NONPOINT SOURCE SUCCESS STORY

Louisiana

Implementing a Suite of Best Management Practices Results in Removal of Bayou Mallet's Dissolved Oxygen Impairment

Waterbody Improved

Pollution from agricultural runoff entering Louisiana's Bayou Mallet caused dissolved oxygen levels to fall below water quality standards, which impaired the bayou's fish and wildlife propagation (FWP) designated use. As a result, Bayou Mallet was listed on the 2002 modified court-ordered Clean Water Act (CWA) section 303(d) list of impaired waters. Since 2005, local landowners have implemented agricultural best management practices (BMPs) within the watershed to reduce runoff of sediment and fertilizer. Dissolved oxygen levels have improved, prompting the Louisiana Department of Environmental Quality (LDEQ) to remove the dissolved oxygen impairment from the CWA section 303(d) list in 2010. Dissolved oxygen levels continue to trend upward.

Problem

The Bayou Mallet watershed (LDEQ subsegment 050103) is in Acadia, Evangeline, and St. Landry parishes in Louisiana; it covers approximately 141 square miles (Figure 1). Primary agricultural land uses in the watershed are soybeans (22 percent), pasture (19 percent) and rice (17 percent). Producers typically add fertilizer to fields in this watershed to enhance crop production. Nutrients in the fertilizer are primarily nitrogen and phosphorus.

Louisiana's water quality criteria for dissolved oxygen in Bayou Mallet are seasonal. From March through November (summer), dissolved oxygen must remain above 3.0 milligrams per liter (mg/L); from December through February (winter), dissolved oxygen levels must remain above 5.0 mg/L. To meet the FWP designated use, no more than 10 percent of measurements taken over a 12-month period may fall below the seasonal criteria. In 1998, three of 12 ambient dissolved oxygen samples (25 percent) failed to meet seasonal criteria: 2.2, 2.95 and 1.73 mg/L. In 2003, two of 11 ambient dissolved oxygen samples (18 percent) did not meet criteria: 2.94 and 2.95 mg/L. Sampling in both years showed that the bayou failed to meet the 10 percent exceedance threshold for dissolved oxygen.

The suspected source of impairment was runoff from crop production that transported sediment and nutrients to the watershed, threatening fish and wildlife. High nutrient loading facilitates algal growth and oxygen depletion as the algae die off and decompose, resulting in low levels of dissolved oxygen. Due to these conditions, Bayou Mallet was listed for dissolved oxygen impairment on the modified court-ordered CWA section 303(d) list of impaired waters in 2002.

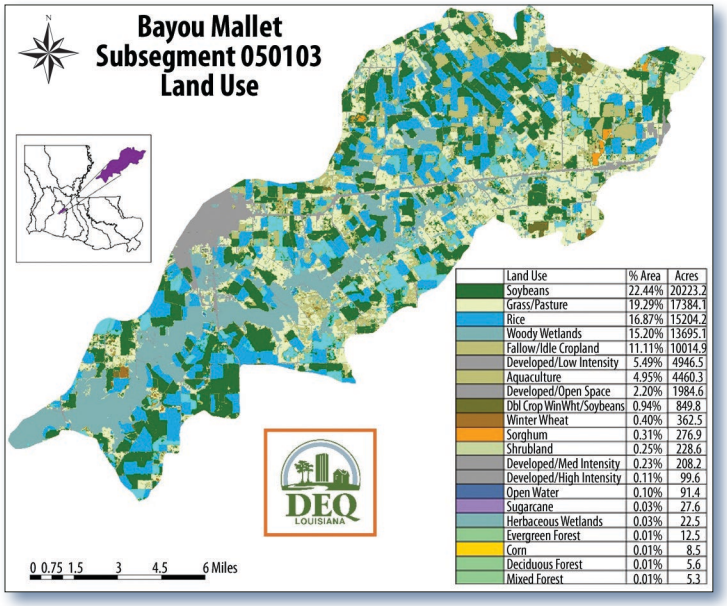

Figure 1. The Bayou Mallet watershed is in central Louisiana.

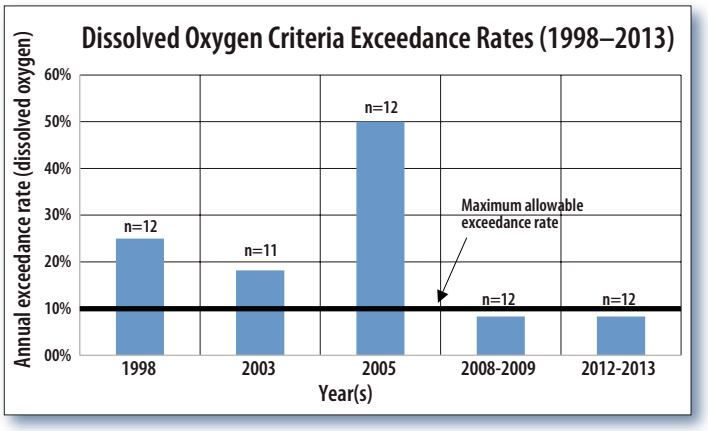

Figure 2. Annual exceedance rates of dissolved oxygen criteria in Bayou Mallet (ambient sampling cycles, 1998–2013).

Figure 3. Bayou Mallet below Louisiana Highway 95 in 2015, after restoration efforts improved dissolved oxygen levels and restored the FWP designated use.

Project Highlights

A total maximum daily load was developed in 2002, which indicated that nonpoint source pollution loads should be reduced by 12.5 percent from March through November to meet the dissolved oxygen criteria; no load reductions were necessary from December through February. Beginning in 2005, the Louisiana Department of Agriculture and Forestry (LDAF) and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) worked with local landowners to implement several agricultural BMPs, including nutrient management (1,911 acres), irrigation land leveling (14,271 acres), conservation crop rotation (5,285 acres), grade stabilization structures (222 units), wetland wildlife management (15,672 acres), and field borders (142,050 feet). From 2010 to 2013 additional BMPs were implemented with 319 funds in the watershed which included conservation crop rotation, residue and tillage management (no-till/direct seeding), grade stabilization structure, irrigation land leveling, irrigation water management, nutrient management and pest management.

Results

Dissolved oxygen concentrations improved in Bayou Mallet as a result of the BMP implementation. In the 2008–2009 monitoring period, one sample was below 3 mg/L in the summer season. In the 2012–2013 monitoring period, one sample was below 5 mg/L in the winter season. These results translate to a less than 10 percent annual exceedance rate of the seasonal dissolved oxygen criteria in the 2008–2009 and 2012–2013 sampling seasons (Figure 2), both of which meet water quality criteria. Due to these improvements, LDEQ removed Bayou Mallet from the state impaired waters list for dissolved oxygen impairment in 2010 (Figure 3).

Partners and Funding

LDAF provided $152,352 in CWA section 319 funding, along with landowner in-kind match of $146,782 for a total of $299,134 from FY2010–2013. NRCS also provided approximately $3,909,310 in federal funding, along with landowner in-kind match of $3,658,475 from FY2005–2012.

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