



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Iowa

Restoration Efforts Repair a Drinking Water Source and Recreational Area

Waterbody Improved

Erosion from heavily grazed pasture lands and intensively farmed cropland caused excessive siltation in Iowa's Lake Icaria, triggering the Iowa Department of Natural Resources (IDNR) to place the lake on the state's 1998 303(d) list of impaired waters. The local Soil and Water Conservation District realized that the lake, which serves as both an important water supply and recreation area, was being slowly degraded. They began working with landowners in the upper reaches of the watershed to install agricultural best management practices (BMPs) that reduce soil erosion. Their efforts were successful—water quality improved, and IDNR removed Lake Icaria from Iowa's 2008 303(d) list of impaired waters for sediment.

Problem

The 669-acre Lake Icaria is in southwest Iowa's Adams County, adjacent to a cluster of small lakes that supply drinking water to surrounding communities. The watershed consists of active cropland, pasture lands, and small portions of retired cropland converted to grassland as part of the Conservation Reserve Program. The lake is surrounded by a county-owned park and serves as a popular community destination for recreation and fishing.

Increasing sediment loads originating from agricultural practices in the upper reaches of the watershed began reaching the lake and degrading the water quality. IDNR first added the lake to Iowa's 303(d) list of impaired waters in 1998. A December 2002 total maximum daily load (TMDL) study determined that excess siltation contributed to poor aquatic habitat, causing the lake to not fully support its warm water habitat/aquatic life designated use. Iowa does not have numeric water quality criteria for siltation that apply to Lake Icaria. Therefore, IDNR field staff members used their best professional judgment of the water quality when they added Lake Icaria to the list of Iowa impaired waters.

Sediment affected Lake Icaria primarily by interfering with reproduction and growth of fish and other aquatic life, particularly in the shallow, upper portions of the lake that offer critical habitat for spawning (70–90 percent of available habitat). Although the entire lake was listed as impaired, it was primarily the excessive sediment deposition in the upper arms of the lake that caused the lake to not meet water quality standards. The upper reaches of the lake became covered with fine silt

that made successful spawning almost impossible, severely limiting the fishery in the entire lake. Additionally, the colloidal nature of the sediment delivered to Lake Icaria created less-than-ideal feeding conditions for sight feeders. Bass and bluegill primarily feed along the shoreline, and the fry use the shoreline's vegetative cover for protection from predators. Reduced water clarity from sedimentation inhibits aquatic vegetation from growing, leaving the smaller fish unable to feed successfully and exposed to predation.

Project Highlights

Between 1996 and 2005, state and federal agencies worked with landowners to promote and implement numerous BMPs to alleviate the erosion within the upper watershed. Practices include grade stabilization structures, terraces, filter strips, pasture and hay planting, grassed waterways, streambank crossings and prescribed grazing systems. Partners organized demonstration field days to show how BMPs such as livestock management techniques can reduce soil erosion in the stream corridor (Figure 1). They also constructed a wetland along Lake Icaria's largest tributary as the last line of defense for trapping sediment and nutrients. In addition to the water quality benefits, the wetland offers other benefits to wildlife and hunters.



Figure 1. Landowners inspecting residue levels at a manure injection field day.

Results

This project was the first in Iowa to effectively use a geographical information system (GIS) to initiate detailed watershed assessment techniques. The GIS has proven to be an efficient tool when mapping a watershed and planning strategic placement of BMPs. GIS data for sheet/rill erosion indicates that the practices implemented in the watershed resulted in a soil-loss savings of 22,239 tons/year (Table 1). Estimated sediment delivery rates decreased from 12,095 tons/year pre-project to 4,350 tons/year post-project.

Assessments and surveys by IDNR's Fisheries Bureau, Iowa State University and University Hygienic Laboratory determined that Lake Icaria now fully supports its aquatic life designated use. The IDNR Fisheries Bureau indicated that the extensive soil conservation practices implemented in the watershed successfully reduced nutrient and sediment loadings in Lake Icaria. As a result, IDNR removed Lake Icaria from Iowa's 2008 303(d) of impaired waters for sediment.

Partners and Funding

A variety of partners from local, state and federal agencies combined efforts to ensure the project's success. The project used approximately \$500,000 of Clean Water Act section 319 funds to install 20 grade stabilization structures, four waste system renovations, one stream crossing, one constructed wetland, and to support the salary for the project coordinator from 2001 to 2005. Additional funds from Adams and Pottawattamie Counties' Pheasants Forever and Ducks Unlimited supported wetland construction.

Funds from the Natural Resources Conservation Service helped to share the cost of implementing BMPs on the estimated 3,052 acres that were enrolled in the Conservation Reserve Program. Iowa's Publicly Owned Lakes Fund provided cost-share for installing 112,995 feet of terraces, 3 acres of grassed waterways, and one sediment control structure.

Iowa's Water Protection and Watershed Protection Funds (WPF and WSPF) provided cost-share funds for BMPs including 43,450 feet of terraces, 31 grade stabilization structures, 341 acres of prescribed grazing, 32 acres of pasture and hayland planting, one streambank crossing, one acre of grassed waterway, and 987.4 acres of animal waste management systems. The WPF and WSPF also funded yield monitoring, water monitoring and the project coordinator's salary.

The Environmental Quality Incentive Program provided cost-share funds for three grade-stabilization structures, 190 acres of prescribed grazing systems, and 68 acres of pasture and hayland plantings.

Table 1. Erosion and sediment delivery reductions in tons/acre/year

Location	Sheet/Rill Erosion Reductions Resulting from Project BMP Installations		Sheet/Rill % Reduction
	Before	After	
Lake Icaria	82859	60620	27%

Location	Sheet/Rill Sediment Delivery Reductions Resulting from Project BMP Installations		Sediment Delivery % Reduction
	Before	After	
Lake Icaria	12095	4350	64%



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