



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

New Hampshire

Community-led Sediment Control Projects Restore Recreational Uses to Lake and Beach

Waterbody Improved

Beginning in the 1970s, recreational uses at Manchester's Crystal Lake were affected by chronic water quality problems including elevated levels of sedimentation with accompanying nutrient loading and weed infestations. New Hampshire Department of Environmental Services (NHDES) placed both Crystal Lake and Crystal Lake Beach on the 2006 303(d) list of impaired waters. In the mid-1990s, the City of Manchester and Crystal Lake Preservation Association (CLPA) began addressing stormwater problems using structural and non-structural best management practices (BMPs). Manchester implemented sediment control measures, and CLPA organized outreach and monitoring efforts. As a result of these and other measures, Crystal Lake and Crystal Lake Beach are no longer listed as impaired for primary or secondary contact recreation on New Hampshire's 2008 303(d) impaired waters list.

Problem

Crystal Lake is a 19-acre lake (Figure 1) in New Hampshire's largest city, Manchester. Much of the 200-acre watershed is comprised of residential neighborhoods, all served by a municipal sewer system. Shoreline development includes seasonal camps, year-round homes, and the city's only municipal beach. Crystal Lake has no surface tributaries; rather it is a seepage lake, fed primarily by groundwater flow and stormwater runoff.

Historically, untreated runoff deposited large amounts of sediment into the lake. The sediment deposition and associated nutrients led to shallow water depths, algal blooms, reduced water clarity, and excessive aquatic vegetation growth, especially adjacent to the city beach. Manchester's Parks and Recreation department began reporting these issues and their impact on recreation in 1973. The frequent algal blooms, which could be attributed in part to phosphorus transported and retained in sediments, caused low dissolved oxygen levels and decreased biodiversity.

In 1985 NHDES completed a Diagnostic and Feasibility Study which documented that the main impact to water quality at Crystal Lake resulted from untreated stormwater runoff. The study found that sediments, nutrients, bacteria, and heavy metals were present in elevated levels. The study also noted that deposited sediment was a main component of a phosphorus rich, unconsolidated muck layer that was up to 25 feet deep in spots. In 2006, NHDES added Crystal Lake and Crystal Lake Beach to New Hampshire's section 303(d) impaired waters



Figure 1. Crystal Lake beach in July 2008.

list for primary and secondary contact recreation due to sedimentation/siltation.

Project Highlights

In 1994 CLPA received a U.S. Environmental Protection Agency (EPA) section 319 grant to engage local residents and begin restoration efforts. CLPA organized one of New Hampshire's first storm drain stenciling programs, delivered stormwater pollution information door to door, constructed an information kiosk at the beach, and, with technical assistance from DES staff, measured water quality benefits of street sweeping. CLPA, NHDES, and the city cooperated on a 1996 EPA section 104(b)(3) project to install six StormTreat® systems to address the first of two large stormwater outfalls. Another section 319 grant in 2004–2005 provided funds for



Figure 2. A vegetated swale built to treat road and parking lot runoff before it enters Crystal Lake.

the city to construct BMPs at the second outfall including deep sump catch basins, a stormwater baffle tank, lateral drains, and vegetated swales (Figure 2). As part of the non-federal match for the grant, the city dredged the beach to remove historic sediment and weed accumulations.

CLPA received two additional section 319 grants to help fund outreach and capacity-building for local water quality protection. Volunteers from CLPA with assistance from NHDES Volunteer Lake Assessment Program, and Manchester’s Urban Ponds Restoration Program continue to monitor water quality at Crystal Lake. The city sweeps the roads in the watershed at least three times annually, and sweeps the beach parking area five times annually. The city implements a NPDES Phase II Stormwater Plan that includes semiannual inspection of catch basins and treatment units around the lake, with clean-outs performed at least annually.

Results

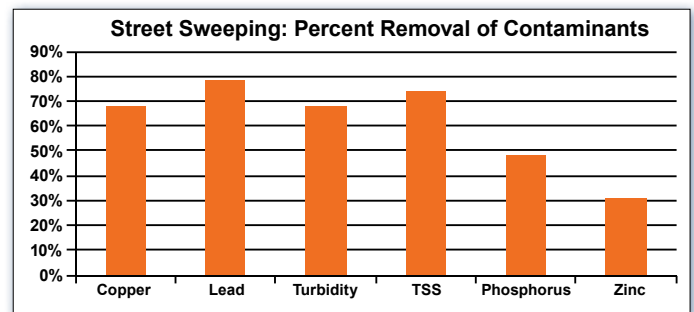
Crystal Lake has no remaining untreated stormwater outfalls. The city’s dredging project removed 121.5 tons of historic sediment, which improved water depth and reduced aquatic weed growth at the beach. Partners implemented structural and non-structural BMPs to prevent sediment re-accumulation. Since 2005, the city has removed on average 9.5 tons of sediment annually from catch basins and treatment devices. Additional sediment removal is achieved with the vegetated swale and street sweeping, but those amounts are not tracked. Street sweeping also reduces phospho-

rus and metal inputs to the lake (Figure 3). Because of these projects, primary and secondary contact recreation is no longer impaired by sedimentation/siltation. These impairments were removed from NH’s 2008 section 303(d) list; however, Crystal Lake remains listed for dissolved oxygen and mercury.

Partners and Funding

This project involved cooperation of CLPA, Manchester Urban Ponds Restoration Program, Manchester Parks Recreation and Cemeteries Department, Manchester Environmental Protection Division, NHDES Watershed Management Bureau, and EPA. The association of local volunteers, along with city, state, and federal staff worked cooperatively throughout the project period and continue to coordinate maintenance and monitoring activities.

The 1985 Diagnostic and Feasibility study was funded through an EPA section 314 Clean Lakes grant with in-kind services provided by the state. From 1994 through 2005, EPA provided a total of \$111,845 to facilitate restoration work at Crystal Lake. In 1994, 1997, and 2003, CLPA used a total of \$14,362 in section 319 funds and \$9,557 in matching funds to complete outreach and education activities related to nonpoint source pollution and water quality monitoring. In 1996 CLPA used \$24,000 in section 104(b)(3) funds and \$36,000 in matching funds to install the initial series of structural BMPs. From 2003 to 2005, the city used \$73,483 in section 319 funds and \$85,199 in matching funds to construct additional BMPs. The city continues to fund BMP maintenance and laboratory costs for water quality samples. CLPA continues to provide additional funding and in-kind services through volunteer monitoring activities.



Source: CLPA and DES sampling and analysis 1993-1995

Figure 3. Data from samples collected at stormwater outfalls, before and after street sweeping, were compared to determine contaminant removal efficiencies.



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

EPA 841-F-09-001DD
September 2009

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