



NONPOINT SOURCE SUCCESS STORY

New York

Dam Removal and Stream Restoration Improve Fish and Wildlife Habitat in the East Branch of Wappinger Creek

Waterbody Improved

For more than 50 years, the Shapp Pond Dam near the outlet of the East Branch of Wappinger Creek in Dutchess County, New York, had blocked the passage of imperiled migratory fish such as American eel, disrupted natural flow and sediment regimes, and created artificial lentic habitat that favored non-native and invasive species. In 2016, the dam owner, the local soil and water conservation district, and the New York State Department of Environmental Conservation's (NYSDEC's) Hudson River Estuary Program (HREP) completed a cooperative project to remove the Shapp Pond Dam. Removal of the dam facilitated streambank stabilization and riparian habitat recovery throughout the East Branch of Wappinger Creek. After restoration, HREP and Cornell University documented significant improvements in the physical habitat quality and macroinvertebrate community that will help the stream meet its designated aquatic life and fishing use.

Problem

The East Branch of Wappinger Creek drains an area of roughly 86 square kilometers and is a major tributary to the Hudson River Estuary (Figure 1). Over the last century, a suite of anthropogenic stressors, including agricultural nonpoint source pollution, urbanization and hydromodification contributed to water quality and aquatic habitat degradation. A number of low-head dams throughout the watershed fragment aquatic habitat and impair natural riverine functions and ecological processes.

The 12-foot-high Shapp Pond Dam blocked the passage of imperiled migratory fish such as American eel, disrupted natural flow and sediment regimes, and created artificial lentic habitat that favored non-native and invasive species. The impoundment caused streamflow stagnation that contributed to elevated water temperatures, lower dissolved oxygen levels, and a greater probability of harmful algal blooms. In addition, given its poor structural condition, the dam represented a flood and safety hazard for the dam owner and downstream property owners.

In 2016, NYSDEC, in collaboration with the New York State Water Resources Institute and Cornell University, collected macroinvertebrate and substrate samples and characterized the habitat quality within

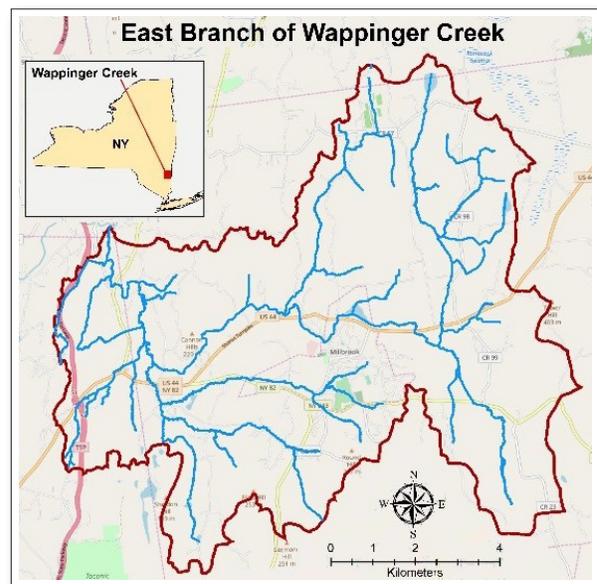


Figure 1. Wappinger Creek is in southeastern New York.

the impounded section of the river. These analyses indicated that the stream macroinvertebrate community as well as the aquatic and riparian habitat were negatively affected by the dam. Significant differences in fish communities were found below and above the dam. The warmer waters of the impoundment contained silt that was suboptimal for cold water species (e.g., trout) and species that prefer gravel substrate (e.g., Longnose Dace, Eastern Blacknose Dace). Fewer



Figure 2. Project site before and after dam removal.

American eel were found above the dam than in the downstream habitat as well. Dams are known to be significant barriers to resident and migratory fish species and contribute to habitat fragmentation and degradation, especially in high-quality cold-water tributaries.

Story Highlights

Using grant funds from the NYSDEC Hudson River Estuary Program, the Dutchess County Soil and Water Conservation District (SWCD) developed a restoration plan that included removing the dam while retaining some remnants of the dam and adding some erosion control along the streambank near the home for stabilization. The project partners implemented the restoration project in the summer of 2016 (Figure 2). After removing the dam, the SWCD planted native trees, shrubs and grasses along the formerly impounded area to reestablish a vegetated corridor. To document the ecological response and recovery of the stream, the team monitored fish, macroinvertebrate and substrate at locations both upstream and downstream of the dam.

Results

Restoration efforts restored connectivity to over five miles of stream habitat. Bioassessment data collected by the NYSDEC and Cornell University over the course of three years show clear recovery of the degraded upstream section of the river.

For instance, Biological Assessment Profile (BAP) scores that characterize the integrity of the macroinvertebrate community show improvement within the impounded section from “moderately impacted” to “slightly impacted” after removal of the dam (Table 1). Data suggests that the formerly impounded section of the East Branch of the Wappinger Creek now supports aquatic life uses. Likewise, qualitative habitat assessment scores obtained using the Stream Visual Assessment method suggests an improvement in the stream and riparian habitat in the impounded section following dam removal (see Table 1). Worth noting is the improvement in both metrics in the unimpounded (downstream) section from pre- and post-removal, as well. Moreover, particle size distribution within the impounded section coarsened substantially post-removal, indicating a mobilization of impoundment sediments and a restoration of natural lotic benthic habitat. (For more information on the BAP completed in East Branch of Wappinger Creek, see https://www.dec.ny.gov/docs/water_pdf/bapnarrative18.pdf.)

Partners and Funding

Engineering, demolition and streambank stabilization efforts were funded by the New York State Environmental Protection Fund through an HREP grant for Tributary Restoration and Resiliency, awarded to the Dutchess County SWCD (\$96,408). Biological and physical habitat monitoring data were collected by researchers from Cornell University with funding support from the New York State Water Resources Institute (\$33,401). Riparian planting was supported by HREP’s Trees for Tribs Program.

Table 1. Pre- and post-removal assessment data.

Year	Removal Status	Stream Visual Assessment Score ¹		Biological Assessment Profile Score ²	
		Impounded section	Unimpounded downstream section	Impounded section	Unimpounded downstream section
2016	Pre-removal	6.2	7.0	3.5	7.4
2017	Post-removal	8.5	8.5	6.4	7.5
2018	Post-removal	8.7	8.8	6.3	7.5

¹ SVA scores: 1–2.9 = severely degraded, 3–4.9 = poor, 5–6.9 = good, 9–10 = excellent

² BAP scores: <2.5 = severely impacted, 2.5–5 = moderately impacted, 5–7.5 = slightly impacted, >7.5 = non-impacted



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-20-001D
January 2020

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