



NONPOINT SOURCE SUCCESS STORY

New Jersey

Project Evaluates Subsurface Gravel Wetland Treatment Design Alternatives for the Barnegat Bay Watershed

Waterbody Improved

The New Jersey Department of Environmental Protection (NJDEP) added a section of the Metedeconk River (Route 9 to I-195) to the 2002 Clean Water Act (CWA) section 303(d) list of impaired waters for biological impairment due to excessive nutrient loading from surface runoff. In 2013, NJDEP approved the Metedeconk River Watershed Protection and Restoration Plan to restore and protect water quality in the Metedeconk River watershed. To address the biological impairment caused from high levels of phosphorous and nitrogen loads, the Rutgers Cooperative Extension Water Resources Program led a project to design and install four stormwater management systems and evaluate their effectiveness. These systems, designed to remove nitrogen, phosphorus, and total suspended solids from surface runoff, led to improved biological conditions in this section of the Metedeconk River. As a result, NJDEP removed it from the impaired waters list in 2018.

Problem

The Metedeconk River drains into eastern New Jersey's Barnegat Bay, an estuary well known for its commercial fishing and recreational boating activities (Figure 1). High levels of phosphorous and nitrogen loads to the watershed can cause eutrophic and hypoxic conditions—reducing the dissolved oxygen levels in the water and harming organisms that live on or in the bottom sediment of the waterbody. Excessive nutrient loads cause increased occurrences of algal blooms and result in the loss of submerged aquatic habitat and fisheries. Land use within the watershed, largely composed of residential and commercial spaces, can increase the amount of nutrient loading. Using 1995 data, NJDEP added a section of the Metedeconk River (Route 9 to I-195) assessment unit (hydrologic unit code 02040301020020) to the 2002 CWA section 303(d) list of impaired waters for biological impairment due to excessive nutrient loading from surface runoff in the watershed.

Story Highlights

Four stormwater management systems were installed at Georgian Court University's campus in Lakewood, New Jersey, with the goal of evaluating their effectiveness to inform future stormwater management projects. The project partners designed and installed four wetland cells on the project site: one advanced



Figure 1. The Metedeconk River flows through the Georgian Court University campus in eastern New Jersey.



Figure 2. One of the on-campus wetland project sites.

bioretention system and three subsurface gravel wetlands (Figure 2). Each system was installed with a particular design variation. These variations were intended to increase knowledge and assist in determining whether an optimal design exists, based upon the removal rate from the inflow through the cells, that could be used to reduce nitrogen in the Barnegat Bay watershed. To determine the effectiveness of the individual wetland cells, stormwater monitoring occurred from May 2016 through October 2017.

Results

Implementing these systems led to reduced nitrogen, phosphorus, and total suspended solids. Two of the four designs reached the project's stated goal and were successful in reducing total nitrogen within the gravel wetlands by approximately 25%. All four designs were effective at reducing total suspended solids by roughly 85%–90%. Three of the designs showed total phosphorus reductions of varying degrees. The collective impact from these reductions has had a positive impact on the biological conditions of this section of the Metedeconk River (Figure 3), leading NJDEP to delist it for biological impairment in 2018.

Partners and Funding

In 2013, NJDEP awarded the Rutgers Cooperative Extension Water Resources Program \$250,000 to design, implement, and analyze the results for this project. The grantee partnered with Georgian Court University and Integrated Land Management, Inc. NJDEP also provided funds for subsequent projects within the watershed. In 2018, the Brick Township Municipal Utilities Authority was awarded \$950,000 to implement the Metedeconk watershed plan, retrofit storm basins, and conduct microbial source tracking.

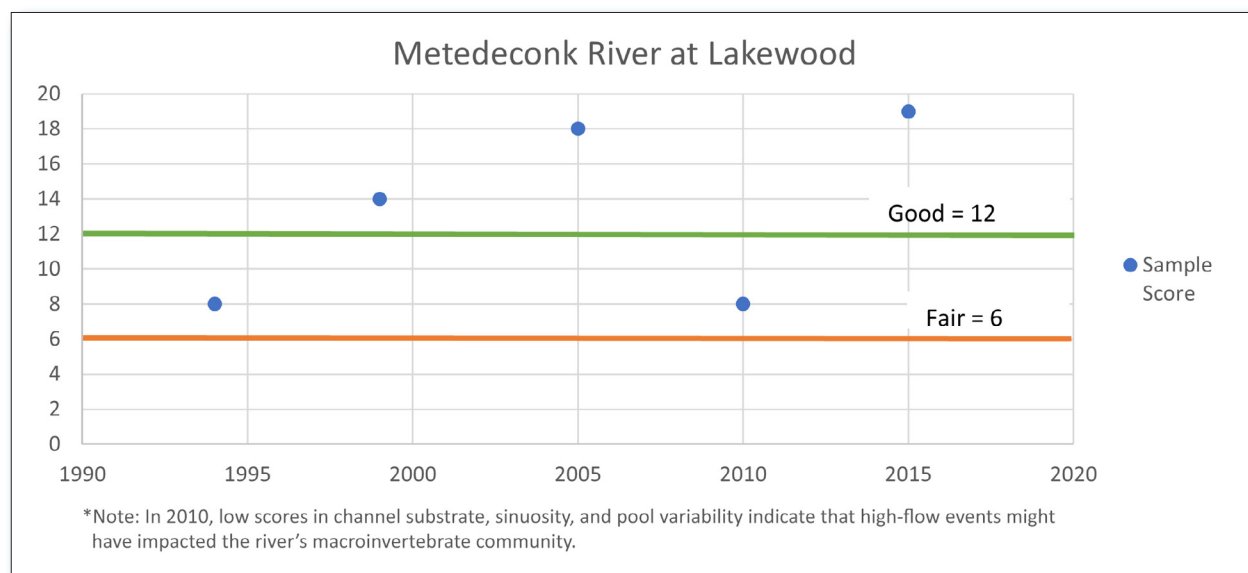


Figure 3. Biological health scores show water quality improvement.



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