



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

## WISCONSIN

### Phosphorus Reductions in Bass Lake Restore Fishery

#### Waterbody Improved

Livestock operations and other agricultural activities contributed to nutrient overenrichment and fish kills in Bass Lake in northeastern Wisconsin, forcing it to be added to the state's 303(d) list of impaired waters. The Marinette County Land and Water Conservation Department (LWCD) led an effort to reduce polluted runoff by installing state-of-the-art barnyard control practices combined with other in-lake treatment techniques that reduced phosphorus levels in the lake. The Bass Lake restoration project achieved total maximum daily load (TMDL) targets by reducing the average phosphorus concentrations from 490  $\mu\text{g/L}$  to 10  $\mu\text{g/L}$ , and the lake will be removed from the state's 303(d) list in the next listing cycle.

#### Problem

Bass Lake was placed on Wisconsin's 303(d) list of impaired waters for high phosphorus, low dissolved oxygen levels, and winter fish kills. Runoff from cropland, livestock barnyards, and nutrient accumulation in a wetland through which the inlet drained delivered high levels of nutrients and biological oxygen demand to the lake. Nutrient runoff caused heavy algae blooms, which covered the lake in the summer months, and dissolved oxygen concentrations fell to zero in the winter months when ice covered the lake. Low dissolved oxygen concentrations caused fish kills and decimated the sport fish population.

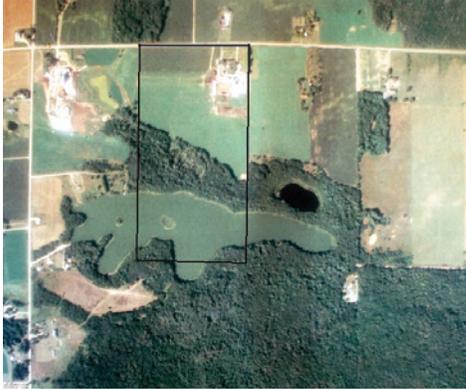
#### Project Highlights

Marinette County LWCD spearheaded an effort to work with two livestock operations, with a combined total of 700 animal units, identified as the major sources of phosphorus entering the lake. LWCD worked with landowners to install state-of-the-art barnyard control practices such as manure storage facilities, clean water diversions, and roof runoff controls. Eventually, one landowner chose to discontinue operations in his barnyard. Funds from the state stewardship program allowed him to put 2,000 feet of Bass Lake shoreline and 55 acres of cropland under permanent easement. The U.S. Fish and Wildlife Service aided in the installation of sediment



Bass Lake just after alum treatment, which helped reduce phosphorus in the lake.

basins and restoration of wetland areas to prevent further loading. The remaining livestock operation further reduced runoff from livestock areas by moving animals into a free stall facility where cows are kept indoors in large pens. A sediment control basin and a leachate collection system—designed to collect polluted runoff and pump it into the manure storage—were also installed on the farm to virtually eliminate pollution transport from livestock areas to Bass Lake. With support from the Wisconsin Department of Natural Resources (DNR), LWCD worked with a professional consultant to treat Bass Lake with alum during fall 1999 to break the cycle



About 2,000 feet of Bass Lake shoreline is under permanent easement. Box in photo identifies approximate location of easement boundary.



No fish kills have occurred in Bass Lake since best management practices were implemented, and the fish population appears healthy.

of internal phosphorus release from sediment on the lake bottom and to reduce phosphorus levels in the lake.

## Results

The Bass Lake restoration project achieved TMDL targets by reducing the average phosphorus concentrations from 490  $\mu\text{g/L}$  to 10  $\mu\text{g/L}$ , and the lake will be removed from the state's 303(d) list in the next listing cycle. Farmers' participation in nutrient management planning should reduce nutrient delivery from cropped areas in the watershed even further.

The alum treatment dramatically reduced total phosphorus in Bass Lake. Without the high concentration of phosphorus to feed on, heavy blue-green algae blooms no longer cover the lake and water clarity continues to improve. Secchi disk readings have improved from less than 10 feet before the project to up to 20 feet during July 2004 after the alum treatment. No fish kills have been noted since the project, and the fish population appears healthy.

## Partners and Funding

Marinette County LWCD led this effort and received assistance from the Wisconsin DNR, U.S. Department of Agriculture's Natural Resources Conservation Service, U.S. Fish and Wildlife Service, Town of Beaver, and landowners. Project costs are estimated at \$696,100. The State Stewardship Fund provided \$195,000 of that total through section 319 and the Lakes program for a conservation easement to abandon one barnyard operation. Section 319 funds were also used to implement best management practices, which accounted for approximately 40 percent of project costs. The Wisconsin DNR Lakes Partnership Program also provided support with Lakes Protection grants for project activities. Some Clean Lakes activities, now funded by Clean Water Act section 319 grants, were formerly funded under the section 314 Clean Lakes program. Among other things, the Lakes program helped pay for the alum treatment, along with local cost share.



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## For additional information contact:

**Greg Sevener**  
Wisconsin Department of Natural Resources  
715-582-5013  
[gregory.sevener@dnr.state.wi.us](mailto:gregory.sevener@dnr.state.wi.us)