



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Maine

## Improved Forestry Practices Help Restore Lake

### Waterbody Improved

Located in northern Maine's vast forest, Madawaska Lake experienced declining water quality beginning in the 1980s when increased timber harvesting and shoreland development in the watershed contributed excess phosphorus and sediment to the lake. As a result, Maine Department of Environmental Protection (MDEP) added Madawaska Lake to the state's 1988 Clean Water Act section 303(d) list of impaired waters. The lake's water quality began improving in the mid-1990s, due to changes in state-wide forestry standards, improved regulatory oversight of development and the implementation of forestry best management practices (BMPs). MDEP removed Madawaska Lake from its section 303(d) impaired waters list in 2006.

### Problem

Madawaska Lake is located in the town of Westmanland and in one of Maine's unorganized townships, T16 R4. The 1,600-acre lake is valued for boating, fishing and swimming and is composed of two basins: Big Madawaska Lake and Little Madawaska Lake. The watershed is primarily forested, with residential development concentrated along the shoreline (Figure 1).

In the 1980s extensive timber harvest activity (including clearcuts and road building) and a surge in shoreline development increased the export of sediment and phosphorus from the watershed into the lake. A 1993 summary of watershed land use conditions reported that 21.8 percent of the watershed was harvested (13.5 percent clear cut; 8.3 percent selective cut). Until about 1982, most of the land was owned and managed by one forestland company for commercial timber production, and the lakeshore was leased for seasonal camp lots. After the land was sold in 1982, the new owner built new forest access roads and increased timber harvest activity including both selective cuts and clear cuts. Lake shoreland properties were sold to former lease holders, many of whom decided to upgrade camps into year-round homes. The result was a small building boom around Big Madawaska Lake.

Erosion and sediment from timber harvest operations, roads and shoreland development, and

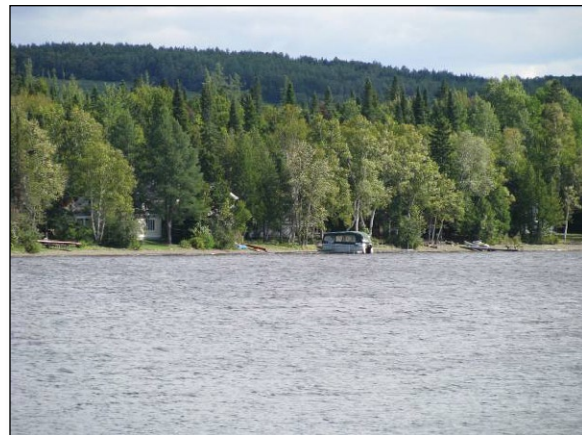


Figure 1. Madawaska Lake's watershed is forested with numerous homes along the shoreline.

septic systems contributed excess phosphorus to the lake, which spurred the growth and overabundance of noxious blue-green algae. From 1987 to 1992 the lake suffered four nuisance algae blooms, and water clarity was reduced to less than 2.0 meters, meeting MDEP's definition of a culturally induced nuisance algal bloom that impairs swimming and aquatic life. In 1988 MDEP designated Madawaska Lake as impaired for aquatic life support due to the observed decline in trophic status and added the lake to Maine's 303(d) list.

In 1994 MDEP completed an EPA section 314-funded Diagnostic Feasibility study of the water quality problem. In 2000 MDEP completed the Madawaska Lake total maximum daily load for total phosphorus.

## Project Highlights

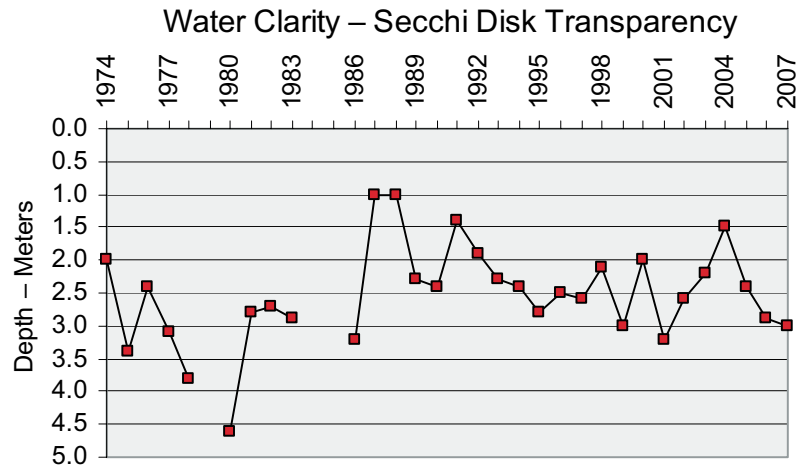
MDEP worked with the new owners of the timberlands to install BMPs on new roads and harvested areas. In addition, a 1990 EPA-funded section 319 project was undertaken to identify problem sites in the watershed and provide technical assistance for forestry and shoreland development practices. The Maine Forest Service produced statewide guidelines for forestry BMPs with financial assistance from MDEP and a section 319 grant. In 1999 the Maine Legislature passed the Forest Practices Act, which improved regulation of timber harvesting.

The Maine Land Use Regulatory Commission (LURC) opened an office in Presque Isle in 1989 to improve land use regulation services in the region. LURC staff services helped control new development to meet standards. In 1990 LURC staff used section 319 funds to inspect and evaluate the use of timber harvesting BMPs in the Madawaska Lake watershed.

The town of Westmanland and the Aroostook County government used MDEP's Small Community Grant Program to help replace failing septic systems at homes in lake shore areas. In addition, MDEP successfully encouraged residents to adopt practices that reduce erosion and sedimentation. Residents conducted a section 319-funded watershed survey in 2003 with the help of an Americorps Volunteer working for MDEP.

## Results

Phosphorus loads to the lake have been steadily declining due to watershed improvements such as the gradual reforestation of timber harvest sites; reduced timber harvest and road building activity, use of timber harvest BMPs and better erosion control in developed shoreland areas. Madawaska Lake now meets water quality standards—it has a stable or improving



*Water clarity abruptly declined in 1987. From 1987 to 1992 the lake suffered four nuisance algae blooms (SDT < 2.0 meters). Since 1993 water clarity has improved, and the lake has been free of algae blooms for 14 of the past 15 years. (Note: no data were collected in 1979, 1984 and 1985.)*

Figure 2. Big Madawaska Lake Minimum Secchi Disk Transparencies (SDT) 1974 to 2007.

trophic state and has been free of culturally induced algae blooms for more than 5 of the past 10 years (Figure 2). Therefore, MDEP removed Madawaska Lake from the state's 2006 303(d) list of impaired waters.

## Partners and Funding

MDEP, Maine Forest Service, and LURC provided services to help the large forestland owner and homeowners understand and comply with state land use laws and BMPs. EPA provided funds under the Clean Lakes (\$88,830) and section 319 programs for lake diagnostic studies and MDEP and LURC staff services. Westmanland and the Aroostook County government worked with landowners to replace failing septic systems. Central Aroostook County Soil and Water Conservation District completed land use surveys and provided technical assistance to landowners. In addition, the Maine Volunteer Lakes Monitoring Program has assisted MDEP in assessing the lake's water quality since the mid-1970s.

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