Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY

Iowa

Installing Best Management Practices and Removing Silt Improved Bluegill Habitat in Yellow Smoke Lake

Waterbody Improved

Shoreline erosion and runoff from local farms contributed excess sediment that negatively affected fish populations in Iowa's Yellow Smoke Lake, prompting the state's Department of Natural Resources (DNR) to add the lake to its Clean Water Act (CWA) section 303(d) list of impaired waters in 1998 for an aquatic life impairment. Landowners and farm operators installed terraces and grade stabilization structures to reduce runoff from the lake's watershed. The Crawford County Conservation Board (CCCB) also removed silt from the lake. These improvements restored the lake's aquatic life designated use, allowing DNR to classify Yellow Smoke Lake as restored in 2012.

Problem

Yellow Smoke Lake is a 38.4-acre reservoir in the Boyer River watershed in west central Iowa's Yellow Smoke Park (Figure 1). The park is a popular location for camping, hiking, fishing, swimming, and boating. Constructed impoundments like Yellow Smoke Lake often have steeply sloped shorelines which limit the amount of shallow-water spawning habitat available for nesting and reproduction by Centrarchid (sunfish) species, such as bluegills. Additionally, these shallow-water spawning areas are usually in the upper reaches of an impoundment, where sediment-laden drainage from the watershed enters the lake.

In the late 1990s and early 2000s, the deposition of sediment from the watershed affected the ability of bluegills to spawn in Yellow Smoke Lake by making the water too shallow or by burying the eggs and suffocating them. The sediment originated from the inflow of agricultural runoff, as well as from shoreline erosion made worse by heavy foot traffic from campers and anglers. Fish survey data collected by DNR Fisheries in the mid-1990s showed that Yellow Smoke Lake failed to support its aquatic life designated use. As a result, DNR added the lake to Iowa's CWA section 303(d) list of impaired waters in 1998. Although the entire lake was listed as impaired, most of the sediment deposition was occurring in the northeast portion of the lake.

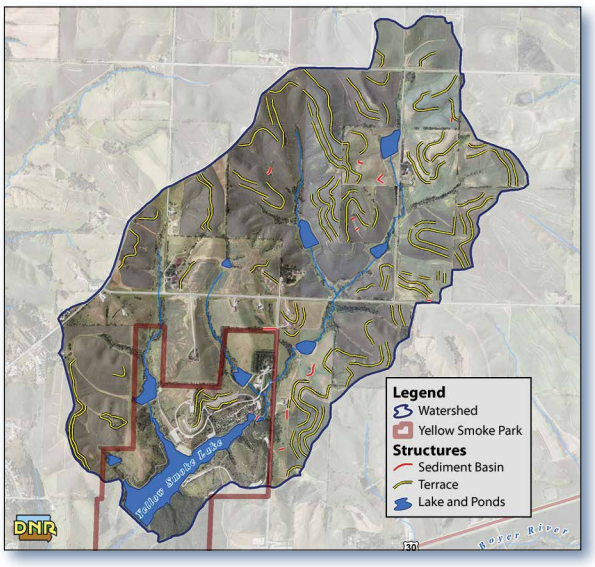

Figure 1. Yellow Smoke Lake watershed BMPs include sediment basins and terraces.

Project Highlights

Because no numeric criteria for siltation that applied to Yellow Smoke Lake or its sources existed, DNR developed a total maximum daily load (TMDL) in 2001 on the basis of the existing DNR Fisheries survey data. The TMDL stated that restoring water quality in Yellow Smoke Lake would require (1) that silt be removed from the lake and

Figure 2. Riprap was added to stabilize almost 2,000 linear feet of the upper east arm of Yellow Smoke Lake.

(2) that sediment retention structures be put in place to prevent sediment from entering the lake through watershed runoff. The success of restoration efforts would be measured on the basis of improvements in affected fish populations.

Per the TMDL recommendations, watershed stakeholders implemented a variety of restoration measures to restore Yellow Smoke Lake's aquatic life designated use. The CCCB and the U.S. Department of Agriculture's Natural Resources Conservation Service worked with private landowners to install 52,000 feet of terraces, 12 sediment basins, and five ponds (see Figure 1). In addition, beginning in 2003, the CCCB was awarded multiple grants to restore bluegill spawning grounds with in-lake improvements. Over a six-year period, 375 tons of washed concrete sand was placed on the bottom of shallow-water areas in the north arm of Yellow Smoke Lake to create suitable spawning habitat. CCCB removed 10,000 cubic yards of sediment from the lake, armored 1,930 feet of shoreline to curtail erosion in the high-foot-traffic area (Figure 2), and built two silt-control structures to intercept silt before it reached the lake. All of these practices led to improved bluegill spawning habitat.

Results

A fishery survey conducted by DNR Fisheries staff in 2010 demonstrated that fish populations had become well balanced and healthy, and that natural sunfish reproduction was occurring consistently. Electrofishing samples indicated a relatively strong size class of bluegill in the 8- to 9.45-inch size

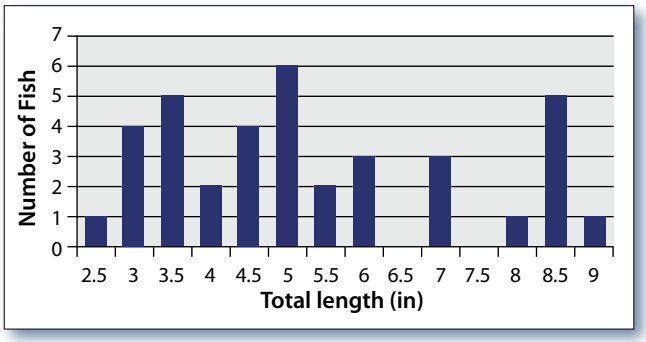

Figure 3.Length frequency of bluegill in Yellow Smoke Lake, May 2010 (n = 40).

range, with several strong size classes centered around 3.5 and 5 inches (Figure 3). The relatively high abundance of bluegill in the smaller size classes indicated consistent reproduction, which bodes well for future survival and growth of the fish population.

The DNR Fisheries staff observed that sunfish were nesting, noted that the protected shorelines of Yellow Smoke Lake were remaining stable, and confirmed that the areas dredged in the upper east end of the lake were remaining intact.

As stated in the TMDL, success can be measured by the response of the aquatic life to improvements made to the watershed and lake. The fishery survey indicated that the sunfish species, which were of primary concern for the lake restoration project, had responded to the lake improvements by reproducing successfully and by providing good recreational fishing opportunities for anglers. On the basis of these data, DNR classified Yellow Smoke Lake as restored in 2012. Yellow Smoke Lake now fully supports its aquatic life designated use.

Partners and Funding

The CCCB undertook most of the restoration work; the Crawford County Soil and Water Conservation District and local farm landowners and operators performed additional work. The CCCB was awarded $127,000 from DNR's fish habitat grant program between 2004 and 2009. The Iowa Department of Agriculture and Land Stewardship's Watershed Protection and Resource Enhancement and Protection program invested $70,000 in best management practice implementation on private land. Iowa DNR's CWA section 319 program provided technical assistance for the TMDL, and DNR Fisheries provided technical assistance for in-lake improvements.

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