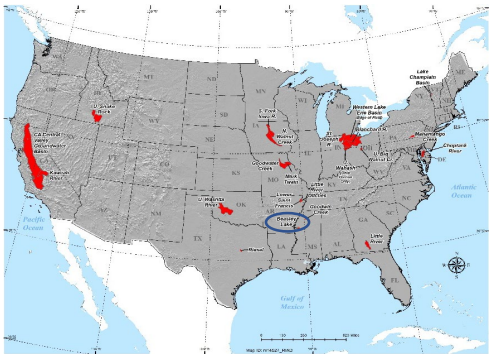
Beasley Lake Watershed

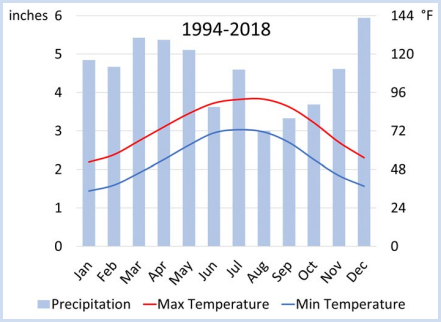


A Conservation Effects Assessment Project (CEAP) Watershed Assessment Study: A collaboration between the Agricultural Research Service and the Natural Resources Conservation Service

Location

Beasley Lake Watershed is 2.4 mi^2 and is located in western Mississippi along the Lower Mississippi Alluvial Plain. The lake is used primarily for fishing, hunting, and recreation.

Temperature and Precipitation



Major land uses

Cropland: Corn, Soybean, Cotton, Sorghum, Wheat.
Riparian Woodland

Data collection

Beginning in 1995, lake surface water quality was assessed seasonally for sediment, nutrients, and algae. Since 1996, lake water quality has been monitored biweekly. Lake pesticide monitoring began in 1998 to assess a suite of herbicides and insecticides commonly used in the watershed. Starting in 2005, storm runoff water was collected with automated samplers within Conservation Reserve Program acreage. Runoff monitoring expanded in 2008 to include edge-of-field buffers, and, in 2011, runoff through a sediment retention pond. Lake ecology is assessed by monitoring algal blooms, fishery production, and biochemical processes.

Concerns

Soils in the watershed range from sandy loam to heavy clays and are vulnerable to erosion and loss of soil organic carbon and soil structural stability under conventional farming practices.

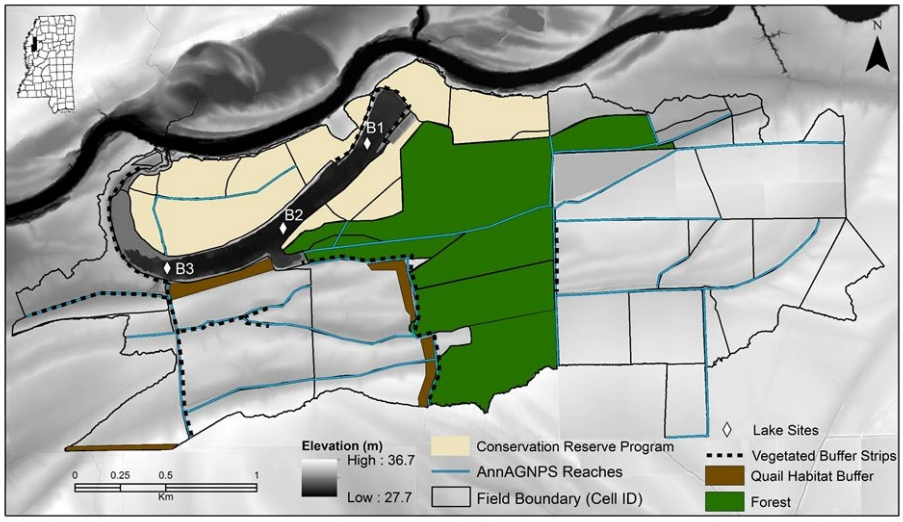
Regionally, high precipitation with highly erodible soils creates runoff with high sediment, nutrient, and pesticide transport to surface water.

Lake water quality and fish habitat degrade with sedimentation and increased eutrophication, causing harmful algal blooms and altering lake productivity. Excess nutrients and sediments from watersheds in the Lower Mississippi River can contribute to hypoxia in the Gulf of Mexico.

Main conservation practices used

Several conservation practices have been implemented over time, including vegetated drainage ditches and conservation tillage. Multiple studies have assessed effectiveness of practices for improving both runoff and lake water quality, such as:

- edge-of-field grass filter strips, late 1990's;
- 215-acre Conservation Reserve Program (CRP) and constructed wetland, 2004-2005;
- mixed-vegetated quail habitat buffer, 2008; two-stage sediment retention pond, 2010.



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Outcomes/Findings

Plot and field scale

- CRP reduced runoff sediment by more than 90% and reduced Total Nitrogen (TN) and Total Phosphorus (TP) by 50-100%. Mixed vegetation buffers reduced runoff sediment by 34-70% but TN and TP reductions varied greatly.
- Integrated conservation practices of vegetated drainage ditches and a sediment retention pond reduced runoff sediment by 69% while TN and TP reductions were 30-50%.
- A three-stage vegetated constructed wetland reduced runoff herbicides atrazine by 70-89% and fluometuron by 58-81% and reduced runoff of the insecticide diazinon by over 95%.

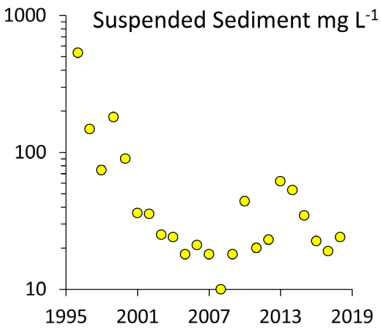
Watershed scale

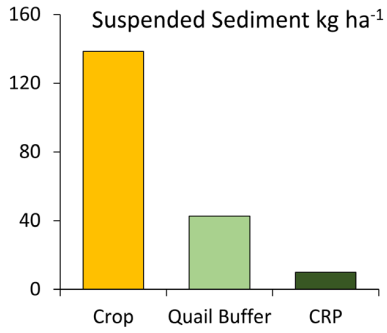
- Multiple integrated conservation practices implemented across the watershed reduced lake suspended sediment by more than 60% and increased water clarity by more than 100%.
- Watershed-wide conservation practices reduced lake water TP by 50-70% and nitrate-nitrogen by more than 80%, but TN was unaffected.
- The Annualized Agricultural Non-Point Source (AnnAGNPS) model predicts that no-till and cover crops will reduce runoff sediment and nutrients by 20-75% even with the coming climate change.

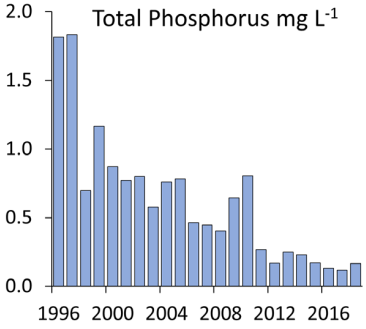
Ecology

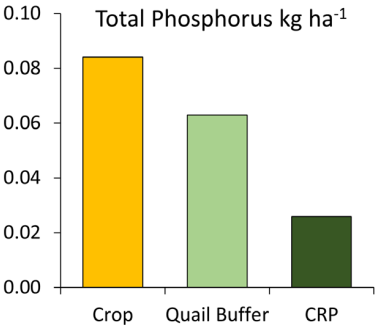
- Conservation practices more than doubled lake fishery production and the lake currently supports a healthy self-sustaining bass population.
- Conservation practices decreased pesticide toxicity in lake sediments by 40-70% and reduced pesticides in crustacean tissues by more than 80%.

Clockwise from left: Jason Taylor measures lake fishery production, Wade Steinriede collects lake water samples, Richard Lizotte measures wetland plant diversity, view of Beasley Lake from an edge-of-field buffer.









Collaborators and Stakeholders

More Information

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