LEARNING EXCHANGE

FUNDING SOURCE WATER PROTECTION

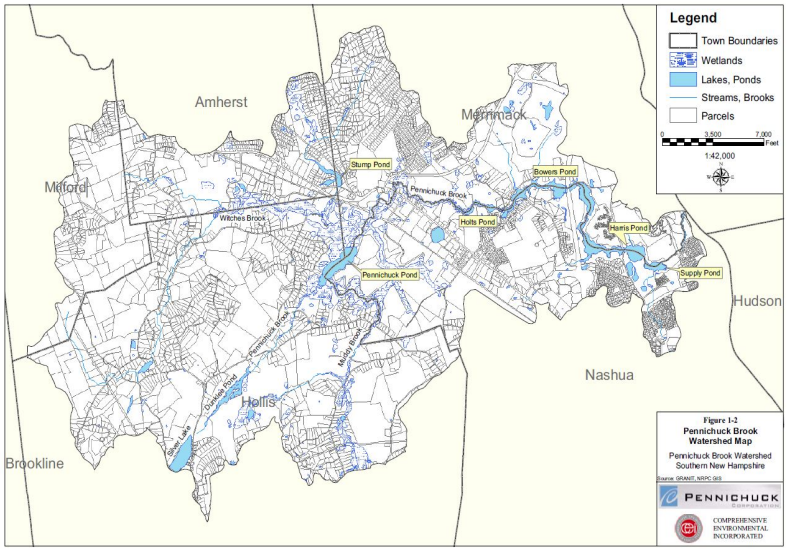
CASE STUDY

Restoring Pennichuck Water Works' Source Watershed

Summary: In 2005, the New Hampshire Department of Environmental Services (NHDES) Watershed Assistance Section awarded a U.S. Environmental Protection Agency (EPA) Clean Water Act Section 319 Watershed Assistance Grant to Pennichuck Water Works (PWW) to complete the comprehensive, nine-element, *Pennichuck Brook Watershed Restoration Plan (2008)*. Since 1998, PWW has initiated a pollutant loading monitoring program for the Pennichuck watershed and implemented source water protection as part of a robust watershed management and restoration plan. PWW has made use of both the Clean Water Act Section (CWA) 319 grants and Drinking Water State Revolving Fund (DWSRF) set asides to fund these efforts.

Programs Involved

- New Hampshire Department of Environmental Services, Drinking Water and Ground Water Bureau - Drinking Water Source Protection Program
- New Hampshire Department of Environmental Services, Watershed Assistance Section in the Watershed Bureau
- Pennichuck Water Works



Project Scope:

Pennichuck Brook is one of the primary sources of drinking water for Nashua, New Hampshire, an area experiencing fast residential and commercial growth. The Pennichuck watershed covers approximately 18,000 acres within five southern New Hampshire towns: Nashua, Merrimack, Amherst, Milford, and Hollis. Pennichuck Water Works supplies a population of around 110,000 and obtains its water supply from a series of six chain ponds (Supply Pond, Harris Pond, Bowers Pond, Holts Pond, Stump Pond, and Pennichuck Pond) covering roughly 351 acres of water connected by the Pennichuck Brook.

Clean Water Act-Funded Activities: PWW first published a watershed management plan (WMP) in 1998. The implementation of the WMP was considered highly successful, occurring from 1998 until 2007; however, the effectiveness was not quantified due to lack of monitoring data. In 2008, PWW completed an EPA-Approved nine element watershed restoration plan and implementation program to provide the needed data. The foundation of the plan is an analysis of watershed hydrology and pollutant loading by sub-watersheds which provided the basis for critical comparisons and effective targeting and prioritization of implementation tasks. The plan focused on identifying actions necessary to reduce sources of phosphorus, a critical limiting factor for plant growth in a fresh water systems. Reductions in external loading of phosphorous to source waters should minimize the occurrence and magnitude of harmful algal blooms and associated problems such as algal-generated toxins, foul taste in drinking water, foul odor from source water, and increased water treatment costs. Harris Pond, one of the PWW supply sources, is currently listed on the 305(b)/303(d) Surface Water Quality Assessment for cyanobacteria. Cyanobacteria or "blue-green" algae is responsible for the harmful algal blooms and are a result of excess phosphorus loading into the Pennichuck water supply ponds. While the 1998 Watershed Management Plan contained sound watershed protection activities, it did not contain significant water quality and flow data to form a technical basis for implementing "Best Management Practices (BMPs)" to mitigate pollution.

In 2006, PWW received a Watershed Assistance Grant from the NHDES to develop a Quality Assurance Program Plan (QAPP) to model pollutant loading and determine the stormwater practices necessary to control phosphorus and other contaminant runoff to the PWW pond system. This was the first step in ten year watershed restoration effort that continues to this day. Since 2006, considerable water quality and flow data has been collected throughout the watershed during both dry conditions and wet weather precipitation events. Based on the data collected and available historical data, PWW was able to evaluate flows and pollutant loads throughout the watershed. PWW contracted Comprehensive Environmental Inc. (CEI) to develop and calibrate a model that mimics flow and quality of Pennichuk Brook at various locations throughout the watershed. The water quality model was calibrated so that 'what if' scenarios could be evaluated regarding how to meet water quality goals under differing future land use scenarios. In 2008 and 2012, PWW received further CWA 319 grant funding from NHDES to develop two watershed implementation projects and to conduct more detailed assessments of each of the nine sub-watersheds to examine problem areas and recommend improvements. A number of follow-on actions identified in the restoration plans were implemented using DWSRF program funding through Local Source Water Protection Grants.

Drinking Water SRF-Funded Activates: Since 2000, the NHDES Drinking Water and Groundwater Bureau's Source Water Protection Program has provided grants (derived from the DWSRF set-aside funds) to water suppliers, municipalities, and other local organizations to protect drinking water sources. PWW received nearly $250,000 to implement sixteen watershed restoration project, including design and installation of structural stormwater practices (e.g. bioretention areas) to limit phosphorus loading, evaluation of sediment loading from tributaries into the pond system, targeted outreach, and development of educational materials for watershed residents. PWW, with financial assistance from both the CWA 319 grants and DWSRF, initiated a comprehensive watershed management effort that continues to preserve and protect the area's drinking water resources.

Ongoing Challenges: With a fast-developing commercial corridor nearby and much of the Nashua region a suburb of the Boston metro area, conserving land and open space remains the most significant challenge to water quality in Pennichuk Brook. The multi-jurisdictional nature of the watershed also presents unique challenges. Warmer water temperatures and emerging contaminants in the shallow pond system will likely pose serious challenges in the future.

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Web links to supporting documents and resources:
Pennichuck Brook Watershed Initiatives and Resources Website