Lake Waramaug Watershed Agricultural Waste Management System

Connecticut Department of Environmental Protection

Nonpoint Source Management Program

Success Stories

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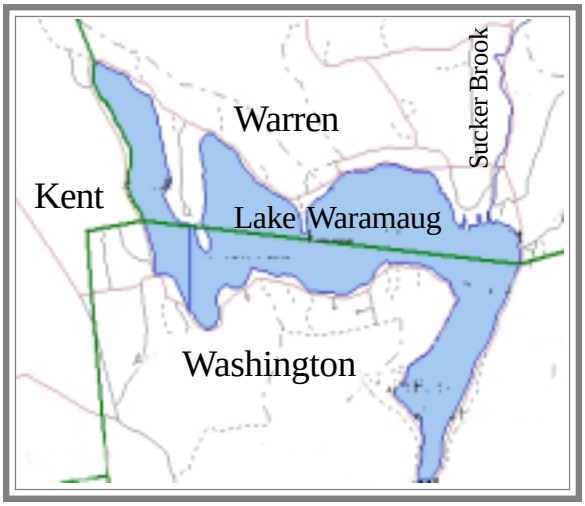
Connecticut Department of Environmenatl Protection, 79 Elm Street, Hartford, CT 06106-5127 - Arthur J. Rocque, Jr., Commissioner

The Resource

Lake Waramaug is located in the Housatonic River watershed in northwestern Connecticut in the towns of Washington, Warren, and Kent. This deep, 680-acre lake is the scenic center of the area's tourism business, and is used for a variety of recreational activities, including boating, fishing, and swimming. Waramaug is the second largest natural lake in the state. The lake's 14.3 square mile watershed is largely forested, with land use consisting of low-density residential development and several farms. Much of the lake's shorefront is developed with large-lot single family homes. There are two state parks located on and near the lake, including the Lake Waramaug State Park and Mount Bushnell State Park.



Lake Waramaug

Environmental Problems

Twenty-five years ago, thick mats of algae covered the surface of Lake Waramaug, causing a panic among property owners and local businesses. Dead fish washed ashore and became food for seagulls, raccoons, and other wildlife. The cause of the problem was over-enrichment caused by runoff of phosphorous and other nutrients from farms, lawns, roads, and septic systems.

These nutrients are considered a significant nonpoint source (NPS) problem in the Housatonic River Watershed. (see **Nonpoint Source Pollution** sidebar). The nutrients fed the growth of algae that turned the lake's surface green every summer. When the algae died and sank to the bottom, the decomposition of the organic material consumed the oxygen that fish and other aquatic life require for survival. The algae also blocked out sunlight from native aquatic plants, which were both a food source and refuge for aquatic organisms.

Nonpoint Source Pollution Nonpoint source (NPS) pollution is diffuse in nature, both in terms of its origin and in the manner in which it enters surface and ground waters. It results from a variety of human activities that take place over a wide geographic area. Pollutants usually find their way into waters in sudden surges, often in large quantities, and are associated with rainfall, thunderstorms, or snowmelt. NPS pollution generally results from land runoff, precipitation, atmospheric dry deposition, drainage, or seepage. Hydromodification — physical disturbance to a water resource caused by filling, draining, ditching, damming, or otherwise altering wetlands and stream courses — is also considered a nonpoint source problem.

By the mid-1990s, many of these problems had been solved through the joint efforts of the three watershed towns, area residents, and state and federal government agencies. However, water quality monitoring in Sucker Brook, which feeds the lake, was still finding elevated levels of nutrients and bacteria. Stream monitoring determined that a single dairy farm was the largest remaining source of nutrients in the watershed. This farm houses 255 cows, heifers, and calves, and the milking room, corn bunker silos, and barnyards are located uphill and adjacent to Sucker Brook. Runoff from the farm, containing high concentrations of nutrients and bacteria, entered the stream and transported these pollutants to the lake (see **Water Quality Impacts** sidebar).

Sucker Brook

Water Quality Impacts The installed waste storage structure, when properly managed, can prevent contaminants from the barnyard, milking parlor, and bunker silage from leaching to the ground water or running off to surface water. Sufficient waste storage capacity allows the farmer to apply the waste when the ground is not frozen. Nutrients, pathogens, and organic materials are thus prevented from contaminating water resources.

The Solution

One of the first steps to solving Lake Waramaug's problems was the formation of the Lake Waramaug Task Force in 1975. In 1978, the task force, with assistance from federal and state agencies and a private consultant, completed the "Lake Waramaug Management Plan" with recommendations on how to restore and protect water quality. "Major in-lake management projects include a 2.0 million gallon per day "withdrawal-treatment-reinjection system", two layer aeration systems that mix the top water with the mid depths of the lake to create a large zone of cold well oxygenated water, construction of a channel through the delta formed at the Sucker Brook outlet to direct cold, well-oxygenated stream flow to the oxygen depleted bottom waters, and several in-stream sediment collection basins. Numerous watershed nonpoint source controls were also established including stream bank and lake shore erosion stabilization projects, a dairy farm manure storage system, and a vineyard wine waste lagoon."

However, as described above, there was still one major pollution source that remained unchecked. To address this problem, the farmer requested technical assistance from the Litchfield County Soil and Water Conservation District (LCSWCD) and USDA Natural Resources Conservation Service (NRCS) to plan, design, and build a farm waste management system. The task force raised private funds, and through the conservation district, also solicited financial assistance from the towns that border the lake, and the Connecticut Department of Enivornmental Protection (CT DEP). The CT DEP subsequently applied for and received Section 319 funds from the U.S. Environmental Protection Agency (US EPA). The farmer applied for funds through the USDA Farm Services Agency and the CT Department of Agriculture and a loan from the Lake Waramaug Task Force.

Settling area adjacent to manure storage facility during contruction

Future Plans

To ensure the future protection of water quality, the farm waste management system needs to be regularly inspected and mainained. It is expected that the dairy farm (with the assistance of local conservation organizations) will continue to take measures necessary to protect water quality in Sucker Brook and Lake Waramaug by following through with a new operation and maintenance plan established for the farm. The Lake Waramaug Task Force and local health departments will continue monitoring the lake and its feeder streams to determine whether the farm waste management system and other best management practices are working to maintain and improve water quality. A task force member stated in a recent local newspaper article that, "This is a success story, but it wouldn't take much to turn it around. There has to be constant monitoring; constant improvement. Everything has to be kept working, brought up to date....." (The *New Milford Times*, July 21, 2000).

Todd Bobowick, Rescource Conservationist NRCS and Jim Gavin, Engineer NRCS inspect Dry hydrant outlet to irrigation system

Construction of Agricultural waste storage facility

Results

Water quality monitoring data collected since the completion of the project indicates that the waste management system has significantly reduced pollution levels in Sucker Brook and in Lake Waramaug. Nutrient levels (especially phosphorous) in the stream have been drastically reduced. Before the waste management system was constructed, the farm was contributing more than 20% of the total phosphorous entering Lake Waramaug. Now instead of flowing into Sucker Brook and Lake Waramaug, the nutrient-rich run-off from the farm area is collected, stored, and spray-irrigated on farm fields located hundreds of yards from Sucker Brook. This allows the nutrients to become incorporated in the soil, supporting plant growth on the farm rather than algae growth in the lake. Bacteria levels are also lower than before the water management system was installed, allowing the lake to meet state water quality standards for swimming and other primary-contact recreation.

Project Partners and Funding

This project was a combined effort by LCSWCD, CT DEP, US EPA, USDA, Lake Waramaug Task Force, and the dairy farmer. The total cost of the project was $211,864. Funding was provided by the following organizations:

- $33,000 from an EPA Clean Water Act Section 319 grant awarded by CT DEP;
- $35,000 from the USDA Farm Service Agency (Agricultural Conservation Program);
- $40,000 from the Connecticut Department of Agriculture;
- $61,864 from the Tanner Farm through a loan agreement with the Lake Waramaug Task Force; and
- $42,000 from the USDA NRCS for in-kind and technical services.

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CT DEP and US EPA websites
http://dep.state.ct.us

http://www.epa.gov/owow/nps/education.html

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