Healthy Water, Healthy Communities

Watershed Restoration FAQs

Pennsylvania is a water-rich state with approximately 85,500 miles of rivers and streams connecting over 2,000,000 acres of lakes, bays, and wetlands. Many watersheds across Pennsylvania are polluted and need to be restored. Restoring these waters and the groundwater below is a challenging but vital mission.

For Starters: Why is watershed restoration needed and how do we know?

- There are many watersheds across Pennsylvania that are polluted and need to be restored.
- Watersheds are made up of a network of stream segments. These stream segments are assessed by Pennsylvania DEP, using publicly-participated assessment methods and data collection protocols to evaluate the water quality standards that apply to their protected uses.
- The protected uses fall into four main categories: Aquatic Life, Water Supply, Recreation and Fish Consumption, and Special Protection. Each protected use has specific water quality standards.
- Additional protected uses are found within each protected use category. For example, Aquatic Life uses also include cold water fishes, warm water fishes, trout stocking, and migratory fishes.
- Nonpoint source (NPS) pollution can affect aquatic biological communities, physical habitat, and chemical water quality parameters within streams. Aquatic Life Use assessments evaluate the condition of streams against established numeric and narrative criteria to determine if stream segments are meeting this use. If streams are not meeting all applicable criteria, they are determined to be impaired.
- Assessments that identify impaired stream segments include the sources (origin) and causes (pollutants) that are contributing to impairments. These stream segments are listed in Pennsylvania's Integrated Water Quality Report (IR).

How do I find out which Pennsylvania watersheds are impaired?

- To explore Pennsylvania's streams and their impairment status for each protected use, as well as the assessment methods and data collection protocols used during their assessments, you can visit Pennsylvania's interactive IR: Integrated Water Quality Report-2022 (pa.gov)
- You can find a wealth of information, including your local watershed's impairment status, on EPA's How's My Waterway.

How does the federal Clean Water Act help?

- The Clean Water Act requires each state to list its polluted waterbodies and develop Total Maximum Daily Loads (TMDLs) for polluted waterbodies. TMDLs are a calculation of the maximum amount of a pollutant that a waterbody can handle and still meet water quality standards.
- TMDLs set waterbody-specific pollution limits for the pollutant(s) identified as causing the impairment (i.e., limiting the waterbody's ability to support the designated uses and meet water quality standards).
- **Here is an example of a TMDL for NPS pollution impairment:**
    - Stream segments within a watershed are designated for the Aquatic Life use of cold water fishes, but siltation and nutrients from agricultural sources in the watershed have polluted the stream enough that water quality standards are not met for cold water fishes. The result is an impairment to that stream.
    - When the stream is determined to be impaired, a TMDL is developed by analyzing the sources of pollution in the watershed against the water quality standards designated for that watershed. The TMDL provides pollution load limits in mass per unit time (e.g., pounds per day) for the watershed. It also provides load allocations for all sources contributing to the pollutant load, and establishes required reductions from the largest sources' existing loads, in order to eventually meet water quality standards.
    - For example, in agriculture, the sources of siltation and nutrients are generated from farm animals, stream banks, pastures and croplands, etc. All of these sources can be assigned siltation and nutrients load reductions to meet the TMDL load limits. Implementing best management practices (BMPs) through pollution-reducing projects will help that waterbody eventually meet water quality standards.
- **Key takeaway:** TMDLs in NPS watersheds set challenging goals, but they can be achieved, if done properly.

How are NPS TMDLs implemented so that watershed streams are properly restored?

- Once a watershed receives a TMDL, it may go through a further analysis to develop a Watershed Implementation Plan (WIP) to identify key areas for improvement and BMP implementation.
- Conservation groups work with DEP, local County Conservation Districts and other partners to develop watershed plans. Keep in mind that this is a complicated process that involves communication every step of the way to ensure the plan meets the TMDL goals, as well as the expectations of DEP and U.S. EPA.
- It is important to start with small subwatersheds for WIP development (less than 25 square miles), so that BMPs can be focused within that area to maintain a targeted approach to BMP implementation that will maximize water quality improvement.
- Once the WIP is written and approved by EPA, BMP funding is often available through grants and loans.
- A grantee, usually a watershed association, conservation district, or conservation group, submits proposals to design and construct BMPs according to the WIP. In watersheds impaired by agricultural pollutants, common BMPs include stream restoration, livestock exclusion fencing, riparian buffer restoration, wetland restoration, drainageway protection, barnyard improvements, animal waste management systems, use of conservation tillage and cover crops.
- Conservation district and DEP staff also help to ensure compliance with agricultural regulations, such as the implementation of erosion and sedimentation plans and nutrient management plans.
- As more BMPs are installed in the targeted watershed, stream and habitat monitoring is helpful to track progress along the way.
- In some cases, DEP may streamline the above process via the development of an Advanced Restoration Plan (ARP). Rather than first developing a TMDL and then having an outside organization develop a WIP to satisfy the TMDL, DEP may generate a single document that prescribes needed pollution reductions, proposes a plan for achieving them, and qualifies projects for specific funding sources, such as EPA's 319 program.
- ARPs are typically reserved for special interest watersheds that appear to be restorable, and where there are actively engaged implementation partners.

Finally: How do we know if a watershed and its streams have been successfully restored?

- Once a watershed has been impaired, a TMDL (or ARP) has been developed and implemented, and water quality conditions have improved, the watershed is reassessed by DEP.
- If all stream segments within the watershed improve to the point that they meet the applicable water quality standards, they are listed on Pennsylvania's Integrated Water Quality Report (IR) as successfully attaining their protected uses and the watershed is considered restored.
- When water quality in some, but not all, surface waters within a watershed improves and some stream segments are determined to be attaining, this is known as partial watershed restoration. This indicates partial success and helps to further target areas where work is needed in the remaining impaired segments.
- TMDLs remain in effect in perpetuity as a backstop to avoid the waterbodies slipping back into impairment. Pollutant loading limits to prevent ecological degradation were established through the TMDL and then attained through restoration efforts.
- It is important to keep these limits in place, even in the case of successful restoration, to avoid future impairments.

For additional information please visit Watershed Support (pa.gov) and Water Quality (pa.gov)

Clean water: Great for PA Good for the Bay

Case study: Hungry Run Watershed

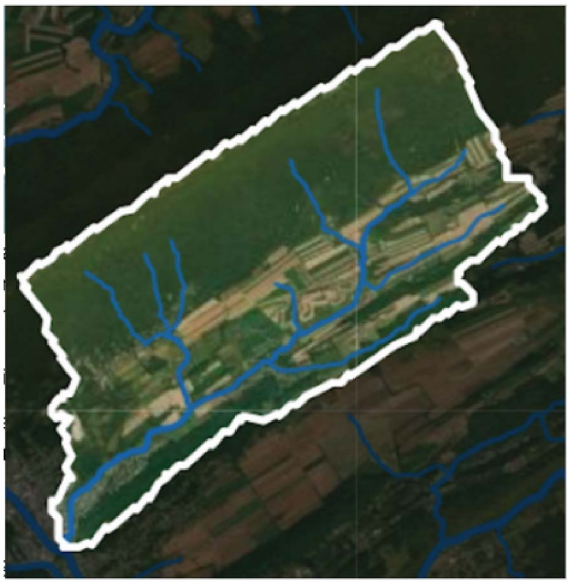
Watershed restoration is a complex task that involves many partners along the way, so successful restoration, when it occurs, should be celebrated and communicated to all watershed restoration partners from the local to the federal level. Hungry Run is an example of this.

Hungry Run is in the Susquehanna River Basin's Ridge and Valley Provincial Province of central Pennsylvania. The eight square mile watershed is bounded by forested ridgelines and has a stream valley dominated by agriculture.

Hungry Run is impaired by sediment from agricultural sources. Mifflin County Conservation District (MCCD) has been working with local partners to reverse these impairments and restore water quality.

From 2008 to 2018, MCCD received nearly $1 million from federal section 319, Pennsylvania Growing Greener, National Fish and Wildlife Foundation, and Natural Resource Conservation Service grants to implement the following BMPs:

- 639 acres of agricultural erosion and sediment plans covering 85% of the agricultural lands in the watershed
- 639 acres of nutrient management plans also covering 85% of the agricultural lands in the watershed
- 214 acres of cover crops
- 539 acres of conservation tillage
- 10,359 linear feet of livestock exclusion fencing to prevent cattle from accessing the stream
- Six stream crossings for livestock
- Three off-stream watering facilities
- 10,270 linear feet of stream restoration
- 16 acres of riparian forest buffers
- Five animal waste management systems covering 88% of the livestock in the watershed
- 2,950 linear feet of stormwater controls
- 1,010 linear feet of access lanes



Water quality monitoring pre- and post-BMP implementation shows that Index of Biotic Integrity (IBI) scores have improved by an average of 25 points. IBI scores will continue to be monitored for improvements. The IBI measures the health of the community of life such as mayflies, caddisflies and stoneflies that live on the stream bottom. Scores below 50 indicate impairment. With Hungry Run's IBI scores improving throughout the watershed, some stream segments have progressed successfully from impaired to attaining, and are no longer polluted to the point of violating water quality standards for Hungry Run's aquatic life use of trout stocking.

The ARP modeled and developed for Hungry Run calls for a 35% reduction in sediment. Modeling of the BMPs implemented demonstrates a 55% reduction in sediment, which meets and exceeds the numeric restoration goal for Hungry Run. This accomplishment, coupled with the positive increase on IBI scores, indicates the health of Hungry Run is improving following BMP implementation. There are several reasons why the Hungry Run watershed was ideal for restoration:

- The watershed is eight square miles, ideal for targeted restoration activities, and in line with DEP's recommendation of less than 25 square miles;
- The high gradient, forested headwater stream segments provide reservoirs of healthy communities of aquatic life ready to recolonize the valley stream segments downstream;
- MCCD is an active partner in conservation that has built a strong relationship of trust with the local landowners as well as the personnel that administer grants; and
- MCCD installed BMPs extensively throughout the Hungry Run watershed while using a combination of funding sources for BMP implementation to control upslope and riparian sources of agricultural pollution.

The health of Hungry Run has improved to the point of partial watershed restoration, but more time and work is necessary to reach the health of similar watersheds that are not impacted by agricultural activities. Hungry Run serves as a prime example of the extensive restoration activities required to restore agricultural watersheds, and the impact this work has on surrounding watersheds and communities.