



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

# Maine

## Watershed Conservation Practices Restore Duckpuddle Pond

### Waterbody Improved

Erosion and runoff from roads and a dairy farm contributed excessive phosphorus and sediment to Maine's Duckpuddle Pond, which sometimes experienced severe nuisance algal blooms as a result. In 1990 the decreased water clarity and low dissolved oxygen of the pond prompted the Maine Department of Environmental Protection (MDEP) to add it to the state's CWA section 303(d) list of impaired waters. Between 1999 and 2010, the Knox-Lincoln County Soil and Water Conservation District (KLSWCD) helped the dairy farm to implement best management practices (BMPs) and worked with local towns and organizations to upgrade roadside ditches and culverts. These efforts significantly reduced nonpoint source pollution. Duckpuddle Pond now meets applicable water quality standards, prompting MDEP to remove it from the state's list of impaired waters in 2010.

### Problem

Duckpuddle Pond (242 acres) is on the border between the towns of Nobleboro and Waldoboro in Lincoln County. The pond captures drainage from an 8.5-square-mile area in the Pemaquid River watershed, near Maine's southern coast. The watershed is mostly forested with interspersed agricultural and rural land uses. Developed areas constitute approximately 14 percent of the watershed. The shoreline is sparsely developed and has several large, undisturbed shorefront areas.

Historically, stormwater runoff carried excessive amounts of phosphorus to Duckpuddle Pond, causing nuisance algal blooms (Figure 1). As a result, in 1990 MDEP placed the pond on the state's impaired waters list because of recurring nuisance algal blooms and increasing trophic state (increased biological productivity). In 1995 the Pemaquid Watershed Association and MDEP completed a watershed survey, which identified 55 priority polluted runoff sites in the watershed.

In 2005 MDEP developed a total maximum daily load (TMDL) for phosphorus in Duckpuddle Pond. In the TMDL report, MDEP estimated that the total phosphorus (TP) export, by land use, was 38 percent from agricultural areas, 30 percent from non-shoreline development (roads and low-density residential), 24 percent from non-developed land, 6 percent from atmospheric deposition, and 2 percent from shoreline development. The TMDL set the pond's assimilative capacity at 335 kilograms TP per year (kg/yr) to meet a target of 16 parts per billion (ppb) TP. According to the TMDL, annual phosphorus loading needed to be reduced by about 136 kg/year (a 29 percent reduction) to allow



Figure 1. Elevated phosphorus levels in Duckpuddle Pond caused nuisance algal blooms.

Duckpuddle Pond to comply with Maine's Class GPA water quality standards. (Class GPA applies to all lakes except man-made ponds less than 30 acres.) The TMDL report recommended implementing numerous actions that could reduce nuisance algal blooms and restore the pond.

### Project Highlights

From 2000 to 2004, KLSWCD implemented the first of two CWA section 319-funded projects to reduce sediment and phosphorus inflows to Duckpuddle Pond. KLSWCD and staff from the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) worked with the Spear Farm, a dairy and vegetable producer, to improve management of manure, milk house wastewater, silage and cropping

practices. Spear Farm enlarged its manure storage capacity from one to six months to enable over-winter storage. In addition, the farmer directed milk house wastewater into a manure storage pit.

KLSWCD also worked with local municipalities and other organizations to reduce erosion along roads. The Town of Waldoboro installed cross-drainage culverts and riprap ditch linings (to distribute runoff more evenly through buffers), upgraded roads, and repaired a failing stream crossing. The Town of Nobleboro installed five new culverts with inlet/outlet protection to help stabilize ditches on two roads. Road maintenance provisions were established to ensure long-term effectiveness. The Cramer Road Association stabilized a road ditch, installed ditch turnouts, and replaced a failing culvert at a stream crossing.

From 2008 to 2010, KLSWCD implemented the second CWA section 319 project to reduce polluted runoff from the farm's livestock feeding areas and a silage bunker. The farmer constructed a heavy-use livestock area (a 2,200 square-foot concrete pad) to separate clean water from contaminated water and manure (Figure 2). Manure that accumulates in the heavy-use area is moved to the existing manure storage pit. Any contaminated water running off the heavy-use area is directed through a 45-foot level-lip spreader into a vegetated wastewater filter strip for treatment. Improvements constructed

at the existing silage bunker area reduced the volume and provided treatment of silage runoff and leachate. Clean stormwater runoff was diverted away from the silage bunker area. In addition, the farm's nutrient management plan was improved, which helped the farmer to manage nutrients and control erosion and sediment export.



Figure 2. A heavy-use livestock area allows for improved manure management.

## Results

Water quality has improved. Duckpuddle Pond now meets Maine's Class GPA water quality standard, which requires the lake to have a stable or improving trophic state and to have been free of culturally

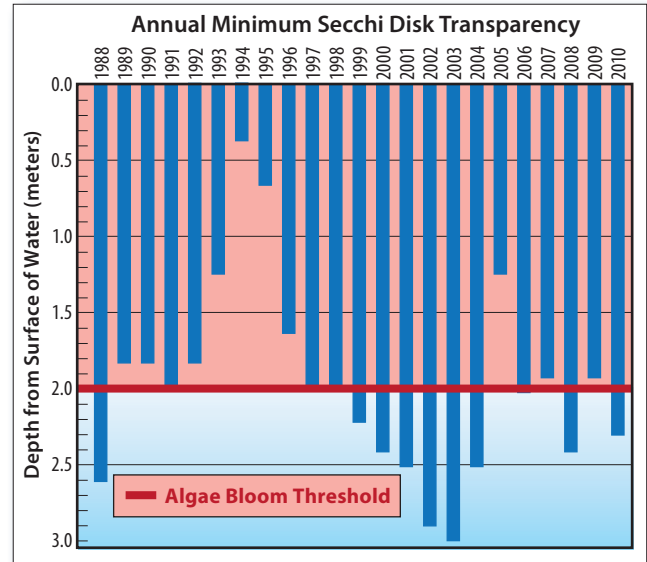


Figure 3. Duckpuddle Pond Annual Minimum Secchi Disk Transparency Data (1988-2010)

induced algal blooms for at least six of the last 10 years (Figure 3). Algal blooms are considered to have occurred when the Secchi disk transparency falls below 2.0 meters.

Restoration project efforts reduced pollutant loading by an estimated 248 tons of sediment and 700 pounds of phosphorus per year. Because Duckpuddle Pond had been free of culturally induced algal blooms for seven of the last 10 years, Maine DEP removed it from the state's CWA section 303(d) list in 2010.

## Partners and Funding

Key project partners included KLSWCD, NRCS, Spear Farm, the towns of Waldoboro and Nobleboro, Cramer Road Association, Pemaquid Watershed Association, Maine Department of Agriculture (MDOA), MDEP, and U.S. Environmental Protection Agency (EPA). EPA provided \$154,687 in CWA section 319 funds (\$128,043 in Phase 1 and \$26,644 in Phase 2); MDOA provided \$20,000. Local match totaled \$99,425, including a significant contribution from Spear Farm. KLSWCD coordinated the project, and NRCS provided landowner assistance and technical services for BMP design, construction and maintenance.



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