to prepare, update, and design these plans with the farmers.

Following a conservation and manure management plan finalization, Donegal Trout moves on to other restoration steps for each stream section. Riparian restoration as a part of the overall stream project typically includes forest buffer installations, streamside fencing in concert with rotational grazing, cattle crossings, channel stabilization, fish habitat improvement, wetland restoration and creation, dam removals, and floodplain restoration involving the removal of legacy sediments.

When stabilizing stream channels, they incorporate the most natural design possible, given site and budgetary limitations and land owner preferences.

Uphill and Downhill

While these restoration endeavors have been ongoing for several years, sometimes the process goes well, and other times it falters. Like any watershed restoration project, Donegal Trout has faced their share of challenges. With a total of 126 problem areas identified, the group has often wondered if it will ever accomplish its goal with this waterway. Keeping hope and sticking to the plan become imperative in times like those.

The TMDL Implementation Plan for Conowingo Creek, now commonly known as a Watershed Implementation Plan (WIP), is based on a simple strategy: start at the top of a watershed and work downstream. This approach has made sense for two reasons. First, it's not logical to jump into the middle of the watershed and undertake a restoration project when upstream conditions will overshadow those improvements. Secondly, beginning at the

top of a watershed means less water flow to manage and typically a more stable design and installation. The more water that is added, the more challenging it can be to strike a balance with BMPs. It's much wiser to tackle several contiguous stream segments in smaller sub-watersheds, where linked improvements have the benefit of building upon each other. Through that order of the process, the collective improvements allow the stream to begin its recovery. As each small success is gathered, eventually the waterways can be removed from the 303(d) list. Managing the sub-watersheds correctly makes addressing the main stream stem much more effective.

Permitting can be very complicated at times. Larger restoration projects usually require a joint permit or a restoration waiver from the PADEP and the U.S. Army Corps of Engineers. Donegal Trout has built a good working relationship with both regulatory agencies; however, collecting all of the necessary components of these permit applications can significantly impact the project budget. Two of the more time-consuming and costly permit preparations include: conducting studies necessary for securing a clearance letter from the Pennsylvania Historical and Museum Commission; and conducting investigations for rare, threatened, and endangered species – usually the bog turtle in that area. Eventually, Donegal Trout receives those clearances, but sometimes it seems apparent by the site conditions that the studies were unnecessary. This can be frustrating when time and money are scarce commodities.

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During project planning and implementation, weather can become an issue. Storms can blow in shortly after seeding and mulching a site, or a flood can occur following a forest buffer planting and tree tube installation. Once, a sycamore tree fell and smashed a newly installed stream side fence, letting in livestock to explore the previously off-limits area.

Maintaining a restored section of stream can also have its ups and downs. When partnering with a land owner, Donegal Trout develops an Operation and Maintenance Agreement. This agreement outlines who is responsible for maintaining and replacing parts of the restoration project, and the duration of the agreement. The routine, affordable items are typically the landowner's responsibility, such as keeping the streamside fencing weed free so that the electric fence does not short out. More costly and time-consuming repairs are generally covered by Donegal Trout, or another identified restoration partner. For example, much of Conowingo Creek's forest buffer maintenance is covered by the Conservation Reserve Enhancement Program, and a similar streamside buffer program is administered by Penn State in the Lower Susquehanna River Watershed. Donegal Trout is committed to not only completing stream restoration projects, but putting in place long-term maintenance plans and regularly checking on the sites.

Wild brown trout fingerlings three years after restored reach.

A Home Outdoors

Donegal Trout is one of many organizations statewide and nationally that are steadily improving our waterways. They continue to raise awareness of the need to protect and restore streams, installing best management practices in the communities they serve. With assistance from environmental regulatory agencies and organizations, design consultants, and skilled earth-moving contractors, our society can enjoy the many benefits derived from a healthy watershed, and children of all ages can continue getting their boots muddy with fishing pole in hand. **L&W**

by Mark Metzler, Senior Environmental Scientist

For more information, contact Mark Metzler, Senior Environmental Scientist, RETTEW, at 1-800-738-8395.