



# NONPOINT SOURCE SUCCESS STORY

## New York

### Controlling Erosion Helps Restore Keuka Lake Fish Consumption Use

#### Waterbody Improved

Keuka Lake was placed on New York's Clean Water Act (CWA) section 303(d) list for fish consumption use impairment in 1998 due to dichloro-diphenyl-trichloroethane (DDT) contamination. In response to the listing, state and local agencies implemented numerous best management practices (BMPs) in the Keuka Lake watershed over the 2003–2014 period. Recent assessment of fish tissue and other factors led the New York State Department of Health (NYSDOH) to relax the DDT advisory for lake trout in Keuka Lake. Thus, the New York State Department of Environmental Conservation (NYSDEC) determined that the lake now fully supports its fish consumption use and removed it from CWA section 303(d) list in 2014.

#### Problem

Keuka Lake is a large oligotrophic lake in New York State's Finger Lakes region (Figure 1). Keuka Lake has a surface area of 11,800 acres, a volume of 1.2 million acre-feet, and a maximum depth of 185 feet. Keuka is a multipurpose waterbody supporting a variety of recreational uses while also serving as a potable water source for more than 20,000 people. Tourism is economically critical to the region—fishing activities alone generate \$5 million per year. The lake's approximately 100,000-acre watershed is mostly forested (52 percent) and supports active agriculture, including grape vineyards.

DDT was a common insecticide used in the Finger Lake region to control pests (e.g., grape cane borers, leafhoppers) until its ban in New York in 1972. DDT and other legacy pollutants are difficult to manage because they have long half-lives in terrestrial and aquatic environments, and they bioaccumulate in the food web. DDT also strongly adsorbs to soil particles, making it highly transportable from the watershed during periods of erosion and sediment transport. As a result of elevated DDT levels, NYSDOH issued a restrictive fish consumption advisory for Keuka Lake in 1983. Keuka Lake was subsequently placed on New York's CWA section 303(d) list for fish consumption use impairment in 1998 due to DDT contamination. The source of DDT impairment in the lake was assumed to be from past pesticide use in the basin.

NYSDOH fish consumption advisories are primarily based on information that NYSDEC collects on contaminant levels in fish. NYSDOH reviews this information to determine if an advisory should be issued or revised

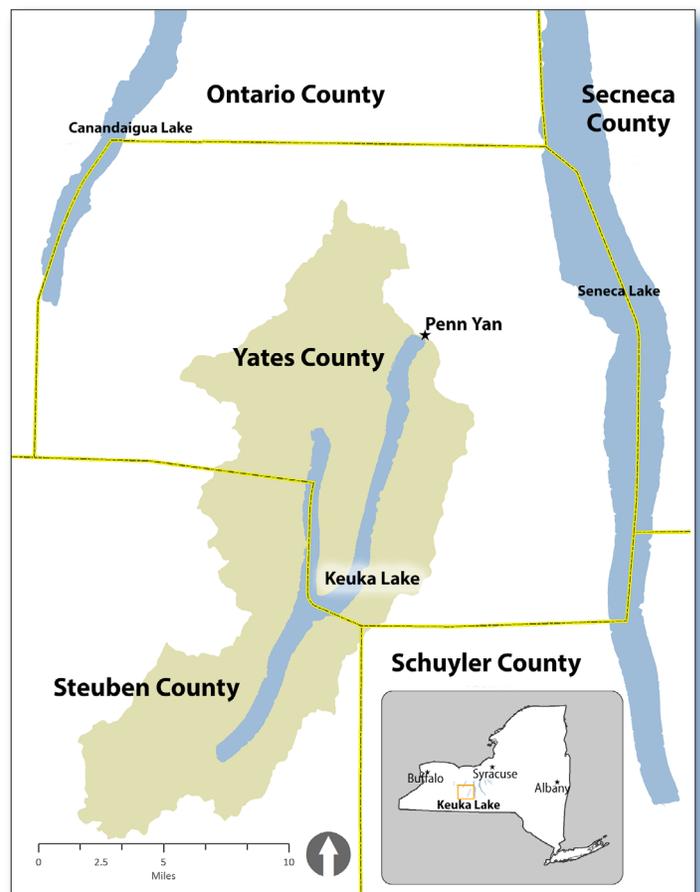


Figure 1. Keuka Lake is in west-central New York.

for a given waterbody or fish species. When reviewing the fish tissue data, NYSDOH compares the data to federal marketplace standards for a contaminant (when available) and considers other factors including, but

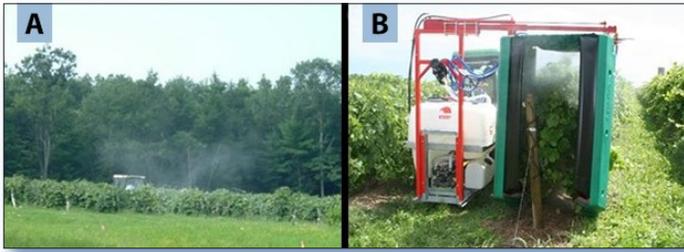


Figure 2. Farmers used (a) IPM practices and had access to (b) new spraying technology.

not limited to, potential human exposures and health risks, location, type and number of samples.

## Story Highlights

The banning of DDT and implementation of pesticide management practices and erosion control activities have helped to reduce the amount of pollution reaching Keuka Lake. From 2003 to 2014, agricultural and other nonpoint source BMPs were implemented on more than 60 farms and 20 vineyards in the Keuka Lake watershed. Specific projects targeted the two primary transport mechanisms of DDT and other pesticides to Keuka Lake: (1) reduction of sediment erosion and transport and (2) reduction of pesticide use and off-site drift.

First, implementing erosion control practices in vineyards has been critical for reducing the transport of DDT-laden sediment to the lake. Stakeholders have added thousands of feet of diversion ditches, installed hay mulch to vineyard row middles, and seeded cover crops to vineyard row middles throughout the watershed. Adding hay mulch to vineyard row middles is effective at reducing runoff and increasing stormwater infiltration, which keeps sediments and attached pollutants on-site. More than 220 acres of cover crops and more than 600 acres of critical planting (establishing permanent vegetation in small areas of excessive erosion) were implemented to minimize sediment loss. Other BMPs included adding animal fencing and stream crossing, planting grassed waterways, installing sediment control basins, planting herbaceous riparian buffers and installing subsurface drainage.

Second, to reduce pesticide use and drift, integrated pest management (IPM) practices were employed on approximately 300 acres of agricultural land from 2007 to 2014 to reduce the usage and off-site drift of

pesticides. In addition, funds were used to purchase new sprayers for use on more than 40 farms in the Keuka Lake watershed, allowing for better deposition of sprays on target plants, which improves efficacy of materials (Figure 2).

## Results

In 2013 NYSDOH reassessed the fish consumption advisory for Keuka Lake by evaluating lake trout fish tissue data collected in 2000, 2003, 2007 and 2011; results for other species (brown trout, largemouth bass, smallmouth bass, and yellow perch); and other factors. The results indicated that total DDT concentrations in Keuka Lake lake trout were much lower than those observed in the 1983 collections.

Based on these results NYSDOH relaxed the restrictive fish consumption advisory for Keuka Lake. Now, all population groups may eat up to four meals per month of all Keuka Lake fish species, which is consistent with the advice for all other New York State freshwaters that have no specific restrictive advisory. Based on the relaxed advisory, fish consumption use in the lake is considered unimpaired. As a result, NYSDEC removed the lake from CWA section 303(d) list in 2014.

## Partners and Funding

IPM and pesticide technology programs were led by the Finger Lakes Grape Program and Cornell University (Geneva Experiment Station). Other partners included the Yates County Soil and Water Conservation District (SWCD) and the Steuben County SWCD who implemented the BMPs. Matching project funds included salaries and in-kind services. In addition, other farms have worked on pesticide management projects without any financial assistance because reducing pesticide applications to the minimum amount possible while still growing quality fruit is economically advantageous. Since 2003, New York's Environmental Protection Fund has awarded approximately \$800,000 to implement nonpoint source pollution control projects in Keuka Lake watershed.



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