



# NONPOINT SOURCE SUCCESS STORY

## Wisconsin

### Stream Restoration Improves Pike River in Petrifying Springs Park

#### Waterbody Improved

A degraded biological community was identified in the Pike River in 2012. The impairment was attributed to total phosphorus levels from nonpoint sources, which caused the river to exceed water quality criteria. Consequently, in 2012 the Pike River was added to Wisconsin's Clean Water Act (CWA) section 303(d) impaired waters list. In 2018 Kenosha County Division of Parks led efforts to restore stream conditions and improve riparian habitat in Petrifying Springs Park. As a result, an estimated 368 pounds of phosphorus will be prevented from polluting the Pike River annually, and post-implementation water quality monitoring showed a 55 percent phosphorus concentration reduction.

#### Problem

The Pike River watershed flows through portions of Racine and Kenosha counties in southeastern Wisconsin, draining an area of over 30,000 acres directly into Lake Michigan. This success story is centered around the work done in the Petrifying Springs Park portion of the Pike River (Figure 1). Although the Pike River as a whole is 39 percent agricultural, this section of river is mainly parkland. That being said, this area has been impacted by pollution contributed from upstream practices in the agricultural portions of the watershed.

The target area of about 20,000 linear feet of stream has been severely degraded by agricultural ditching, which channelized the river around the turn of the twentieth century. This channelization led to flashy flow conditions, increased erosion, and sediment loading during rain events. As a result, the Pike River is characterized by highly eroded streambanks and sediment accumulation, which has led to water quality problems.

The Wisconsin Department of Natural Resources (WDNR) conducted a 2012 water monitoring data evaluation, which led them to list this section of the Pike River as impaired on Wisconsin's 2012 CWA section 303(d) list of impaired waters. WDNR ranked the river's biological community as *poor*, as relatively few fish species were observed. Additionally, the fish species growth rates and condition factors were considered to be depressed. Water quality monitoring results from 2012 also indicated that total phosphorus

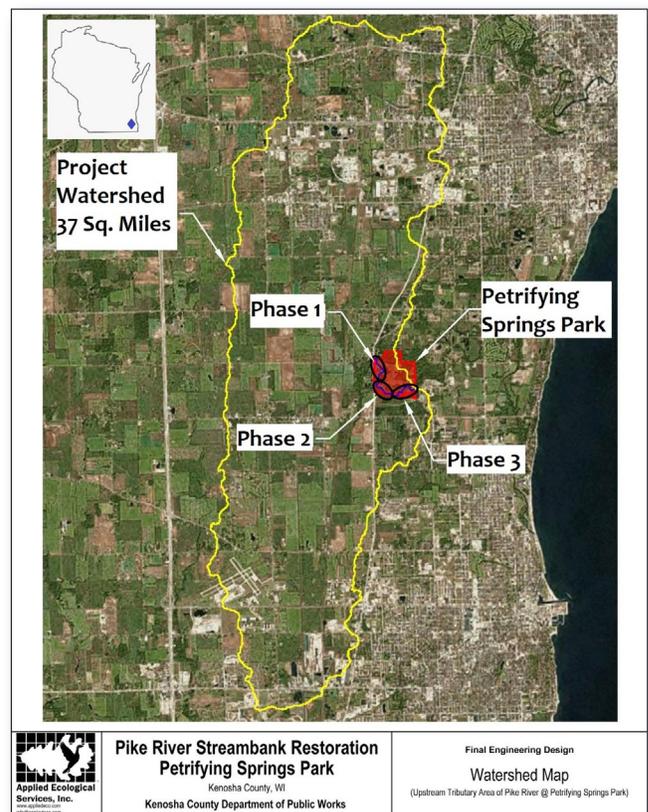


Figure 1. The Pike River flows through Petrifying Springs Park before draining into Lake Michigan.

concentrations (median 0.114 milligrams per liter [mg/L] and minimum 0.084 mg/L) clearly exceeded local stream water quality criteria, which established an upper threshold of 0.075 mg/L.

## Story Highlights

The Pike River in Petrifying Springs Park was identified as a priority area for restoration in the approved *Pike River Watershed Restoration Plan*, which was completed in 2013. The Pike River restoration project specifically addresses the plan's recommendations for river unit #PR11 (the Petrifying Springs Park portion of the river), which calls for "restoring streambanks using bioengineering techniques; removing problematic debris jams; and selectively removing invasive trees." In 2017, Kenosha County secured a Great Lakes Restoration Initiative grant award from the U.S. Environmental Protection Agency (EPA) to initiate Phase I restoration efforts. With County Executive Jim Kreuser as the champion of this project, Kenosha County addressed streambank erosion and improved in-stream structure and streamflow dynamics on a 3,145-linear-foot reach of the stream. Additionally, native vegetation plantings were installed within the 5.2-acre riparian habitat to stabilize and improve filtration and infiltration of the riparian corridor. A wetland delineation was also completed in the summer of 2017. Engineering, design, and construction documents were completed in spring of 2018 and restoration at Petrifying Springs Park project began in July 2018. All grading work was completed by November 2018.

Strategic stream stabilization included installing in-stream structures to increase hydraulic roughness aimed to dissipate energy, improve channel stability, and re-introduce aquatic habitat. In-stream structures included rock riffles, wing deflectors and boulder clusters. These structures will also enhance the recreational experience and aesthetics of the stream in highly visible areas: adjacent to parking and access areas, park pavilions, and trails. Green infrastructure practices and management in the project site addressed nonpoint source pollution in the Pike River and ultimately Lake Michigan. Restoration of the Pike River at Petrifying Springs Park will continue in Phases II and III.

In addition to improvements in water quality and stream habitat, public awareness of the project was increased through informative banners, press releases, social media posts, interpretive signage, and public forums. These educational efforts have been and will continue to be important to educate the public about the benefits of the Pike River restoration.

## Results

Kenosha County collaborated with the University of Wisconsin–Parkside to conduct water quality sampling. Monitoring by the university suggests positive changes are occurring in the Pike River, with short-term data showing reductions in concentrations of phosphorus (55% reduction) and nitrogen (44% reduction) (Table 1). Kenosha County has allotted funds to continue gathering monitoring data to analyze the impact of completed and future restoration work on the Pike River.

**Table 1. Pre- and post-implementation stream monitoring of the Petrifying Springs Park Pike River Restoration project (Phase I).**

| Parameter (units) | 2018 average (before) | 2019 average (after) | Target level |
|-------------------|-----------------------|----------------------|--------------|
| Nitrogen (mg/L)   | 2.706                 | 1.51                 | < 1.798      |
| Phosphorus (mg/L) | 0.22                  | 0.1                  | < 0.075      |
| Turbidity (NTU)   | 7.8                   | 11.2                 | < 14         |

In addition to water quality monitoring data, modeling (using the Spreadsheet Tool for Estimating Pollutant Load [STEPL]) indicates that the streambank stabilization is estimated to have removed 527 tons of sediment and 368 pounds of phosphorus from the river as a result of Phase I restoration. While this restoration project has been successful, additional work to reduce nonpoint pollution in the Pike River watershed will be needed to fully meet water quality goals.

## Partners and Funding

The Pike River Watershed Restoration Plan was completed in 2013 as an EPA Nine-Element Watershed-Based Plan. This plan served as a catalyst to convene project partners and pursue funding to implement the long-term improvements. In addition to Kenosha County Division of Parks, project partners included University of Wisconsin–Parkside, WDNR, and the Root-Pike Watershed Initiative Network, among many other educational, governmental and environmental groups. Funding for the project included \$500,000 from EPA via the Great Lakes Restoration Initiative award (2017), \$150,000 from the Fund for Lake Michigan (2017), and \$591,000 of in-kind match from Kenosha County, for a total of \$1,241,000.



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