



NONPOINT SOURCE SUCCESS STORY

Pennsylvania

Agricultural Best Management Practices Improve Water Quality in Hungry Run

Waterbody Improved

Sediments and nutrients from agricultural activities impaired Hungry Run's aquatic life. As a result, the Pennsylvania Department of Environmental Protection (PA DEP) added Hungry Run to Pennsylvania's 2002 Clean Water Act section 303(d) list of impaired waters for excessive siltation and nutrients due to agriculture. The Hungry Run Section 319 Nonpoint Source Management Program Watershed Implementation Plan (WIP) was developed in 2008. The Mifflin County Conservation District (MCCD) led watershed restoration efforts, working with farmers and private landowners to implement agricultural best management practices (BMPs). Recent monitoring indicates that water quality is improving in the Hungry Run watershed.

Problem

Hungry Run is a tributary to the Kishacoquillas Creek in the Juniata River and Susquehanna River basins. The 8-square-mile watershed is in Mifflin County and is surrounded by wooded ridges and Jack's Mountain. The stream is relatively small (4.7 miles long) but flows through three political jurisdictions in Mifflin County before joining Kishacoquillas Creek in Burnham Borough (Figure 1).

The watershed's primary land use is forest (62%) but agricultural activities and some residential development dominate its narrow stream valley. Agriculture (31%) is the other major land use in the watershed and is considered the source of impairment, according to PA DEP. Most nutrients are applied to Mifflin County agricultural land as both fertilizer and manure, often from dairy and swine production. However, excess nutrients applied to agricultural land can negatively impact water quality, resulting in nitrogen and phosphorus entering waterways through stormwater runoff. Additionally, tillage and earth disturbance activities contribute excess sediment to surface waters through stormwater runoff and streambank erosion (often due to vegetation removal and increased flow volumes). Hungry Run's aquatic life use is designated as Trout Stocked Fishes and Migratory Fishes under Pennsylvania's Chapter 93 Water Quality Standards. This aquatic life use is listed as impaired for sediment and nutrients from agriculture.

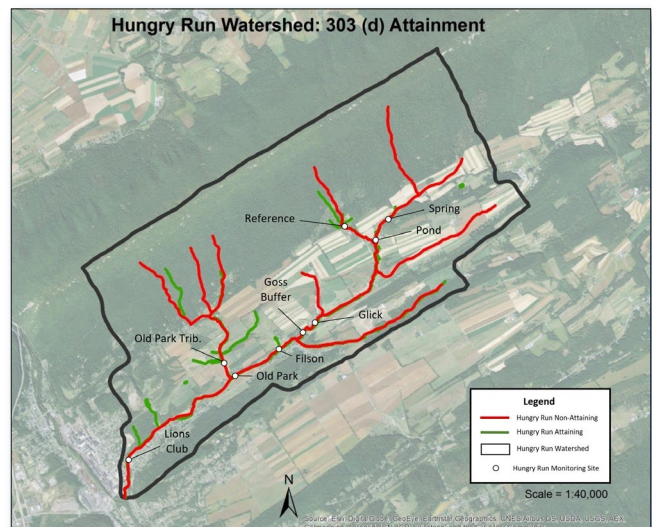


Figure 1. Hungry Run is in south-central Pennsylvania.

Story Highlights

Hungry Run is included in the 2017 Kishacoquillas Alternative Restoration Plan (ARP). In 2017, this ARP identified load reductions needed from specific sources in the most impaired subwatersheds, including Hungry Run. The ARP replaces and improves the total maximum daily load, includes an accounting of current BMPs, and uses future modeling scenarios. The ARP calls for a required annual load reduction of 35% for sediment and 53% for total phosphorus.

Table 1. Hungry Run watershed IBI scores ¹ (2014–2021)

Years	Hungry Run IBI monitoring stations ²								
	Reference	Filson	Glick	Goss Buffer	Lions Club	Old Park	Old Park Trib.	Pond	Spring
2014	46.6	35.8	30.6	32.8	15.0	34.6	47.9	52.3	22.8
2015	73.2	32.0	45.2	36.7	46.6	39.0	35.8	60.1	43.3
2016	59.0	33.1	43.6	28.8	35.9	41.3	36.8	56.1	33.0
2017	54.2	37.5	48.1	32.2	45.1	36.6	45.1	49.2	31.0
2018	54.0	40.0	40.4	35.9	42.4	36.5	44.7	47.2	34.7
2019	53.8	45.6	50.3	39.2	47.2	36.7	41.1	52.7	39.1
2020	44.1	55.0	61.2	50.1	45.8	46.0	41.6	49.4	51.0
2021	50.4	51.2	54.7	48.4	48.3	54.6	59.8	64.2	28.7

¹ IBI scores: ≥ 63 = attaining; 50–63 = requires further evaluation; < 50 impaired.

² Monitoring station locations are shown in Figure 1.

Agricultural BMPs are designed to remedy the problems of sedimentation and nutrient loading from farming. The MCCD works with willing landowners to implement agricultural BMPs to reduce sediment and nutrient pollutant loads in the Hungry Run watershed, with the ultimate goal of meeting the water quality standards. Twenty-four farms in the watershed have implemented a variety of agricultural and livestock BMPs to date. BMPs include five manure storage structures; six heavy use areas; 12,909 feet (2.45 miles) of stream fencing that created 16 acres of riparian buffers; seven stabilized livestock crossings; more than 75 in-stream fish habitat/streambank stabilization structures; 639 acres placed under nutrient management plans and agricultural erosion and sediment plans; 214 acres of cover crops; and 539 acres of conservation tillage.

Results

Watershed-wide long-term monitoring efforts began in 2014 to track water quality trends. MCCD’s multifaceted sampling includes field chemistry, water chemistry, physical habitat assessments and biological (macroinvertebrates and fish) assessments. Macroinvertebrate sampling in 2014 showed low index of biotic integrity (IBI) scores, which indicate aquatic life use impairment. An IBI score is a quantitative representation of the benthic macroinvertebrate community living in a stream.

Through annual monitoring, Hungry Run has experienced significant improvement in water quality metrics, illustrated by an increase in IBI scores. For example, Hungry Run Pond registered an IBI score of 64.2 in 2021, signifying the attainment of its aquatic life use (Table 1). An increase in IBI scores trending over time indicates an increase in macroinvertebrate diversity and populations.

The habitat assessments also revealed a general decrease in streambed embeddedness, which can be attributed to reduced sediment contributions from agriculture and streambank erosion. Continued monitoring and BMP implementation are still needed to take the significant improvements one step further to meet water quality standards.

Partners and Funding

Organizations that contributed time and funds to this project include MCCD, the Chesapeake Bay Foundation’s Buffer Bonus Program, the Pennsylvania Conservation Reserve and Enhancement Program, the National Fish and Wildlife Foundation’s Small Watershed Grants Program, and the PA DEP Section 319 Nonpoint Source Management Grants Program (\$1,514,980).



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